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Supporting documentation – Committee papers

The enclosed documents were considered by the NICE medical technologies advisory committee (MTAC) when making their draft recommendations:

1. **EAC assessment report** – an independent report produced by an external assessment centre who have reviewed and critiqued the available evidence.
2. **Assessment report overview** – an overview produced by the NICE technical lead which highlights the key issues and uncertainties in the company's submission and assessment report.
3. **Scope of evaluation** – the framework for assessing the technology, taking into account how it works, its comparator(s), the relevant patient population(s), and its effect on clinical and system outcomes. The scope is based on the sponsor's case for adoption.
4. **Adoption scoping report** – produced by the adoption team at NICE to provide a summary of levers and barriers to adoption of the technology within the NHS in England.
5. **Sponsor submission of evidence** – the evidence submitted to NICE by the notifying company.
6. **Expert questionnaires** – expert commentary gathered by the NICE team on the technology.
7. **EAC correspondence log** – a log of all correspondence between the external assessment centre (EAC) and the company and/or experts during the course of the development of the assessment report.
8. **Company fact check comments** – the manufacturer's response following a factual accuracy check of the assessment report.

Please use the above links and bookmarks included in this PDF file to navigate to each of the above documents.

Document cover sheet

Assessment report: Plus Sutures for preventing surgical site infection (MT507)

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EAC sign-off: Andrew Sims

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Medical technologies guidance
MT507 Plus Sutures for preventing surgical site infection
External Assessment Centre report

Produced by: Newcastle External Assessment Centre

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Purpose of the assessment report

The purpose of this External Assessment Centre (EAC) report is to review and critically evaluate the company's clinical and economic evidence presented in the submission to support their case for adoption in the NHS. The report may also include additional analysis of the submitted evidence or new clinical and/or economic evidence. NICE has commissioned this work and provided the template for the report. The report forms part of the papers considered by the Medical Technologies Advisory Committee when it is making decisions about the guidance.

Declared interests of the authors

Description of any declared interests with related companies, and the matter under consideration. See NICE's Policy on managing interests for board members and employees.

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Responsibility for report

The views expressed in this report are those of the authors and not those of NICE. Any errors are the responsibility of the authors.

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Abbreviations

Term	Definition
AE	Adverse event
CABG	Coronary artery bypass graft
CAS	Chemical abstract service
CCA	Cost consequence analysis
CDC	Centre for Disease Control
CHEERS	Consolidated Health Economic Evaluation Reporting Standards
CI	Confidence interval
CrI	Credible interval
DSA	Deterministic sensitivity analysis
EAC	External Assessment Centre
HES	Hospital Episodes Statistics
HRG	Healthcare resource group
ICU	Intensive care unit
LoS	Length of stay
MAUDE	Manufacturer and User Facility Device Experience Database
MIB	Medtech Innovation Briefing
MTEP	Medical Technologies Evaluation Programme
NICE	National Institute for Health and Care Excellence
NICE CG	NICE clinical guideline
NICE MTG	NICE medical technology guidance
OR	Odds ratio
PHE	Public Health England
PLICS	Patient Level Information and Costing System
PRESS	Peer Review of Electronic Search Strategies
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSA	Probabilistic sensitivity analysis
RCT	Randomised controlled trial
ROBIS	Risk of bias in systematic reviews
RR	Risk reduction
SLR	Systematic literature review
SSI	Surgical site infection
SSISS	Surgical site infection surveillance service
VAS	Visual analogue scale
vs	Versus

Executive summary

Plus Sutures are absorbable surgical sutures coated with the antibacterial agent triclosan. Three sutures were considered within the scope: PDS Plus, MONOCRYL Plus and VICRYL Plus. These have varying absorption rates, but otherwise are considered equivalent in their antibacterial properties. There are non-triclosan coated versions available for each of the three above mentioned sutures. The claimed benefits of Plus Sutures are that the technology reduces the incidence of surgical site infection (SSIs), with resultant benefits for the patient and healthcare system.

The company performed a high-quality, systematic literature search that identified 31 randomised controlled trials (RCTs) as being relevant to the decision problem. The EAC could not improve on the search and so it was not repeated. The EAC excluded three RCTs that were primarily focussed on the barbed suture STRATAFIX due to these being considered out of scope. Three additional studies were included by the EAC, meaning 31 studies in total informed this assessment, 30 of which reported on unique patients. The EAC was satisfied no relevant studies had been omitted.

The studies were heterogeneous in nature and were performed in a range of clinical settings and procedural specialties, which were categorised as being in adults or children and resulting in clean or non-clean wounds. Studies ranged in size from n=20 to n=2,546, and in total over 14,000 unique patients were included. The EAC considered eight studies were high-quality (low-risk of bias), six were moderate quality, and 16 were low-quality (high-risk of bias). Nearly all the studies reported on the post-operative incidence of SSI according to Centre for Disease Control (CDC) or related criteria as their primary outcome. Most studies reported numerical reductions in this outcome, but many did not find a statistically significant effect size (risk reduction) when considered individually.

The company performed a series of meta-analyses adopting the relative risk reduction (RR) as the synthesised outcome. The EAC replicated these analyses, repeated the adult subgroup analysis to include one additional study (Ruiz-Tovar et al., 2015), and adopted the random effects model for reporting of results. In the base case (n=28 studies), the RR associated with Plus Sutures was 0.71 (95% CI 0.59 to 0.85). The RR in clean wounds was 0.71 (95% CI 0.53 to 0.96) and in non-clean wounds was 0.67 (95% CI 0.48 to 0.92), with greater absolute reductions in SSI in the latter due to the higher baseline rates. The EAC undertook additional meta-analyses by investigating the effect of stratifying data by study quality, size, and location (UK or non-UK). The EAC was confident that overall, the aggregated data showed that the addition of triclosan to the sutures reduced the SSI rate.

The company identified eight economic studies from the literature search that were relevant to the decision problem. All the economic studies reported potential cost-savings due to reduced SSIs associated with the use of Plus Sutures. However, none were fully generalizable to NHS practice of England.

The company provided a *de novo* economic model in Microsoft Excel in the form of decision tree, with results reported within a cost-consequence framework from the perspective of the NHS. The clinical effectiveness of Plus Sutures was aligned with data reported in the company's meta-analyses. Other clinical parameters and costs were derived from appropriate sources and generally considered to be conservative. The company conducted extensive deterministic sensitivity analysis (DSA), and probabilistic sensitivity analyses (PSA, on the base case only). The EAC replicated the company's model in R and adjusted some of the parameter inputs, principally by removing data pertaining to STRATAFIX sutures, using the relative risks calculated from the random effects meta-analysis and by using a fixed technology cost from published data, rather than a sales volume weighted average cost that included STRATAFIX. The EAC also performed PSA in all the scenarios in order to fully explore the uncertainty involved.

The company reported that Plus Sutures were associated with cost-savings in the base case scenario, other scenarios, and with all plausible DSA and PSA undertaken. The EAC found that the base case cost saving (N=28 studies), was £13.60 (95% CrI £4.71 to £23.15). There was some uncertainty in the cost-saving potential of Plus Sutures when used in procedures with clean wounds, such as knee or hip replacement, with a cost saving of £9.30 (95% CrI -£2.24 to £19.26). The EAC performed additional scenario analyses by stratifying RR data based on study quality, size, and location; this resulted in the CrI crossing zero, likely related to reducing the sample size and consequently the power and precision of the analysis. However, the EAC noted that in all scenarios, the point estimate favoured Plus Sutures and the probability of Plus Sutures being cost-saving was 73.8% or greater.

Overall, the EAC was satisfied that the use of Plus Sutures is associated with a reduction in the incidence of SSIs. No evidence was found for significant adverse events or contraindications to using Plus Sutures, and the potential negative consequences of adoption are low (incrementally increased technology cost). As with all infection control measures, Plus Sutures should be used as part of an overall bundle of care packages designed to reduce SSIs and hospital acquired infections.

1 Decision problem

Changes to the decision problem made by the company, with EAC comments, are reported in Table 1.1. There were no changes made to the decision problem by the company other than the addition of STRATAFIX sutures. However, these sutures feature a barbed knot design and have a different mechanism of action from the other Plus Sutures that are the subject of this assessment. NICE clinical experts were unanimous that, for this reason, direct comparisons cannot be made with the other sutures, stating "it would not be possible to isolate the additional effect of triclosan when making comparisons with standard sutures. [We] would need to compare STRATAFIX Plus Suture with an equivalent barbed suture without triclosan for the same indication for fair comparison. Barbed sutures are used for different indications to standard sutures" (EAC external correspondence log, 2021). The majority of STRATAFIX sutures are triclosan coated, and studies comparing coated and uncoated STRATAFIX sutures are lacking. Therefore the EAC has excluded further analysis on STRATAFIX sutures.

It was confirmed that the three versions of Plus Sutures included, which were PDS Plus Antibacterial (polydioxanone) Suture; MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture; and Coated VICRYL Plus Antibacterial (polyglactin 910) Suture, were functionally equivalent for the purposes of this assessment (EAC external correspondence log, 2021). In their submission the company noted that the "three suture polymers have different physical and absorption properties, providing hospitals and healthcare professionals the choice of suture most suitable for their patient, procedure and tissue to be sutured (based on tissue healing time); the addition of triclosan does not impact intraoperative handling or absorption profile (Barbolt, 2002), therefore no additional specific training is required to use Plus Sutures".

The EAC noted that the principal outcome reported in studies was the incidence of surgical site infections (SSIs). This outcome also solely informed the company's meta-analyses and economic submission. The standard definition of a SSI, also adopted by Public Health England (PHE), is derived from the Center for Disease Control (CDC) in the US (Center for Disease Control, 2021). For superficial SSIs, a timeframe of within 30 days of the procedure is used. For SSIs caused by deep incisions, a timeframe of 30 or 90 days is adopted. The majority of studies in this field have adopted the CDC criteria for SSIs.

Other outcomes listed in the scope were less frequently reported in the primary studies and did not inform the meta-analyses or the economic model. It is acknowledged that the nature and severity of SSIs is heterogeneous, and there is a lack of consistency on how SSIs are classified. For instance, the ASEPSIS validated scoring system was developed in 1986 (Wilson *et al*., 1986) but is not widely used in

the NHS (EAC external correspondence log, 2021). Issues concerning the costs associated with SSIs are discussed in Section 9.2.6.

Table 1.1. Scope of the decision problem.

Decision problem	Scope	Proposed variation in company submission	EAC comment
Population	Adults and children that need wound closure after a surgical procedure and in whom absorbable sutures are an appropriate option.	No variation.	
Intervention	• PDS Plus Antibacterial (polydioxanone) Suture • MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture • Coated VICRYL Plus Antibacterial (polyglactin 910) Suture	"The STRATAFIX™ barbed design for knotless suturing has been included within the clinical and economic evidence in this submission". Rationale: "Plus technology is inclusive of the STRATAFIX range, and is described within the main section of the NICE scope. Meta-analysis is presented both with and without STRATAFIX"	The 3 Plus Suture technologies were regarded as functionally equivalent. The STRATAFIX variant of the technology was not included in the decision problem of the final scope (§2) (NICE, 2021b). The EAC has excluded STRATAFIX and all studies that primarily reported on barbed variants of the sutures. This approach was agreed with NICE clinical advisers (EAC external correspondence log, 2021).
Comparator(s)	Sutures that do not contain an antibacterial agent.	No variation.	
Outcomes	The outcome measures to consider include: • incidence of SSI • type of SSI • length of post-operative stay in hospital relating to SSI • readmission related to SSI • antibiotics use for SSI (including prescription, duration and dose) • Severity of SSI using validated scoring systems such as ASEPSIS (additional treatment, serous discharge, erythema, purulent exudate, separation of tissues, isolation of bacteria, stay duration as	No variation.	The EAC notes that by far the most reported outcome was the incidence of SSIs. This was also the only outcome that informed the company's meta-analyses and economic model.

	an inpatient) wound score. • incidence of wound dehiscence (wound opening) • patient reported pain or discomfort • device-related adverse events.		
Subgroups	• Adults • Children • Clean wound procedures • Non-clean wound types	No variation.	

2 Overview of the technology

The company described the technology in Section 3 of the Clinical Submission. All necessary regulatory documentation was provided by the company. Plus Sutures are CE-marked (Medical Device Directive) class III medical devices. The following is a brief overview of the technology.

Plus Sutures (Ethicon, Johnson & Johnson Medical Ltd) are synthetic, absorbable sutures that are coated with the antibacterial agent triclosan. Triclosan protects against most common organisms associated with surgical site infection (SSI), such as *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella pneumoniae*. Three suture devices are included in the decision problem of the final scope. These differ primarily on the rates of reabsorption of the suture (and therefore are indicated in different tissue types):

- Ethicon PDS Plus Antibacterial (polydioxanone) Suture
- Ethicon MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture
- Ethicon Coated VICRYL Plus Antibacterial (polyglactin 910) Suture.

PDS Plus and MONOCRYL Plus are monofilament sutures made from polyester and poliglecaprone 25 copolymer, respectively. Both contain no more than 2,360 micrograms/m triclosan. VICRYL Plus is a multifilament suture made from a copolymer of glycolide and lactide and contains no more than 472 micrograms/m triclosan. VICRYL Plus is also designed to further support the suture with a coating of copolymer, calcium stearate and triclosan. The regulatory certificates state that the safety and effectiveness of VICRYL Plus sutures in cardiovascular tissue, ophthalmic surgery and neurological tissue has not been established.

The absorption rate varies between versions. VICRYL Plus Sutures are absorbed between 56 and 70 days, MONOCRYL Plus Sutures are absorbed between 91 and 119 days and PD Plus Sutures are absorbed between 182 and 238 days. The absorption rates and handling properties are the same as non-triclosan sutures. The technology is designed to inhibit bacterial colonisation of the suture for seven days or more.

The company reports that Plus Sutures are the only triclosan coated sutures on the market that are CE marked and FDA approved (EAC external correspondence log, 2021). They are indicated for wound closure in adults and children. The only contraindication to Plus Sutures is a known allergy to triclosan. However, in practice, such a documented allergy is unusual and rarely encountered in clinical practice (EAC external correspondence log,

2021). Absorbable sutures, including Plus Sutures, may not be appropriate for older people, or people who are malnourished, debilitated or have conditions that could delay wound healing (Section 3.1).

The EAC considers Plus Sutures innovative because of their triclosan coating, which may reduce the incidence of SSIs. All associated benefits claimed by the company for Plus Sutures relate directly or indirectly to their potential to reduce SSI incidence. This includes reduced hospital length of stay (LoS) or readmission; reduced antibiotic prescribing; and overall healthcare cost savings. Ethicon currently has about [redacted] of the global and UK market share in absorbable sutures, with Plus Sutures representing about [redacted] of this figure in the UK (EAC external correspondence log, 2021).

3 Clinical Context

The company has adequately described the clinical context of the technology in Section 3 of the Clinical Submission. Plus Sutures are offered by the company for all surgical procedures where their non-Plus equivalents are indicated, with the exception of the patient having a known allergy to triclosan (EAC external correspondence log, 2021).

Triclosan coated sutures may reduce the risk of SSI as part of an overall package of infection prevention (EAC external correspondence log, 2021). Prevention of SSIs is described in NICE guidance *Surgical site infections: prevention and treatment* (NG125) (NICE, 2019a). Positive recommendations for reducing the incidence of SSIs involve three phases of management:

- Preoperative phase, including: nasal decolonisation using a chlorhexidine body wash; use of specific patient and staff theatre wear; minimisation of movement of non-theatre staff; removal of hand jewellery, artificial nails, and nail polish; use of antibiotic prophylaxis.

- Intraoperative phase, including: hand decontamination; use of sterile gowns and gloves; antiseptic skin preparation; maintenance of patient homeostasis (including prevention of hypothermia); suitable use of closure methods and wound dressing.

- Post-operative phase, including: suitable methods for dressing changes; appropriate wound dressings; antibiotic treatment if there are signs of SSI; and having access to specialist wound care settings.

Regarding the use of triclosan coated sutures (i.e. Plus Sutures), NG125 states:

> "1.3.20 When using sutures, consider using antimicrobial triclosan-coated sutures, especially for paediatric surgery, to reduce the risk of surgical site infection [2019]".

This recommendation was made on the basis of an evidence review consisting of a systematic review and meta-analyses on Plus Sutures (Appendix D) (NICE, 2018).

3.1 *Special considerations, including issues related to equality*

The Scope for the technology states the following:

"[The technology] should not be used in people with known allergies to triclosan. All absorbable sutures, including Ethicon Plus Sutures, may not be

appropriate for older people; age is a protected characteristic under the 2010 Equalities Act. The company's product information manual advises that the use of all absorbable sutures, including Ethicon Plus Sutures, may also not be appropriate for people who are, malnourished, debilitated or people with conditions that may prevent wound healing. In some cases, these people may be classed as disabled; disability is a protected characteristic under the 2010 Equalities Act".

The EAC has not identified any further equality issues.

4 Clinical evidence selection

4.1 *Evidence search strategy and study selection*

The company search strategy was peer reviewed using the PRESS tool (McGowan *et al*., 2016). Details are reported in Appendix A. It was clear that a rigorous search process had been carried out and that the search strategy was developed by an information specialist and peer reviewed by another, which is the method recommended by the Cochrane Handbook *(Higgins et al.*, 2019) (section 4.48).

The search concepts “sutures” and “triclosan coating” were appropriate and were developed extensively comprising a range of synonyms and incorporating a wide range of search fields. A range of terms were used for each product including Chemical Abstract Service (CAS) registry numbers and alternative product names/codes. A broad range of databases had been searched, no additional relevant sources were identified. Detailed notes were added where appropriate to indicate where the search had been altered on translation and why this was necessary.

The EAC “snowballed” peer-reviewed systematic reviews (i.e. retrieved papers identified in the bibliographies of reviews) (Ahmed *et al*., Apisarnthanarak *et al*., 2015, de Jonge *et al*., 2017, Leaper *et al*., 2017, Onesti *et al*., 2018, Wu *et al*., 2017) identified by the MedTech Innovation Briefing (MIB204) (NICE, 2020), and NG125 (NICE, 2018) as an additional safeguard to ascertain if any relevant studies had been omitted. The EAC was satisfied no important studies had been omitted (Appendix C).

As no changes were necessary to this search strategy, following discussion with NICE, a search focussing on adverse events relating to the technology identified in any study design (i.e. not restricted to randomised controlled trial (RCTs)) was developed (EAC external correspondence log, 2021). However, the EAC notes that information regarding adverse events is not always found in published literature. These searches are intended to support other investigations into adverse events that are normally conducted. The search terms identified in the company search were utilised and a validated filter to identify adverse event papers was added to focus the results (Golder *et al*., 2019). The search results were limited to 2004 onwards, as this is when the product received a CE mark. Animal studies were excluded as were non-English papers.

The searches were run on 10 March 2021 in Medline (Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) 1946 to March 09, 2021), Embase (Ovid 1996 to 2021 Week 09) and CINAHL (EBSCO). 960 records were retrieved in

total with 608 records remaining after deduplication. Details of the search terms and PRISMA diagram are reported in Appendix D.

4.2 *Included and excluded studies*

The company identified 31 fully published peer-reviewed studies they considered were relevant and in scope of the decision problem. All the studies were RCTs. The EAC has reviewed all these studies and considered three were not in scope (Ruiz-Tovar *et al*., 2020, Sundaram *et al*., 2020a, Sundaram *et al*., 2020b). This was because these studies reported on the use of the STRATAFIX device which was excluded from the assessment (see Section 1). One of these studies reported on a small three-armed RCT that included a secondary comparison of PDS sutures with PDS Plus (Ruiz-Tovar *et al*., 2020). However, it was considered that this study did not contribute to the evidence base in a meaningful way considering the large volume of other studies identified, and it remained excluded.

The EAC identified two additional RCTs through its search for adverse events (Section 6.2). One of these studies was excluded by the company for reasons of "ineligible study design" (Sala-Perez *et al.*, 2016). The other was not identified by the company (Chen *et al*., 2011). The EAC has considered as these were both technically RCTs, they should have been included and the EAC has done so for completeness. However, these were small studies, were poorly reported, were of high risk or unclear risk of bias in most domains, and were in indications of borderline relevance to the decision problem, and therefore have not been included in the EAC's meta-analyses (Section 7). Two studies reported on the same patient population but reported on different surgical incisions: vein harvesting for coronary artery bypass graft (CABG) (Thimour-Bergström *et al*., 2013) or primary closure of the CABG (Steingrimsson *et al*., 2015). These studies were considered independently; thus, 31 studies in total were included by the EAC. The characteristics of the included studies are reported in Table 4.1; further in depth details are reported in the company's submission in Tables 1a to 1c. Characteristics of the three studies that were not included by the EAC are reported in Table 4.2.

Table 4.1. *Studies selected by the EAC as the evidence base.*

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Arslan et al., 2018) Turkey	RCT ☑ Block randomisation at 1:1 ratio, surgeon not blinded (other blinding not explicitly reported). Intervention (n=86): PDS Plus (retention, skin) and VICRYL Plus (subcutaneous) ☑ Comparator (n=91): Prolene (retention, skin) and VICRYL (subcutaneous) ☑	Recruitment between January 2011 and January 2013. Patients aged over 18 years who underwent wide excision and primary closure for pilonidal disease. Setting: general surgery department ☑	SSI (superficial, deep), wound dehiscence (superficial, deep), seroma. Primary and secondary healing rates and time to healing also reported. ☑	All patients were discharged same day after surgery, antibiotics were not continued. Outpatient follow-up at 1, 3, 7, 15 and 30 days post-op.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Baracs et al., 2011) [NCT01123616] Hungary ☑	RCT (multi-centre; 3 university clinics, 4 high-volume hospitals) ☑ Randomisation by software. Intervention (n=188): PDS Plus (abdominal fascia closure), MONOCRYL Plus (skin) ☑ Comparator (n=197): PDS (abdominal fascia closure), MONOCRYL Plus (skin) ☑	Recruitment between December 2009 and November 2010. Patients aged between 18 and 80 with benign or malignant colon or rectal disease undergoing an elective open surgical procedure involving an enterotomy. Setting: general surgery department ☑	Pain scale, SSI, type and quantity of wound discharge (serous, pustulous, feculent), status and penetration of SSI (superficial incisional, deep incisional, abdominal dehiscence), microbiology results (type of bacteria and antibiotics given), number and type of dressings, local lavage, interventions (abdominal lavage, drainage, reoperation), infectious complications of the abdomen (suture insufficiency, abscess, peritonitis) and the number of nursing days. ☑	Patients received antibiotic prophylaxis. Follow-up via telephone at 30 days after discharge. Information collected relating to clinical intervention, outpatient registration attributable to late SSI or readmission.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Diener et al., 2014) Germany	RCT (multi-centre; 24 hospitals) Permuted-block randomisation of 1:1 ratio, block size of 4. Triple-blinded. ☑ Intervention (n=587, per protocol=451): PDS Plus (abdominal fascia closure) ☑ Comparator (n=598, per protocol=462): PDS II (abdominal fascia closure) ☑	Recruitment from April 2010 (single-centre trial) and January 2011 (multi-centre) until April 2013. Patient 18 years old and over, undergoing elective midline abdominal laparotomy for any reason. Setting: general surgery department ☑	SSI (superficial, deep), wound dehiscence (cutaneous and subcutaneous), burst abdomen (fascial dehiscence), intensive care unit days, postoperative hospital days, 30-days mortality, quality of life (EQ-5D). ☑	Patients received antibiotic prophylaxis. Follow-up on day 10 or on day of discharge (whichever first), and day 30. Photographs of wound uploaded and assessed by validation committee.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Ford et al., 2005) US	RCT (single centre) Randomised 2:1 ratio. Surgeons were blinded. ☑ Intervention (n=98): VICRYL Plus ☑ Comparator (n=49): VICRYL ☑	Patients aged 1 to 18 years scheduled for general clean or clean-contaminated surgical procedures. Setting: paediatric surgery ☑	Overall assessment of intraoperative handling of suture (including, and assessed separately: ease of passage through tissue, first-throw knot holding, knot tie-down smoothness, knot security, surgical hand, memory, lack of fraying), wound healing (healing progress, infection, edema, erythema, skin temperature, seroma, suture sinus, pain), adverse events. ☑	Wound healing evaluated at follow-up visits at 1-2 days, 14 (+/- 2 days), and 80 (+/- 5 days) post implantation.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Galal and El-Hindawy, 2011) Egypt	RCT (single centre) Randomisation by computer-generated list. Double-blinded ☑ Intervention (n=230): VICRYL Plus (all surgical steps except in some cases polypropylene was used for laparotomy closure and vascular suture), MONOCRYL (skin) ☑ Comparator (n=220): VICRYL (used in all surgical steps except in some cases polypropylene was used for laparotomy closure and vascular suture), MONOCRYL (skin) ☑	Patients of any age, sex, and risk factors undergoing a surgical intervention. Setting: general surgery department ☑	SSI Postoperative hospital days, cost and healthcare resources also reported. ☑	During hospital stay reviewed daily. Followed via outpatient clinical weekly for 30 days, then monthly until end of first year in prosthetic surgeries.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Ichida et al., 2018) Japan	RCT (single centre) Permuted-block randomisation, 1:1 ratio, block size of 2. Double-blinded ☑ Intervention (n=508): VICRYL Plus (abdominal fascia and peritoneum), PDS plus (skin) ☑ Comparator (n=505): VICRYL and PDS II ☑	Recruitment between March 2014 and February 2017. Patients undergoing gastroenterologic surgery. Setting: general surgery department ☑	SSI (superficial, deep) ☑	Patients received antibiotic prophylaxis. Patients undergoing elective colorectal resection underwent preoperative bowel preparation using antibiotics and oral laxatives. Follow-up daily during hospital stay, and monitored at outpatient clinic for up to 30 days after discharge.
(Isik et al., 2012) Turkey	RCT (single centre) Sequential randomisation, double blinded, 1:2 ratio ☑ Intervention (n=170) VICRYL Plus ☑ Comparator (n=340) VICRYL ☑	Recruitment between April 2008 and September 2009. Patients undergoing cardiac surgery Setting: private hospital ☑	Wound assessment (wound discharge, exudates, wound integrity, swelling, redness, pain, sensitivity, and signs of inflammation), infection. ☑	Daily wound assessment after surgery, and follow-up at cardiac rehabilitation department every 10 days after discharge for 1 month

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Justinger et al., 2013) [NCT00998907] Germany	RCT (single centre) Double-blind, randomised in blocks of 50 to 100. ☑ Intervention (n=485): PDS Plus ☑ Comparator (n=371): PDS II ☑	Recruitment between September 2009 and September 2011. Patients aged 18 years and older, scheduled for open abdominal exploration and surgery and closure, accessed via midline or transverse abdominal incision, primary fascial closure. Setting: general and visceral surgery departments. ☑	SSI ☑	Patients received antibiotic prophylaxis. All patients undergoing colorectal resections had a preoperative bowel preparation with 3 L of prepacol. Wounds assessed during hospital stay and during follow-up 2 weeks postoperatively.
(Karip et al., 2016) Turkey	RCT (single centre) Double blinded, 1:1 ratio, randomised by software. ☑ Intervention (n=54): MONOCRYL Plus ☑ Comparator (n=52): MONOCRYL ☑	Recruitment between October 2012 and May 2013. Patients aged between 18 and 55 years old, scheduled for pilonidal sinus excision followed by Karydakis flap repair. Setting: general surgery clinic of training and research hospital. ☑	Infection rates, wound dehiscence 1-2 weeks after surgery, recurrence rates. ☑	Patients received antibiotic prophylaxis. Follow-up at 1 week, 2 weeks, 1, 3 and 6 months after surgery.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Lin et al., 2018) [NCT02533492] Taiwan	RCT (single centre) Double-blinded ☑ Intervention (n=51): VICRYL Plus (arthrotomy, fascial layer, subcutaneous wound closure) ☑ Comparator (n=51): VICRYL (arthrotomy, fascial layer, subcutaneous wound closure) ☑	Recruitment between June 2011 and May 2012. Patients aged between 55 and 85 years old, diagnosed with degenerative osteoarthritis of the knee, and not having previously undergone surgery to the index knee. Setting: orthopaedic surgery department ☑	SSI, length of hospital stay, pain (VAS), functional scores (knee range of motion, SF-12), wound condition (wound drainage, extent of erythema, local heat, skin surface temperature), inflammatory markers (CRP, ESR and IL-6). ☑	Patients received antibiotic prophylaxis. Follow-up at day 1 and 3, weeks 2 and 4, and months 3 and 6 postoperatively.
(Mattavelli et al., 2015) [NCT01869257] Italy	RCT (multi-centre; 4 university referral hospitals) Computerised randomisation, 1:1 ratio. ☑ Intervention (n=140): VICRYL Plus (peritoneum, subcutaneous fat tissue (surgeon preference, skin), PDS Plus (fascia) ☑ Comparator (n=141): VICRYL (peritoneum, subcutaneous fat tissue (surgeon preference), skin), PDS II (fascia) ☑	Recruitment between January 2010 and March 2013. Patients aged 18 years and older, candidates for elective colorectal resection with a clean-contaminated field. Setting: general surgery department ☑	SSI rates (superficial incisional, deep incisional), hospital length of stay, overall incision complication rate (skin swelling, redness, haematomas, seromas). ☑	Patients received antibiotic prophylaxis. Bowel preparation with 3L of an iso-osmotic solution was carried out in candidates for rectal resection. Follow-up of incision every other day until hospital discharge, and weekly until 30 days after discharge.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Mingmalairak et al., 2009) Thailand	RCT (single centre) Double-blinded ☑ Intervention (n=50): VICRYL Plus ☑ Comparator (n=50): VICRYL ☑	Recruitment between August 2006 and March 2007. Patients aged between 15 and 60 years old, undergoing appendectomy (including acute appendicitis and ruptured appendix). Setting: general surgery department ☑	SSI rates. Length of hospital stay also reported. ☑	Patients received antibiotic prophylaxis. Follow-up at 1, 3, 7, 14, 30 days and at 6, 12 months post-operatively.
(Nakamura et al., 2013) Japan	RCT (single centre) Single-blind (assessment of wounds) ☑ Intervention (n=206): VICRYL Plus (abdominal) ☑ Comparator (n=204): VICRYL (abdominal) ☑	Recruitment between April 2009 and March 2011. Patients undergoing elective colorectal surgery. Setting: private hospital ☑	Wound infection rates, hospital stay, hospital cost from infected wound management ☑	Patients received antibiotic prophylaxis. Daily follow-up during hospital stay, and at outpatient clinic weekly up to 30 days after discharge.
(Olmez et al., 2019) Turkey	RCT Randomisation by computer-generated list. ☑ Intervention (n=445): PDS Plus (fascia), no suture used to close subcutaneous tissue, polypropylene (skin) ☑ Comparator (n=445): PDS II (fascia), no suture used to close subcutaneous tissue, polypropylene (skin) ☑	Recruitment between June 2013 and June 2014. Patients aged 18 years and older, undergoing elective or urgent gastrointestinal surgery. Setting: general surgery and gastrointestinal surgery departments ☑	SSI, occurrence of incisional hernia, length of hospital stay, length of ICU stay ☑	Patients received antibiotic prophylaxis. Follow-up every day during hospital stay and at 7 (early onset), 14 and 30 days post-operatively.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Rasić et al., 2011) Croatia	RCT (single centre) Computerised block randomisation, blocks of 10. ☑ Intervention (n=91): VICRYL Plus (peritoneum, muscle, fascia) ☑ Comparator (n=93): VICRYL (peritoneum, muscle, fascia) ☑	Recruitment between September 2008 and September 2009. Patients with colorectal cancer scheduled for elective surgery. Setting: general surgery department ☑	Duration of operation, length of hospital stay, biochemical inflammation parameters (white blood cell count, procalcitonin, CRP), wound infection, dehiscence, haematoma, inflammatory reactions to skin sutures, postoperative hernias, readmissions and reoperations. ☑	Patients received antibiotic prophylaxis. Follow-up throughout hospital stay, and up to 14 days post-operation

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Renko et al., 2017) [NCT01220700] Finland	RCT (single centre) Double-blinded, 1:1 ratio, permuted block randomisation using computer-generated list, blocks of 4. ☑ Intervention (n=778, n=636 per protocol): VICRYL Plus, MONOCRYL Plus, or PDS Plus, depending on desired resorption time. ☑ Comparator (n=779, n=651 per protocol): VICRYL, MONOCRYL, or PDS depending on desired resorption time. ☑	Recruitment between September 2010 and December 2014. Patients aged less than 18 years, admitted to the paediatric surgery and orthopaedic wards scheduled for day time surgery for any elective or emergency surgical intervention. After six months, some exclusions were applied due to different suture resorption requirements. Setting: paediatric surgery unit ☑	SSI (superficial, deep), wound dehiscence, culture findings, courses of antimicrobials, number of extra visits, resorption issues, problems reported by parents, surgical duration, use and timing of anti-microbial prophylaxis. ☑	Follow-up emailed questionnaires at 10 and 30 days post-operatively (telephone calls to those not replying, any wound problems included check-up visits, medical records for visits to other healthcare providers requested).

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Rozzelle et al., 2008) USA	RCT (single centre) Double blinded, stratified randomisation (weight, age, recent shunt infection) ☑ Intervention (n=46 procedures): VICRYL Plus (galea, fascia), MONOCRYL (skin) ☑ Comparator (n=38 procedures): VICRYL (galea, fascia), MONOCRYL (skin) ☑	Recruitment between April 2005 and December 2006. Patients of all ages requiring CSF shunt implantation or revision surgery. Setting: neurosurgery department ☑	Shunt infection, procedure duration ☑☒	Patients received antibiotic prophylaxis. Follow-up at 6 months (noting that all patients undergoing revision after treatment of infection, or after 6 months were re-randomised. Those undergoing revision within six months with negative cultures were re-enrolled to the same group.)
(Ruiz-Tovar et al., 2020) Spain	RCT (multi-centre) Randomisation via sequentially numbered container method, stratified by faecal peritonitis aetiology (acute diverticulitis perforation, neoplastic tumour perforation, colorectal anastomotic leak). Follow-up assessment blinded ☑ Intervention (n=50): Triclosan polyglactin 910 sutures (fascia), staples (skin closure) ☑ Comparator (n=51): Polyglactin 910 (fascia), staples (skin closure) ☑	Recruitment between November 2007 and November 2013. Patients with intraoperative diagnosis of faecal peritonitis secondary to acute diverticulitis perforation, neoplastic tumour perforation, or colorectal anastomotic leak of previous elective colorectal resection. Setting: general surgery department ☑	Incisional SSI (deep, superficial), mortality, length of hospital stay. ☑	Patients received antibiotic prophylaxis. Follow-up at days 5, 30 and 60 post-operation.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Santos et al., 2019) Brazil	RCT (single centre) Double-blinded, computerised block randomisation, block sizes of 2, 4 or 6. ☑ Intervention (n=251): VICRYL Plus (saphenectomy) ☑ Comparator (n=257): VICRYL (saphenectomy) ☑	Recruitment between February 2011 and June 2014. Patients older than 30 years of age, undergoing saphenectomy during CABG with and without cardiopulmonary bypass. Setting: cardiovascular surgery department ☑	Wounds (pain, dehiscence, erythema, infection, necrosis, hyperthermia), ☑	Follow-up at days 7, 14 and 30 post-operatively.
(Seim et al., 2012) Norway	RCT (single centre) Randomisation using sealed envelopes ☑ Intervention (n=160): VICRYL Plus (leg wound) ☑ Comparator (n=163): VICRYL (leg wound) ☑	Recruitment between September 2009 and September 2011. Patient undergoing elective CABG. Setting: cardiothoracic surgery department ☑	SSI (wound integrity, exudates, signs of infection), blood results (haemoglobin, C-reactive protein, white blood cells, glucose and creatinine) ☑	Patients received antibiotic prophylaxis. Follow-up 3 days post-operatively and via registration form at 4 weeks (suspected infections were told to be examined by GP).
(Soomro et al., 2017) Pakistan	RCT (single centre) ☑ Intervention (n=189): Triclosan sutures ☑ Comparator (n=189): Non-triclosan sutures ☑	Study ran between September 2015 and March 2016. Patients aged between 20 and 35 years, with benign breast disease (e.g. fibroadenoma). Setting: general surgery department, breast unit ☑	SSI, wound complication ☑	Patients received antibiotic prophylaxis. Follow-up at day 3, 7 and 30 post-operation

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Sprowson et al.) [ISRCTN 17807356] UK	RCT (multi-centre) Double-blinded, quasi-randomised, block allocation (monthly blocks) ☒☑ Intervention (n=1164): VICRYL Plus (surgical preference ranging from deep fascia to subcutaneous layer) ☑ Comparator (n=1273): VICRYL (surgical preference ranging from deep fascia to subcutaneous layer) ☑	Recruitment between May 2008 and November 2013. Patients aged over 18 years, undergoing primary total hip or total knee arthroplasty. Setting: orthopaedic surgery department ☑	Superficial SSI Mortality, length of hospital stay, critical care stay were also reported, and patients were monitored for readmission. ☑	Patients received antibiotic prophylaxis. Follow-up via telephone appointment at 30 days, and completion of questionnaire

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Sukeik et al., 2019) [ISRCTN21430045] UK	RCT (single centre) Double blinded, block randomisation via sealed envelope assignment of letter codes performed with unequal block sizes. ☑ Intervention (n=81): VICRYL Plus (medial parapatellar incision [TKA] or fascia lata [THA], subcutaneous), clips (skin) ☑ Comparator (n=69): VICRYL (medial parapatellar incision [TKA] or fascia lata [THA], subcutaneous), clips (skin) ☑	Recruitment between November 2013 and December 2014. Patients aged 18 years or older, undergoing primary total hip or total knee arthroplasty. Setting: trauma and orthopaedics department ☑	ASEPSIS wound scoring system, wound assessment (erythema, serous discharge, purulent discharge, dehiscence), time for wound closure, length of operation, length of hospital stay, pain (VAS) post-operative complications ☑	Patients received antibiotic prophylaxis. Follow-up on day 2 or 3, and day 4 or 5 (if still in hospital) and at arthroplasty clinic at 2 and 6 weeks post-operatively, questionnaire at 2 months (contacted by telephone if not completed)
(Tabrizi et al., 2019) [NCT03659344] Iran	RCT (multi-centre) Single blind,randomisation by computer-generated list ☑ Intervention (n=160): VICRYL Plus ☑ Comparator (n=160): VICRYL ☑	Recruitment between September 2016 and July 2018. Patients scheduled for surgery of three dental implants in the posterior mandible. Setting: oral and maxillofacial surgery department, and clinic. ☑	Infection, wound dehiscence. Time to infection was also recorded. ☑	Patients received antibiotic prophylaxis. Follow-up visits on days 7, 14, 21 and 28 post-operatively.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Thimour-Bergström et al., 2013) [NCT01212315] Sweden	RCT (single centre) Double-blinded, block randomisation (stratified for diabetes) using sealed envelopes, block size of 25. ☑ [Vein-harvesting leg] Intervention (n=184): VICRYL Plus (subcutaneous), MONOCRYL Plus (intracutaneous) ☑ Comparator (n=190): VICRYL (subcutaneous), MONOCRYL (intracutaneous) ☑	Recruitment March 2009 and February 2012. Patients undergoing elective CABG, either alone or in combination with aortic valve replacement or mitral valve repair/replacement. Setting: cardiothoracic surgery department ☑	SSI in the vein-harvesting leg (superficial, deep) ☑	Patients received antibiotic prophylaxis. Follow-up at days 4 and 30 post-operatively, telephone interview at day 60.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Steingrimsson et al., 2015) [NCT01212315] Sweden	As Thimour-Bergstrom *et al.* (2013) [Sternotomy wound] ☑ Intervention (n=179): VICRYL Plus (fascia, subcutaneous), MONOCRYL Plus (intracutaneous) ☑ Comparator (n=178): VICRYL (fascia, subcutaneous), MONOCRYL (intracutaneous) ☑	As Thimour-Bergstrom *et al.* (2013) ☑	SSI (deep, superficial), ASEPSIS score. ☑	As Thimour-Bergstrom *et al.* (2013)

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Turtiainen et al., 2012) Finland	RCT (multi-centre; three tertiary referral hospitals, two secondary referral hospitals) Double blinded, block randomisation using sealed envelopes, block size of 4. ☑ Intervention (n=139): VICRYL Plus (subcutaneous), MONOCRYL Plus (intracutaneous) ☑ Comparator (n=137): VICRYL (subcutaneous), MONOCRYL (intracutaneous) ☑	Recruitment between July 2010 and January 2011. Adult patients undergoing non-emergency lower-limb arterial surgery. Setting: vascular surgery department ☑	SSI (deep, superficial, graft), complications (cardiac, renal, stroke, graft thrombosis, pneumonia, major amputation) ☑	Patients received antibiotic prophylaxis. Outpatient clinic follow-up for at least 1 month, and until any SSI had healed.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Williams et al., 2011) [NCT00830271] UK	RCT (single centre) Computerised block randomisation, block size of 50. ☑ Intervention (n=66): VICRYL Plus (subcutaneous), MONOCRYL Plus (subcuticular, at discretion of surgeon), adhesive strips (skin) ☑ Comparator (n=61): VICRYL (subcutaneous), MONOCRYL (subcuticular, at discretion of surgeon), adhesive strips (skin) ☑	Recruitment between November 2008 and February 2011. Female patients aged over 18 years with breast cancer undergoing primary elective surgery. Setting: breast surgery (NHS Trust) ☑	SSI, ASEPSIS, Southampton wound score ☑	High risk patients received antibiotic prophylaxis. Follow-up as outpatients or home visit at 2 and 6 weeks post-operatively.
(Zhang et al., 2011) [NCT00768222] China	RCT (multi-centre; 6 hospitals) Computerised block randomisation by site, block size of 4. ☑ Intervention (n=46 per protocol): VICRYL Plus ☑ Comparator (n=43 per protocol): Chinese silk ☑☒	Recruitment between October 2008 and May 2009. Female patients aged 18 years and older scheduled for clean modified radical mastectomy Setting: general surgery department ☑	Cosmetic outcome (VAS), modified Hollander Cosmetic Scale score, SSI (superficial, deep, organ), ASEPSIS wound score, wound and device adverse events. ☑	Follow-up at days 3, 5, 7, and approximately 12, 30 and 90 post-operatively.

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Chen et al., 2011) Taiwan	RCT (single centre) ☑ Intervention (n=112): VICRYL Plus ☑ Comparator (n=129): Chinese silk ☑☒	Recruitment January 2007 to December 2009. Patients receiving reconstructive surgery after wide excision head and neck cancer. Setting: tertiary care. ☑	Bacterial count (isolated bacterial species). ☑	Identified as part of the EAC literature search for adverse events. Not eligible for meta-analyses.
(Sala-Perez et al., 2016) Spain.	"Split-mouth" prospective clinical controlled study. Single centre ☑☒ Intervention (n=20): MONOCRYL Plus sutures ☑ Comparator (n=20): Chinese silk ☑☒	Patients requiring removal of impacted molar. ☑	Bacterial count (isolated bacterial species). ☑	Identified as part of the EAC literature search for adverse events. Not eligible for meta-analyses.
Key: ☑ aspect of study in scope; ☒ aspect of study in scope ☑☒ aspect of study partially in scope, or elements of this are not in scope. Abbreviations: CRP. C-reactive protein; CABG, coronary artery bypass graft; CSF, cerebrospinal fluid; ESR, erythrocyte sedimentation rate; IL-6, interleukin; SSI, surgical site infection; VAS, visual analogue scale.				

Table 4.2. *Studies included by company and excluded by the EAC.*

Study name and location	Design and intervention(s)	Participants and setting	Outcomes	EAC comments
(Ruiz-Tovar et al., 2020) [NCT03763279] Spain	RCT (multi-centre) Randomisation by random-number table, follow-up assessment blinded ☑ Intervention (n=47): STRATAFIX symmetric (fascia), staples (skin closure) ☒ Intervention (n=45): PDS Plus (fascia), staples (skin closure) ☒☑ Comparator (n=47): PDS (fascia), staples (skin closure) ☑	Recruitment between November 2018 and March 2019. Patients undergoing emergent surgery by laparotomy and midline approach for community-acquired infection, peritoneal contamination secondary to perforation of the digestive tract, and ischemia of a segment of digestive tract requiring resection. Setting: general surgery department ☑	Incisional SSI (deep, superficial), evisceration, mortality, duration of hospital stay, post-operative pain (VAS), biochemical inflammation markers (CRP, fibrinogen, lactate, white blood cell count), integrity of bowel wall. ☑	Patients received antibiotic prophylaxis. Follow-up daily during hospital stay and in outpatient clinic at 30 days, pain and biochemical markers assessed 48 hours post-operatively.

(Sundaram et al., 2020a) [NCT03285529] USA	RCT (single centre) Single blinded, computerised randomisation in 1:1 ratio ☑. Intervention (n=30): STRATAFIX Symmetric PDS Plus (deep layer), VICRYL (subcuticular), MONOCRYL (subcutaneous), adhesive strips (skin) ☒ Comparator (n=30): VICRYL (deep layer, intermediate layer), MONOCRYL (subcuticular), adhesive strips (skin) ☑	Recruitment between January 2018 and May 2018. Patients aged between 18 and 80 years, undergoing primary total knee arthroplasty. Setting: orthopaedic surgery department. ☑	Wound complications, readmission, reoperation, superficial wound infection, discharge, haematoma, dehiscence, stitch abscess. Wound length, suture use, and closure times were also reported. ☑	Follow-up clinic visits at 4 weeks and 90 days post-operatively.

(Sundaram et al., 2020b) [NCT03285555] USA	RCT (single centre) Single-blinded, computerised randomisation in 1:1 ratio. ☑ Intervention (n=30): Ethibond Excel (capsule), STRATAFIX Symmetric PDS Plus (arthrotomy), VICRYL (subcutaneous), MONOCRYL (subcuticular), adhesive strips (skin) ☒ Comparator (n=30): Ethibond Excel (capsule), VICRYL (arthrotomy, subcutaneous), MONOCRYL (subcuticular), adhesive strips (skin) ☑	Recruitment between July 2018 and February 2019. Patients aged between 18 and 80 years, undergoing primary total hip arthroplasty. Setting: orthopaedic surgery department ☑	Wound complications, readmission, reoperation, stitch abscess, haematoma dehiscence, wound discharge, wound infection (superficial, deep, periprosthetic). Wound length, suture use, and closure times were also reported.). ☑	Follow-up clinic visits at 3 weeks and 90 days post-operatively.
Key: ☑ aspect of study in scope; ☒ aspect of study in scope ☑☒ aspect of study partially in scope, or elements of this are not in scope. Abbreviations: CRP. C-reactive protein; RCT randomised controlled trial; SSI, surgical site infection; VAS, visual analogue scale.				

5 Clinical evidence review

5.1 *Overview of methodologies of all included studies*

All 31 studies included were parallel RCTs comparing the use of Plus Sutures with non-triclosan sutures, with most comparators being exactly equivalent with the exception of the absence of the antibacterial agent. Two studies exclusively enrolled children (Ford *et al*., 2005, Renko e*t al.*, 2017), one enrolled adults and children (Rozzelle *et al.*, 2008), and the remainder enrolled mainly adults. A range of surgical specialties were investigated. The largest category of specialties studies was gastrointestinal or abdominal surgery with ten studies identified (Baracs *et al*., 2011, Diener *et al*., 2014, Ichida *et al*., 2018, Justinger *et al.*, 2013, Mattavelli *et al*., 2015, Mingmalairak *et al*., 2009, Nakamura *et al*., 2013, Olmez *et al*., 2019, Rasić *et al.*, 2011, Ruiz-Tovar *et al*., 2020). Five studies related to cardiovascular surgery (Isik *et al*., 2012, Santos *et al*., 2019, Seim *et al*., 2012, Steingrimsson *et al*., 2015, Turtiainen and Hakala, 2014), with one study relating to vein harvesting for CABG (Thimour-Bergström *et al*., 2013), on the same patients as Steingrimsson *et al.* (2015). Five studies were identified concerning soft tissue (including breast reconstruction) surgery (Arslan *et al*., 2018, Karip et al., 2016, Soomro *et al*., 2017, Williams et al., 2011, Zhang et al., 2011), and four involved orthopaedic surgery (Lin et al., 2018, Renko et al., 2017, Sprowson et al., Sukeik et al., 2019). Two studies were in generalised or mixed surgery (Ford *et al*., 2005, Galal and El-Hindawy, 2011), with the remaining studies involving neurology (Rozzelle et al., 2008) and maxillofacial surgery (Tabrizi *et a*l., 2019). The additional studies identified by the EAC were in patients undergoing neck surgery (Chen *et a*l., 2011) and dental surgery (Sala-Perez *et al*., 2016).

The studies were international and were performed in a wide range of countries. Fifteen studies were set in Europe (including Turkey); eight were set in Asia; two were set in the US; one in Brazil; and one in Egypt. Three studies were set in the UK *(*Sprowson *et al.,* Sukeik *et al., 2019,* Williams *et al*., 2011). Study sample sizes ranged from 61 patients (Rozzelle *et al*., 2008) to 2,546 patients (Sprowson *et al*.). In total, over 14,000 unique patients contributed to the analysis.

5.2 *Critical appraisal of studies and review of company's critical appraisal*

The company critically appraised the included primary studies using the risk of bias tool supplied by Medical Technologies Evaluation Programme (MTEP) (Table 7b of Clinical Submission). The EAC reviewed the table and had no concerns over the accuracy of the data or its interpretation. However, the

company did not attempt to summarize the overall quality of the studies individually or the evidence base as a whole.

The EAC independently appraised the RCTs using the Cochrane tool for assessing risk of bias (Higgins *et al*., 2011). This tool assesses the risk of selection, performance, detection, attrition and reporting bias as low, high, or uncertain. However, this judgement requires a degree of subjectivity, in particular in discerning whether there was a true methodological deficit or suboptimal reporting. Other factors to consider include the study size, which determines the precision of results. The critical appraisal tables are listed in Appendix B (Table B1 to B30).

A summary of the studies' risks of bias and overall quality is reported in Table 5.1 and represented graphically in Figure 5.1. Most studies reported an adequate randomisation process, although the method of concealment of allocation was less well described in some studies. However, as baseline characteristics of patients did not significantly differ between groups, it was considered that selection bias was not a significant issue of concern. As unpackaged Plus Sutures appear physically identical to their non-triclosan counterparts, blinding of participants and surgeons was possible, although the requirement to open sterile packs in theatre meant that complete concealment and blinding of all members of surgical teams was difficult to achieve. Nevertheless, performance bias was rarely an issue of concern. Most studies also blinded assessors or investigators, which meant the risk of detection bias was low. About half of the studies did not adequately report on patient flow, which increased the risk of attrition bias. A similar number of studies did not publish a study protocol or had other risks of reporting bias. Finally, some papers did not adequately describe their funding or potential for conflicts of interest.

The EAC systematically categorised studies as being of low, moderate, or high quality using a relatively strict classification scheme based on the number of domains that were considered to be of high, low or unclear risk of bias (see footnote in Table 5.1). Eight studies were determined to be of high-quality *(*Diener *et al., 2014,* Ichida *et al., 2018,* Lin *et al., 2018,* Mattavelli *et al*., 2015, Renko *et al*., 2017, Santos *et al*., 2019, Thimour-Bergström *et al*., 2013, Turtiainen and Hakala, 2014). Three of these studies also enrolled over 1,000 patients, so reported data that was considered to be precise and at low row risk of bias (Diener *et al*., 2014, Ichida *et al*., 2018, Renko *et al*., 2017). The EAC notes that in these three studies, theatre nurses were aware of which type of suture was used, and although the protocols included steps to conceal allocation and blind the operators (surgeons), the success of these measures relied on human behaviour.

Six studies were judged to be of moderate quality (Galal and El-Hindawy, 2011, Justinger *et al*., 2013, Nakamura *et al*., 2013, Sprowson *et al*., 2018, Sukeik *et al*., 2019, Williams *et al*., 2011). Sprowson *et al.* (2018) was the largest of these and was set in the NHS of England. This study was scored at high-risk of bias in the domains of selection and performance bias due to what the authors described as the quasi-randomisation process used (cluster randomisation based upon hospital and calendar month) and also because the protocol included no steps to blind surgeons. This design is inherently susceptible to selection bias (Guyatt *et al*., 2011b). However, the EAC notes that other studies considered at low risk of bias in these domains relied on human factors to ensure blinding. In addition, because this study avoided randomisation in theatre and expected surgical teams to follow usual practice throughout, there is little concern that the surgeons' performance would be affected by knowledge of the suture type. Baseline characteristics were similar in both groups. The study was considered to be of low risk of bias in all other domains.

The remaining 16 studies, about half the total, were considered to be at high or unclear risk of bias in most domains (Arslan et al., 2018, Baracs et al., 2011, Chen et al., 2011, Ford et al., 2005, Isik et al., 2012, Karip et al., 2016, Mingmalairak et al., 2009, Olmez et al., 2019, Rasić et al., 2011, Rozzelle et al., 2008, Ruiz-Tovar et al., 2020, Sala-Perez et al., 2016, Seim et al., 2012, Soomro et al., 2017, Tabrizi et al., 2019, Zhang et al., 2011). There was no common theme to these studies in terms of speciality or wound cleanliness. However, in general, these studies tended to have smaller sample sizes and were set in countries outside of Europe or the US which may have resulted in translation or reporting issues.

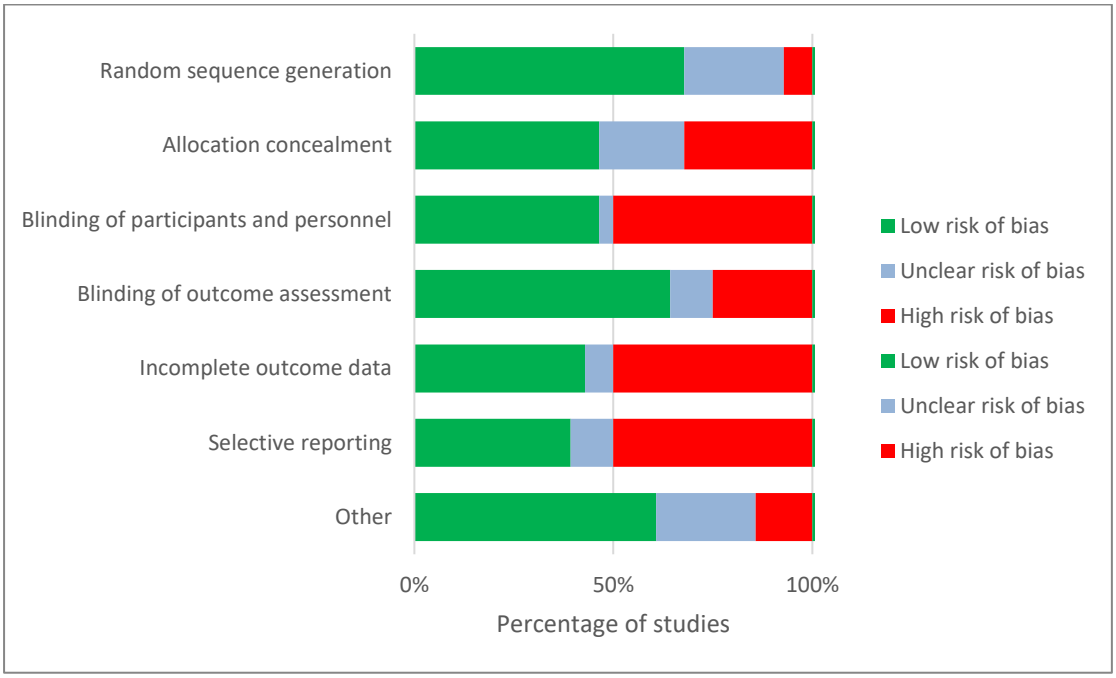
Table 5.1. *Summary of risk of bias in the included studies.*

Study (with link to appraisal table)	n*	A	B	C	D	E	F	G	Overall quality**
Arslan (2018)	177	?	☹	☹	☹	☹	☹	?	Low
Baracs (2011)	468	☺	☹	☹	☹	☹	☺	☺	Low
Diener (2014)	1,224	☺	☺	☺	☺	☺	☺	☺	High
Ford (2005)	151	☺	☹	?	?	?	☹	☹	Low
Galal (2011)	450	☺	☺	☺	☺	☹	☹	?	Moderate
Ichida (2018)	1,023	☺	☺	☺	☺	☺	☺	?	High
Isik (2012)	510	?	?	☹	☹	☹	?	☺	Low
Justinger (2013)	1,042	?	?	☺	☺	☹	☺	☹	Moderate
Karip (2016)	106	☺	☹	☹	☺	☹	☹	☺	Low
Lin (2018)	102	?	☺	☺	☺	☺	☺	☺	High
Matavelli (2015)	300	☺	☺	☹	☺	☺	☺	☺	High
Mingmalairik (2009)	100	?	?	☺	?	☹	☹	☺	Low
Nakamura (2013)	410	?	?	☹	☺	☺	☺	?	Moderate
Olmez (2019)	890	☺	☹	☹	☺	☹	☹	☺	Low
Rasic (2011)	184	☺	☺	☹	☹	☹	☹	?	Low
Renko (2017)	1,633	☺	☺	☺	☺	☺	☺	☺	High
Rozzelle (2008)	61	☺	?	☺	?	☹	☹	☺	Low
Ruiz-Tovar (2015)	110	☹	☹	☹	☺	☺	☹	☺	Low
Santos (2019)	583	☺	☺	☺	☺	☺	?	☺	High
Seim (2012)	323	?	☹	☹	☹	☹	☹	☺	Low
Soomro (2017)	378	☹	☹	☹	☹	☹	☹	☺	Low
Sprowson (2018)	2,546	☺	☺	☹	☺	☺	☺	☺	Moderate
Sukeik (2019)	150	☺	☺	☺	☺	☹	☹	☺	Moderate
Tabrizi (2019)	320	☺	?	☹	☹	☹	☺	☺	Low
Thimour-Bergstrom (2013)	392	☺	☺	☺	☺	☺	☺	?	High
Turtiainen (2012)	276	☺	☺	☺	☺	☺	?	?	High
Williams (2011)	150	☺	☺	☺	☺	?	☹	☹	Moderate
Zhang (2011)	101	☺	☹	☹	☺	☺	☹	☹	Low
Chen (2011)†	241	☹	?	?	?	☹	☹	☺	Low
Sala-Perez (2016) †	20	?	?	☹	☹	☹	☹	☺	Low

Key: ☺, low risk of bias, ☹, high risk of bias; ?, unclear risk of bias.
A, random allocation sequence (selection bias); B, allocation concealment (selection bias); C, blinding of participants and personnel (performance bias); D, blinding of outcome assessment (detection bias); E, incomplete outcome bias (attrition bias); F, selective reporting (reporting bias); G, other bias (for example industry involvement in finding, major concerns over generalisability. As domain G is particularly subjective and partly dependent on journal editorial policy, it is not used in overall summary of evidence.
* number of patients randomised.
** Overall summary of study quality (consistent with GRADE methodology):
High: 5/6 domains A to F at low risk of bias or no high risk of bias in any single domain.

Moderate: high risk of bias in at least 2 domains (A to F) and low risk of bias in at least three domains (A to F).
Low: high risk of bias in three or more domain (A to F).
† Studies identified late as part of the EAC's adverse event literature search. These studies were not included in the meta-analysis.

Figure 5.1. *Summary of the methodological quality of the included studies.*



5.3 *Results from the evidence base*

The company tabulated all available results of outcomes that were in the Scope in Tables 4a to 4e of the Clinical Submission (on an outcome-by-outcome basis), as well as a qualitative analysis in Section 7. Additionally, the company reported the results reported by each RCT on a study-by-study basis in Table 5 of the submission. As this was done comprehensively, the EAC has not replicated this work, but has cross-referenced the data with the original papers where appropriate. The following sections provide a brief narrative of the outcomes in the order they were listed in the Scope.

5.3.1 Incidence of SSIs

The incidence of SSIs was reported by the company in Table 4a of the Clinical Submission. This was the most important outcome and was reported by nearly all the included studies, with the majority using the CDC definition. Two important aspects of SSI as an outcome should be noted. Firstly, as SSIs are a relatively uncommon outcome (and could be described as adverse events) this outcome is difficult to detect, with most studies not reporting significant differences in SSI rates in either direction. This was likely because, despite *a priori* estimation of sample size, they were individually underpowered for this purpose, especially in studies of clean wounds where the baseline incidence rate is particularly low. Secondly, due to the heterogeneous nature of the underlying diseases of the recruited populations, the surgical procedures they received, and different baseline incidence of SSIs, it is not possible to meaningfully compare the *absolute* rates of SSIs in either the intervention or control groups between studies. Therefore, the company focussed on the *relative* risk reduction (RR) of SSI between the intervention and control groups on a per study basis; this approach was deemed to be appropriate by the EAC.

The company synthesised the RR of SSI in the included studies in a series of meta-analyses, reported in Section 7.1. This includes forest plots where the RR of SSIs and the uncertainty behind this can be visualised at study or aggregate level. The EAC considered this was an appropriate approach in order to understand the overall influence of Plus Sutures on SSIs. The EAC has replicated this analysis and provided additional analysis in Section 7.2. The RR of SSIs was an important determinant in the economic analysis (Section 7).

5.3.2 Type of SSI

The company provided a narrative discussion on the type of SSI (superficial or deep) in Section 7 of the report. Most studies did not report this outcome, or did not differentiate between treatment arms. Of those that did report data of sufficient granularity to distinguish between study arms, no consistent findings were reported, meaning no firm conclusions can be drawn.

5.3.3 Length of post-operative stay in hospital relating to SSI

Length of post-operative stay (LoS) was reported in Table 4c and Section 7 of the Clinical Submission. Twelve of the included studies included LoS as an outcome, but many used different descriptive statistical methods or did not include measures of variance. Three of the studies reported significantly reduced LoS in favour of Plus Sutures. All of these were considered to be at high risk of bias by the EAC (Olmez et al., 2019, Rasić et al., 2011, Ruiz-Tovar et al., 2020).

Length of stay is typically a difficult metric to quantify in wound care studies as it is influenced by many factors independent of the intervention being assessed. This is accentuated by the heterogeneous nature of the studies included and their healthcare settings. Additionally, the company correctly stated that it was not appropriate to perform meta-analysis on this outcome due to incomplete and inconsistent reporting and the inherent skewedness of the data. Thus no conclusions can be drawn from LoS empirically, although if Plus Sutures reduce the incidence of SSIs it would be logically plausible that they would also reduce LoS.

5.3.4 Readmission related to SSI

Two included studies reported on this outcome. Sprowson *et al.* (2018) reported 2 patients (0.17%) being readmitted in the Plus Sutures arm compared with none in the control arm, whilst Renko *et al.* (2017) reported 5 (1%) readmissions in the intervention arm and 17 (2%) in the comparator arm. The company concluded it was not possible draw robust conclusions based on these data and the EAC concurs.

5.3.5 Antibiotics use for SSI

The company summarized the antibiotic use for the treatment of SSI in Table 4b and additionally in the qualitative review (Section 7). Six studies reported on the post-operative prescribing of antibiotics as an outcome, but only one made a statistical comparison between treatment arms (Ichida *et al.*, 2018). In this study, which the EAC regarded as high quality, 17.3% of patients receiving Plus Sutures received post-surgical antibiotics compared with 16.8% in the control arm (p=0.868).

The company noted that post-procedural antibiotic use was rarely reported as a specified endpoint and that the data quality was poor. Furthermore, it is difficult to accurately attribute antibiotic prescribing specifically to SSIs, and prescribing practices vary by clinical speciality, procedure, and setting. In many, but not all, studies, prophylactic antibiotics were prescribed, further complicating the clinical picture. Thus, no direct conclusions could be drawn about the prescribing of antibiotics to treat SSI directly from empirical data.

5.3.6 Severity of SSI using validated scoring systems

The only validated scoring system used was the ASEPSIS score *(*Wilson *et al*., 1986), reported in three of the included studies (Sukeik et al., 2019, Thimour-Bergström et al., 2013, Zhang et al., 2011), none of which reported persistently significant differences between arms. Therefore no conclusions can be made about this outcome.

5.3.7 Incidence of wound dehiscence

Wound dehiscence, the splitting or bursting of a wound, is a severe form of SSI that was reported comparatively in 9 studies, with statistical analysis in 6 studies. One study reported a statistically significant difference in favour of Plus Sutures (Rasić et al., 2011); however this study was considered by the EAC to be at high risk of bias in four domains, and furthermore, the company correctly stated this outcome may have been biased as the dehiscence was related to time in hospital only, as LoS was not equivalent between arms. The company also highlighted a recent systematic review where dehiscence was analysed as an outcome in four RCTs, and no difference was reported between the intervention and treatment arms (Guo *et al*., 2016).

5.3.8 Patient reported pain or discomfort

The company reported on patient reported pain or discomfort in narrative form in Section 7 of the Company Submission. Of seven studies reporting comparative data on this outcome, two reported significantly less pain in the Plus Sutures arm (Ford et al., 2005, Ruiz-Tovar et al., 2020), whilst one reported significantly less pain in the control arm at 24 hour time-point only (Lin et al., 2018). Thus, no conclusions can be made about this outcome.

5.3.9 Device-related adverse effects

Device related adverse events are discussed in Section 6.

5.3.10 Summary of results

A summary of the results, according to the outcomes list in the Scope, are reported in Table 5.2. There was only one outcome directly supported from empirical evidence; this was that the use of Plus Sutures is associated with a causative reduction in the incidence of SSIs. This conclusion was drawn from the *de novo* systematic review reported by the company (Section 7.1). Using GRADE methodology, the EAC has rated the overall quality of evidence for this outcome as “High” (meaning the true effect lies close to that of the estimate of the effect) (Guyatt et al., 2011a). This was because the body of evidence consisted of RCTs and there were no *serious* concerns about risk of bias (at an aggregated study level); inconsistency; indirectness; imprecision; or publication bias. However, the absolute reduction in the risk of SSI is less clear and will depend on the population and procedures used.

None of the other outcomes listed in the scope had sufficiently robust empirical evidence to show Plus Sutures were statistically superior to standard sutures. However, these could be inferred or extrapolated from the proven reduction in incidence of SSI. For instance, given it is known that Plus Sutures reduce the rate of SSI, it is reasonable to assume that there will be a resultant reduction in length of hospital stay, readmission rates, and healthcare costs.

Table 5.2. *Summary of results from outcomes listed in the Scope.*

Outcome	Summary of company view*	Summary of EAC opinion*
Incidence of SSIs	SUPPORTED "Plus Sutures were found to significantly reduce the risk of developing a SSI compared to those in the control group in all analyses conducted, included subgroup analyses by age and wound type…. with a significant reduction in the risk of developing an SSI compared with the control group still reported, independently of type of surgery".	SUPPORTED The EAC largely concurs with the company's assessment. Overall, including all studies, the estimated RR of SSIs through meta-analysis was 0.71 (95% CI 0.59 to 0.85). This effect size was largely replicated in studies recruiting only adults or children, and in clean and non-clean wounds. However, the effect size may reduce if only high-quality or large studies are included. Overall EAC conclusion (GRADE): High quality of evidence indicating Plus Sutures lower incidence of SSIs, but the magnitude of reduction may be less than reported by overall analysis (Section 7.2).
Type of SSI	INCONCLUSIVE "In summary, no consistent difference emerges between deep or superficial wounds or between the two arms".	INCONCLUSIVE The EAC concurs with the company assessment. The available evidence is insufficient to make a judgement on the effect of Plus Sutures on types of SSI.
Length of post-operative stay in hospital relating to SSI	INCONCLUSIVE The company did not make conclusions on the effect of Plus Sutures on length of stay.	INCONCLUSIVE There was insufficient empirical data to draw conclusions. However, it is plausible if SSIs are reduced then this would reduce length of stay.
Readmission related to SSI	INCONCLUSIVE "Due to the low incidence of readmission and limited number of trials reporting this outcome, it is difficult to draw robust conclusions".	INCONCLUSIVE The EAC concurs there were a lack of sufficient quality data to assess this outcome. However, it is plausible if SSIs are reduced then this would reduce hospital readmission (as well as community care).

Outcome	Summary of company view*	Summary of EAC opinion*
Antibiotics use for SSI (including prescription, duration and dose)	INCONCLUSIVE "In none of these studies was information on antibiotics use a formal endpoint, and as such, none of these studies but one reported statistical p values, or were powered to evaluate this outcome".	INCONCLUSIVE There were insufficient data to assess this outcome.
Severity of SSI using validated scoring systems	INCONCLUSIVE "Insufficient data were available for a meta-analysis of this outcome".	INCONCLUSIVE The EAC concurs there were insufficient data with which to draw conclusions. It is noted that assessment of SSIs through validated systems is rarely undertaken in clinical practice.
Incidence of wound dehiscence	INCONCLUSIVE The company did not draw firm conclusions on this outcome.	INCONCLUSIVE The data reported was not robust enough to draw firm conclusions. This is a relatively rare outcome which would be difficult to detect using experimental studies.
Patient reported pain or discomfort	INCONCLUSIVE "In conclusion, of the seven studies reporting pain by treatment arm, three studies found no statistically significant difference between arms, and three studies reported statistically significant differences, but not all in the same direction"	INCONCLUSIVE The empirical data was insufficient to assess this outcome. It is expected this outcome would be very difficult to detect using experimental methodology.
Device-related adverse events.	The company estimated an AE rate of [redacted] from MAUDE searches.	Adverse events are reported in Section 6. It is difficult to establish causality of AEs with sutures used. No significant concerns were identified by the EAC.

Abbreviations: AE, adverse event; CI, confidence interval; RR risk reduction; SSI, surgical site infection.
*Outcomes classed as SUPPORTED (evidence supports outcome in favour of Plus Sutures); INCONCLUSIVE (evidence is not robust enough to inform about an effect): or NOT SUPPORTED (evidence indicates outcome is not positive in favour of Plus Sutures).

6 Adverse events

The EAC investigated adverse events in two ways. Firstly, by reviewing the studies included by the EAC and company, and secondly by performing a dedicated literature review to assess the incidence and nature of adverse events in non-RCTs. Observational studies are often suitable for detecting adverse effects caused by medical interventions, for instance by virtue of their sample size.

6.1 *Summary of adverse effects in included RCTs*

Eighteen of the included RCTs explicitly reported adverse events (other than the primary outcome of interest, SSI). It is difficult to determine causation of adverse events and whether these are attributable to the triclosan coating, the suture, the surgeon's technique, the surgical procedure or patient comorbidities (EAC external correspondence log, 2021). Most of the studies were not adequately powered to detect differences between rare event rates. Had statistical correction for multiple comparisons been applied, it is likely that no significant difference in adverse event rates between intervention and control arms would have been identified across any of the included RCTs. Note that SSI, infection, abscess and wound discharge are considered within the primary efficacy outcome measures and are therefore not described within this section.

Diener *et al.* (2014) reported that fewer patients had a burst abdomen in the intervention arm (9 [1.9%] and 22 [4.5%] patients, in intervention and control arms respectively, p=0.0194). The authors reported that there were no significant differences in patients experiencing at least one serious adverse event (146 [25.0%] and 138 [22.9%] patients in the intervention and control arms respectively; p=0.398): serious adverse events included surgical site infections; burst abdomen; anastomic insufficiency; intra-abdominal fluid collection or abscess; bleeding; cardiovascular; pulmonary; renal; other gastrointestinal problems; other; not assessable). Additionally 9 (1.5%) and 20 (3.3%) deaths were reported in intervention and control arms respectively; however the authors stated that none of the deaths were related to the trial intervention. Most deaths were caused by septic shock, multiple organ failure, or cardiac or pulmonary decompensation.

Ford *et al.* (2005) stated that there was no significant difference in adverse events between arms (17% and 20% of patients in the intervention and control arms respectively). The authors states that none of the adverse events were device-related.

Mattavelli *et al.* (2015) stated that there was no significant difference in overall incision complications (aggregating haematoma, swelling, redness, seroma)

between arms; 64 (45.7%) and 54 (38.3%) patients in intervention and control respectively (p=0.208). The authors also report a difference in wound hematoma (13/140, 9.3% in intervention arm and 3/141, 2.1% in control arm, p=0.018).

Mingmalairak *et al.* (2009) reported no allergy or adverse events related to the suture were identified after follow-up of 1 year.

Olmez *et al.* (2019) reported there was no statistical difference in the incisional hernia rate between intervention and control arms; 31 (7.0%) and 35 (7.8%) respectively, p=0.60.

Rasic *et al.* (2011) reported a significant difference in inflammatory reactions to skin sutures (7 patients [7.5%] and 16 patients [17.5%] in intervention and control arms respectively, p=0.039), reoperations (1 patient [1.1%] and 8 patients [8.8%] in intervention and control arms respectively, p=0.015). The authors reported no significant difference in incisional hernia between groups; with 2 (2.2%) and 5 (5.5%) in intervention and control arms respectively (p=0.235). The study reported that no deaths occurred in either group.

Renko *et al.* (2017) reported that the absorbable sutures did not resorb as expected in 45 (6%) and 46 (6%) of patients in the intervention and control arms, however the difference was not significantly different (p=1.0). One unrelated death was reported, and no other adverse events were reported in either arm.

Ruiz-Tovar (2015) reported that nine patients died; with no significant difference between intervention (four deaths) and control (five deaths) arms. Patient deaths were excluded from analysis as they presented with multi-organ failure secondary to septic status and died post-operatively (before 96 hours); therefore SSI could not be evaluated.

Santos *et al.* (2019) reported significant differences in wound pain (p=0.011) (25 patients, 10.0% in intervention and 46 patients, 17.9% in the control arm) and wound hyperthermia (p=0.028) between arms (4 patients, 1.6% in intervention arm, and 14 patients, 5.4% in control arm).

Sprowson *et al.* (2018) reported no significant differences in critical care admissions between intervention and control arms (19/1164 [1.6%] and 23/1273 [1.8%] respectively, p=0.758) and no significant differences in mortality (2/1150 [0.2%] and 4/1269 [0.3%] respectively,p=1.00). They also reported no significant differences in post-operative complications unrelated to the healing of the wound.

Sukeik *et al.* (2019) reported irritation from suture at 6-week follow-up in 2/81, 2.5% in the intervention arm and 0/69, 0% in the control arm, however the

difference between arms is not significant [Fisher's exact test conducted by EAC p=0.50]. Systemic complications were also reported in this study, however no significant differences in nausea and vomiting, bleeding not from wound, stiffness, DVT, PE, chest infection, fracture were identified between intervention and control arms. No deaths or reports of dizziness, MI, CVA, dislocation or loosening occurred in either arm.

Tabrizi *et al.* (2019) reported no significant difference in early implant failure between intervention arm, (5 out of 160, 3.1%) and control arm (four out of 160, 2.5%), p=0.90. No significant difference in wound dehiscence was found between intervention arm (19 out of 160, 11.9%) and control arm (11 out of 160, 6.9%), p=0.18.

Thimour-Bergstrom *et al.* (2013) reported no significant difference in non-infectious wound dehiscence between intervention arm (11 out of 161, 6.8%) and control arm (13 out of 152, 8.5%), p=0.57.

Turtiainen *et al.* (2012) reported no significant difference in graft thrombosis, cardiac complication, stroke, pneumonia, renal insufficiency, or major amputation between intervention and control arms. No significant difference in mortality during one-month follow up was identified, with six in the intervention arm, compared with four in the control arm, p=0.55.

Zhang *et al.* (2011) reported the number of patients experiencing at least one adverse event with 15 out of 51 (29.4%) in the intervention arm and 19 out of 50 (38.0%) in the control arm [Fisher's exact test conducted by EAC p=0.40, not significant]. Also the number of adverse events possibly related to the device and procedure were reported; two in intervention arm and three in control (Fisher's exact test conducted by EAC p=0.68, not significant).

6.2 *Studies identified by dedicated literature search*

A dedicated literature search was performed to identify adverse events related to Plus Sutures. Following sift of 608 titles and abstracts, 58 were included and their full paper retrieved. A further 41 were excluded for the following reasons: 20 conference abstracts; 9 did not measure adverse events (1 RCT, 2 non-randomised trials, 2 propensity matched studies, 2 cohorts with historical controls, 1 retrospective observational cohort and 1 economic paper); 6 incorrect intervention; 4 reviews/letters; and 2 non-English language. A PRISMA diagram of the search and sifting process is presented in Appendix D.

A total of 17 remaining papers recorded adverse events: 1 RCT, 1 randomised pilot, 8 cohort studies with historical controls, 2 prospective single-armed studies, 3 retrospective cohort studies, 1 case series, 1 case report. Findings from these studies are reported in Table 6.1.

Table 6.1. *Studies reporting adverse events identified by literature search.*

Study name and location	Design and intervention(s)	Participants and setting	Adverse events
(Deliaert *et al*., 2009) Netherlands	Randomised pilot; double blinded, single-centre, randomised side (n=26) VICRYL Plus and MONOCRYL for skin closure VICRYL and MONOCRYL for skin closure	Recruitment during 2006 (dates undefined). Female patients undergoing breast reduction surgery.	Significant difference in wound dehiscence between groups (16 in intervention group and 7 in control group, p=0.023). Five patients experienced bilateral dehiscence.

(Holzheimer, 2005) Germany	Case series (n=12) VICRYL Plus (n=4) VICRYL (n=8) Dermabond was used in 11 out of 12 patients.	Recruitment between June 2004 and September 2005. Patients undergoing elective clean operations (varicose veins, hernia, benign soft tissue tumour)	Adverse events occurring within three to eight weeks after surgery. <u>All patients experienced extrusion of the suture material.</u> VICRYL Plus Of three patients undergoing varicose vein surgery, two experienced granuloma, one developed fistula, two developed a subcutaneous infection, all experienced inflammation and delayed wound healing. One patient had an inguinal hernia repair, experienced granuloma and inflammation. <u>VICRYL</u> Of four patients undergoing removal of benign soft tissue tumour, three experienced an inflammatory reaction and delayed wound healing, and two of these experienced granuloma. Three patients undergoing varicose vein surgery, one developed fistula, two developed suture granuloma, all three experienced inflammatory reaction and two experienced delayed wound healing. One patient had a ventral hernia repair, experienced inflammatory dehiscence, granuloma, and delayed wound healing.

Study name and location	Design and intervention(s)	Participants and setting	Adverse events
(Ismail and Nixon, 2020) Australia	Case report (n=1)	Patient with history of atopy, asthma, atopic dermatitis, allergic rhinitis since childhood. Previously tolerated tendon repairs using nylon and silk sutures, however developed redness and swelling at surgical site following breast reduction. Patch testing clinic	Within 24 hours of abdominal hysterectomy using VICRYL Plus and MONOCRYL Plus, redness and swelling at surgical site which progressed to breakdown of the sound. Re-hospitalised for eight weeks, underwent suture removal and multiple vacuum dressing changes under general anaesthesia. Patch testing revealed positive reaction to triclosan 2%, and diagnosed with allergic contact dermatitis to triclosan coasted sutures.
(Jenaw et al., 2019) India	Retrospective cohort; single centre (n=306) VICRYL Plus (subcutaneous) and MONOCRYL Plus (intracutaneous)	Recruitment between July 2016 and January 2017. Patient undergoing surgical wound closure.	No signs of wound dehiscence. No intraoperative complications or adverse events occurred in cohort.

Study name and location	Design and intervention(s)	Participants and setting	Adverse events
(Jung *et al*., 2014) Korea	Prospective single-arm study; single centre (n=916) VICRYL Plus for two-layer closure.	Recruitment between December 2009 and September 2011. Patients undergoing curative radical gastrectomy for gastric cancer.	Within 30 days post-op, seroma occurred in 147 patients (with a cumulative occurrence rate of 18.5%), tenderness (12.1%), erythema (6.4%), wound dehiscence (4.9%), purulent discharge (0.8%). Eight patients (0.9%) had an adverse event: six had respiratory problems (atelectasis, pleural effusion, pneumonia), and two had non-complicated fluid collection in the intra-abdominal cavity after the operation. Authors state that all were caused by general anaesthesia or gastrectomy, and that no symptom was directly related to triclosan-coated sutures.
(Justinger *et al*., 2009) Germany	Control with historical controls; single centre (n=2,088) VICRYL Plus (n=1,043) PDS II (n=1,045)	Patients undergoing midline laparotomy using VICRYL Plus sutures (between October 2005 and September 2006) and PDS II sutures (between October 2004 and September 2005).	No significant difference in mortality, days in the ICU or duration of hospital stay between arms.
(Justinger *et al*., 2012) Germany [Subset of Justinger *et al.* (2009)]	Cohort with historical controls; single centre (n=1018) VICRYL Plus (n=504, 389 with 36 month follow-up) PDS II (n=514, 399 with 36 month follow-up)	Patients undergoing elective primary midline laparotomy	No significant difference in incisional hernia at 36 month follow-up between arms (59 in VICRYL Plus arm, 56 in PDS II arm). An operative repair of the incisional hernia was performed in 89 out of 115 patients during follow-up

Study name and location	Design and intervention(s)	Participants and setting	Adverse events
(Justinger *et al*., 2011) Germany	Cohort with historical controls; single centre (n=839) VICRYL Plus (n=430) PDS II (n=409)	Patients undergoing transverse abdominal incision, closed using VICRYL Plus (start date assumed to be October 2005, end date October 2007) and PDS II (between October 2003 and September 2005).	No patient reported pain scores >3 (VAS) within 24 hours post-operatively.
(Laas *et al*., 2012) France	Cohort with historical controls; single centre (n=190) VICRYL Plus & MONOCRYL Plus (n=98) VICRYL & MONOCRYL (n=92)	Patients undergoing breast surgery using VICRYL Plus and MONOCRYL Plus (between June 2010 and August 2010) and VICRYL and MONOCRYL sutures (June 2009 and August 2009).	No significant difference in suture material-related complications, all complications, hematoma, seroma, discharge, cutaneous complications, wound dehiscence, necroses, wound healing delay, allergy, or axillary bridle between groups.
(Nakamura *et al*., 2016) Japan [likely subset of above]	Cohort with historical controls; single centre (n=670) PDS Plus (n=382) PDS II (n=288)	Peritoneum and fascia closure using PDS Plus (between April 2012 and April 2015), and using PDS sutures (between January 2010 and March 2012). Patients undergoing laparoscopic surgery for primary single colon cancer.	No surgery-related deaths. No patients had flare-ups of SSI or surgical site dehiscence during follow-up up to 30 days after discharge.
(Nakamura *et al*., 2020) Japan	Cohort with historical controls; single centre (n=1,144) PDS-Plus (n=856) Not PDS-Plus (n=288)	Peritoneum and fascia closure using PDS Plus (between April 2012 and December 2017), and using PDS sutures (between January 2010 and March 2012). Patients undergoing elective laparoscopic surgery for primary single colon cancer.	Complications after laparoscopic surgery for colon cancer occurred in 16.9% (193/1144) of the patients, including wound infection in 4.5% (51/1144), suture failure in 4.4% (50/1138), and intestinal obstruction in 3.6% (41/1144). No in-hospital deaths. No flare-up of wound infection or wound dehiscence occurred during the follow-up period after discharge.

Study name and location	Design and intervention(s)	Participants and setting	Adverse events
(Okada *et al*., 2014) Japan	Cohort with historical controls; single-centre (n=198) VICRYL Plus (n=88) VICRYL (n=110)	Patients undergoing elective pancreaticoduodenectomy with incision closure using VICRYL Plus (between March 2009 and February 2012) and using VICRYL (between June 2005 and February 2009).	No significant difference in organ/space SSI, pancreatic fistula formation, delayed gastric emptying or duration of post-operative hospitalisation between arms.
(Ruiz-Tovar *et al*., 2018) Spain	Retrospective cohort; multi-centre (n=104) VICRYL Plus (n=25) for fascial closure PDF Plus (n=20) for fascial closure VICRYL (n=26) for fascial closed PDS (n=33) for fascial closure. Staples were used for skin closure in all cases.	Recruitment between January 2014 and December 2015. Patients with intra-operative diagnosis of faecal peritonitis secondary to acute diverticulitis perforation, neoplastic tumour perforation, or colorectal anastomotic leak of previous elective colorectal resection.	Mortality 6.7% up to 30 days after surgery (non-significant difference between arms, p-value not reported; all deaths were related to multi-organ failure secondary to sepsis). No significant difference in evisceration rate between arms (p=0.05). The use of monofilament sutures was associated with higher risk of evisceration (RR 6.35 [95%CI 2.2 to 19.4], p=0.033).
(Sala-Perez *et al*., 2016) Spain	RCT; single centre, randomised side of mouth (n=20) MONOCRYL Plus (on one side) Braided natural black silk (other side).	Patients undergoing surgical removal of 4 third molars presenting similar impaction.	No significant difference in degree of discomfort between sutures.

Study name and location	Design and intervention(s)	Participants and setting	Adverse events
(Ueno *et al.*, 2015) Japan	Cohort with historical controls; multi-centre (n=405) VICRYL Plus (n=200) VICRYL (n=205) for fascia, muscle, subcutaneous and staples for skin	Patients undergoing spinal surgery with wound closure using VICRYL Plus (between May 2011 and April 2012) and using VICRYL (between May 2010 and April 2011).	No significant difference in wound dehiscence between groups (2 in VICRYL arm, 1 in VICRYL Plus arm).
(Yokoyama *et al.*, 2017) Japan	Prospective single-arm study (n=168) Triclosan coated suture for closure of muscle and epidermal layers.	Period of 24 months (dates undefined). Patients undergoing chest drain insertion for thoracic diseases.	No complications (infection, fluid leakage or opening of surgical wound) on removal of the chest tube. No poorly healed wounds or empyema.
(Zhang *et al.*, 2018) China	Retrospective cohort; single centre (n=245) VICRYL Plus (n=129) for muscle, subcutaneous tissue and skin closure. Braided silk suture (n=116) for muscle, subcutaneous tissue and skin closure.	Recruitment between January 2011 and December 2013. Patients aged 18 to 70 years old undergoing elective craniotomy and tumour resection for supratentorial gliomas.	Eleven patients in the VICRYL Plus group experienced wound-related complications (5 wound swelling and exudation, 6 subcutaneous bloody fluid collection). Twenty patients in the control group experienced wound-related complications (9 wound swelling and exudation, 11 subcutaneous bloody fluid collection).

There is no discernible safety signal from use of Plus Sutures. This is supported by information the company has given (including the very low amounts of triclosan used on coated sutures and the metabolism of triclosan) (EAC external correspondence log, 2021). Clinical experts confirmed no experience of patient allergy to triclosan (EAC external correspondence log, 2021). Triclosan allergy was noted in a published case report which referenced a retrospective analysis of 113,162 patients patch tested with triclosan 2% petroleum. A positive reaction was observed in only 363 patients (0.32%); however, 54% of positive reactions were considered clinically relevant (Buhl et al., 2014). The concentration of triclosan is much lower in Plus Sutures, and it is rapidly metabolised and eliminated by the body (EAC external correspondence log, 2021)

7 Evidence synthesis and meta-analysis

7.1 *Description of company meta-analysis*

7.1.1 Methodology

The company performed a series of meta-analyses to establish the overall pooled effect size associated with Plus Sutures on the incidence of SSIs. Meta-analyses were performed in R (version 4.0.2) (R Core Team, 2020) using the *meta* package (version 4.16-2) (Balduzzi et al., 2019), and the company also reported using the *dmetar* package (Harrer et al., 2019).

In the base case, 31 studies identified by the literature search reported in the company's Clinical Submission were included. These studies were heterogeneous in terms of the populations and procedures studied, as well as by country and setting. They included multiple types of abdominal surgery; knee and hip arthroplasty; surgery for pilonidal disease; CABG surgery with saphenous vein harvesting; breast surgery; dental surgery; and neurological surgery. With the exception of four RCTs, all the studies used the standardised CDC definition of SSI, measured at 30 day or later (Center for Disease Control, 2021). Three of the RCTs not reporting CDC defined SSIs were excluded, whilst one was included as it was considered the timeframe used was close enough to be acceptable (Justinger et al., 2013). The meta-analyses used the RR of SSI as their only outcome, with other outcomes not providing sufficiently high-quality data to perform meaningful synthesis (Section 5.3).

The company submitted forest plots for six meta-analyses, in which both fixed and random effect models had been fitted, where appropriate. The subgroups were defined *a priori* and were consistent with the Scope (Section 1). The primary outcome of interest was relative risk of developing a surgical site infection between the intervention (Plus Sutures) and control group. The six separate meta-analyses were performed using:

- All studies of Plus Sutures that provided sufficient data (base case, N=28)
- A subset of studies in adults (N=20)
- A subset of studies in children (N=2)
- A subset of studies in those with clean wounds (N=15)
- A subset of studies in those with non-clean wounds (N=12)
- All studies of Plus Sutures including STRATAFIX Plus that provided sufficient data, as a sensitivity analysis (N=30).

The company pooled effect sizes using the Mantel-Haenszel method (Mantel and Haenszel, 1959, Robins et al., 1986), and used the Sidik-Jonkman estimator to calculate τ^2 in the random effects models (Sidik and Jonkman, 2007). The company also applied Hartung-Knapp adjustment to the random effects models (IntHout et al., 2014), and used continuity correction of 0.5 in studies with zero event counts.

Between-study Heterogeneity and outliers

The company assessed the degree of heterogeneity within the pooled studies using Higgins and Thompson's I^2 and τ^2 (Higgins et al., 2003), and Cochrane's Q, although the latter was not reported in their submission. Prediction intervals were displayed on the forest plots for all meta-analyses to provide a range of expected effects for future studies to fall within based on current evidence (IntHout et al., 2016). The company defined a study as an outlier if its confidence interval did not overlap the confidence interval of the pooled effect, in other words, if there was high certainty that the study was not part of the "population" of effect sizes used to inform the meta-analysis.

Publication bias

The company stated in their submission that they assessed publication bias using funnel plot analysis and Egger's test of the intercept (Egger et al., 1997). However, the results of these assessments were not reported.

Influence analysis

The company performed influence analysis to detect and remove studies having an extreme influence on the effect size. They submitted a Baujat diagnostic plot (Baujat et al., 2002), and leave-one-out analysis, which they stated showed that no study highly influenced the pooled effect size or heterogeneity of the model. The pooled effect size ranged between 0.67 and 0.70, and I^2 was between 33% and 41%. The company noted that the Diener 2014 study standing alone at the top of the plot was most likely due to its large sample size, relative to the other included studies, resulting in higher heterogeneity and higher influence on the pooled results.

7.1.2 Company results

The company reported the results as forest plots in the Clinical Submission in Figures 7c to 7h. The EAC has reported the base case Forest plot in Figure 7.1, and summarized the scenario analyses in Table 7.1.

Figure 7.1. *Forest plot of all SSI incidence studies (Figure 7c of company's Clinical Submission).*

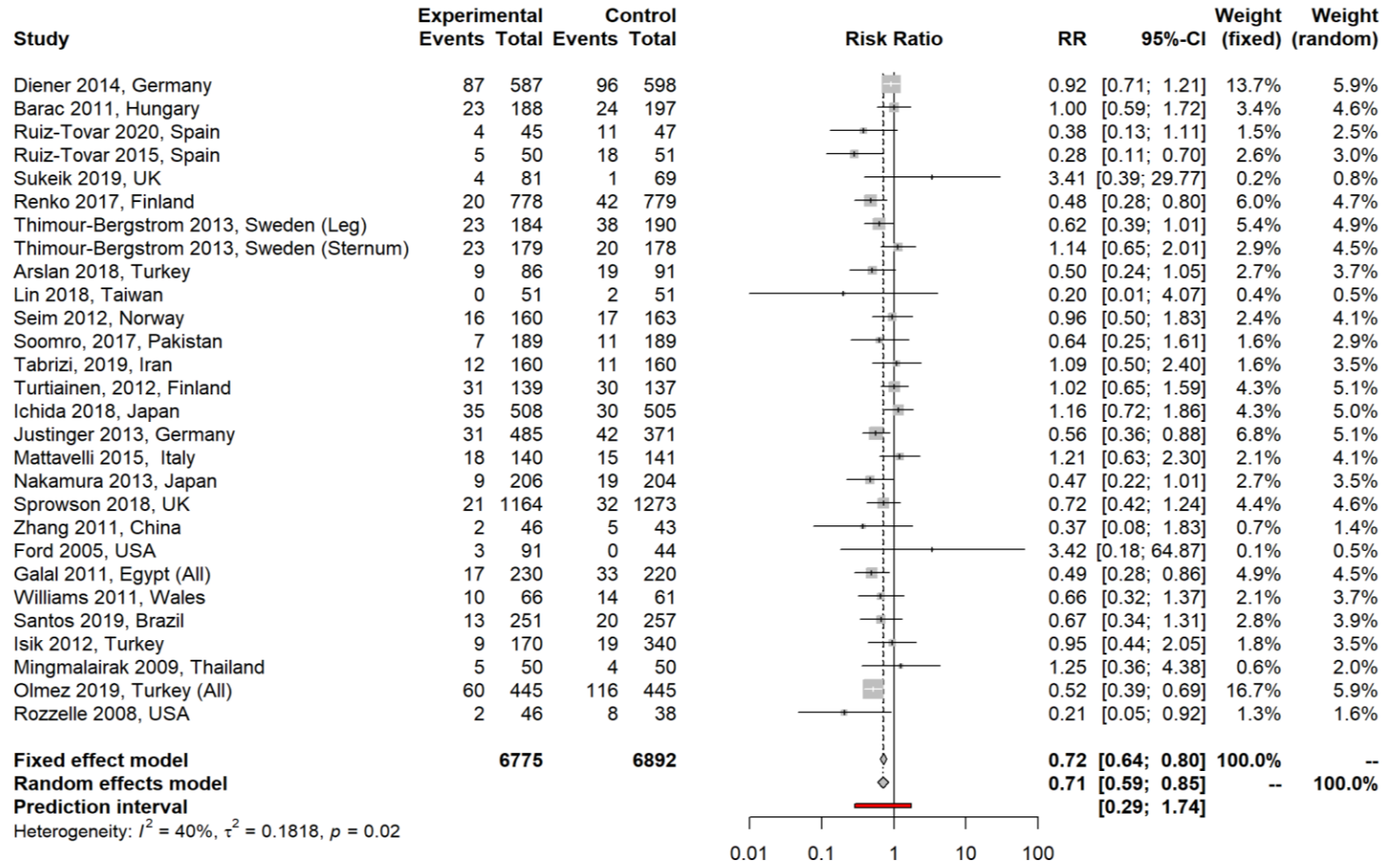


Table 7.1. *Summary of company results from meta-analyses.*

Subgroup analysed	Analysis used*	I^2 value†	Relative risk	Lower 95% CI	Upper 95% CI
Base case (N=28)	Random	40%	0.71	0.59	0.85
	Fixed		0.72	0.64	0.80
Adults (N=20)	Random	33%	0.74	0.62	0.88
	Fixed		0.73	0.65	0.82
Children (N=2)	Fixed	40%	0.52	0.32	0.87
Clean (N=15)	Random	3%	0.71	0.53	0.96
	Fixed		0.75	0.62	0.90
Non-clean (N=12)	Random	32%	0.67	0.48	0.92
	Fixed		0.66	0.54	0.80

* Fixed or random effects analysis. Taking a conservative approach, the use of random effect analysis is most appropriate (Nikolakopoulou *et al*., 2014).
† I^2 value is a measure of inter-study heterogeneity. It can be interpreted as follows: 0% to 40%, might not be important; 30% to 60%,may represent moderate heterogeneity; 50% to 90%, may represent substantial heterogeneity; 75% to 100%: considerable heterogeneity (Higgins *et al*., 2019).

Using data analysis from using the random effects model where possible, it can be seen that the Plus Sutures are associated with a reduction of nearly 30% in the base-case, and this magnitude of effect is also seen in the other scenarios investigated. The effect in children is more pronounced, but this was based on two studies and only the fixed effects result was reported. As the upper 95% confidence interval (CI) did not cross 1 in any scenario, all the results were considered statistically significant.

7.1.3 EAC appraisal of the company meta-analyses

The EAC considered the company's meta-analyses (and the associated systematic review) were of high-quality and reported clearly. The EAC formally appraised the analysis using the ROBIS tool (Whiting et al., 2016), with the full results being reported in Table B31. Overall, the EAC considered the systematic review and meta-analyses were at low risk of bias.

Specific strengths of the analysis considered by the EAC were as follows:

- The identification of studies was performed through the systematic review described in Section 4. The EAC could not improve on the literature searching methods used and had no major concerns regarding omitted studies. Additionally, sub groups were defined *a priori* with full rationale for the inclusion and exclusion of studies.

- The meta-analyses adopted RR in SSI as the outcome measure. This was appropriate, as measuring relative effects through risk reduction is

more intuitive than through odds ratios (Grant, 2014). Forest plots were clearly presented and included the prediction interval; this clearly illustrates the highly probable values for the true treatment effects in future settings (IntHout et al., 2016).

- The meta-analyses reported several useful methods for the assessment of study heterogeneity and detection of outlying studies, such as the Baujat diagnostic plot and "leave one out analysis" (Kossmeier et al., 2020). Whilst it was stated a funnel plot was undertaken (for detection of publication bias), these data were not presented. However, other published systematic reviews and meta-analyses have indicated publication bias is unlikely in this field (Ahmed et al., de Jonge et al., 2017, Konstantelias et al., 2017, Wang et al., 2013).

The EAC did not agree with the company on its assessment of study heterogeneity, where it was stated "There was an overall lack of heterogeneity across all the studies, which was confirmed by the quantitative assessment". Whilst this was generally true using standard Cochrane measurements for heterogeneity such as Cochrane's Q, Higgins and Thompson's I^2 and τ^2 metrics, it did not mean the studies were sufficiently homogenous to allow for fixed effect analysis. This was because the studies were performed in very heterogeneous populations, using different surgical procedures and different baseline SSI risks, and as such, the treatment effect sizes might be expected inherently to differ from study to study. In these circumstances, it would be prudent to primarily report using random effects rather than fixed effect analysis, to reflect the uncertainty present (Nikolakopoulou et al., 2014). It was noted by the EAC that each form of analysis reported similar results in most cases.

However, the EAC's main concern was not the meta-analysis *per se*, but the underlying quality of the studies that informed it, with half of these being considered as low quality (discussed in Section 5.2). Whilst the company had critically appraised the RCTs using the provided template tool, no attempt was made to stratify the analysis by study quality or size. Therefore the EAC performed this as additional analyses.

7.2 *Additional meta-analyses undertaken by the EAC*

7.2.1 Replication of analysis

The EAC was able to replicate the results of the meta-analyses using R (version 3.6.1), and a newer version of the meta package (version 4.17.0). The first meta-analysis (all studies) was also replicated using Review Manager (version 5.3) (Cochrane, 2019) to verify the results of the meta package, for both fixed and random effects. Results were found to be identical; thus the company's meta-analyses were considered to be validated.

The EAC updated the adult subgroup analysis to include the Ruiz-Tovar 2015 study. The results are summarized in Table 7.2, and the updated forest plot is given in Appendix E (Figure E1).

Table 7.2: Summary of EAC results from updated meta-analyses

Subgroup analysed	Analysis used*	I^2 value†	Relative risk	Lower 95% CI	Upper 95% CI
Adults (N=21)	Random	30%	0.71	0.59	0.86
	Fixed		0.72	0.64	0.81

* Fixed or random effects analysis. Taking a conservative approach, the use of random effect analysis is most appropriate (Nikolakopoulou *et al*., 2014).
† I^2 value is a measure of inter-study heterogeneity. It can be interpreted as follows: 0% to 40%, might not be important; 30% to 60%,may represent moderate heterogeneity; 50% to 90%, may represent substantial heterogeneity; 75% to 100%: considerable heterogeneity (Higgins *et al*., 2019).

7.2.2 Additional meta-analyses

For reference, the EAC has calculated the absolute SSI rate in each arm of the included studies (N=28), Table 7.3, as these are not reported directly in the meta-analysis.

Table 7.3. *Absolute SSI rate in control and intervention arms.*

Study	**Intervention arm patients (n)**	**Intervention arm SSI rate (%)**	**Control arm patients (n)**	**Control arm SSI rate (%)**
Arslan 2018, Turkey	86	10.5	91	20.9
Baracs 2011, Hungary	188	12.2	197	12.2
Diener 2014, Germany	587	14.8	598	16.1
Ford 2005, USA	91	3.3	44	0.0
Galal 2011, Egypt (All)	230	7.4	220	15.0
Ichida 2018, Japan	508	6.9	505	5.9
Isik 2012, Turkey	170	5.3	340	5.6
Justinger 2013, Germany	485	6.4	371	11.3

Lin 2018, Taiwan	51	0.0	51	3.9
Mattavelli 2015, Italy	140	12.9	141	10.6
Mingmalairak 2009, Thailand	50	10.0	50	8.0
Nakamura 2013, Japan	206	4.4	204	9.3
Olmez 2019, Turkey (All)	445	13.5	445	26.1
Renko 2017, Finland	778	2.6	779	5.4
Rozzelle 2008, USA	46	4.3	38	21.1
Ruiz-Tovar 2015, Spain	50	10.0	51	35.3
Ruiz-Tovar 2020, Spain	45	8.9	47	23.4
Santos 2019, Brazil	251	5.2	257	7.8
Seim 2012, Norway	160	10.0	163	10.4
Soomro 2017, Pakistan	189	3.7	189	5.8
Sprowson 2018, UK	1164	1.8	1273	2.5
Sukeik 2019, UK	81	4.9	69	1.4
Tabrizi 2019, Iran	160	7.5	160	6.9
Thimour-Bergstrom 2013, Sweden (Leg)	184	12.5	190	20.0
Thimour-Bergstrom 2013, Sweden (Sternum)	179	12.8	178	11.2
Turtiainen 2012, Finland	139	22.3	137	21.9
Williams 2011, Wales	66	15.2	61	23.0
Zhang 2011, China	46	4.3	43	11.6

The EAC performed the following additional meta-analyses:

- Based on study quality, stratified by high quality (N=9, Figure E2); high/moderate quality (N=15, Figure E3); low quality (N=11, Figure E4).
- Based on study sample size, stratified by >1,000 (N=4, Figure E5); ≤1,000 (N=24, Figure E6); >500 (N=8, Figure E7); ≤ 500 (N=20, Figure E8).
- Based on location, stratified by UK only (N=3, Figure E9) and non-UK only (N=25, Figure E10).

A summary of the EAC's analysis is reported in Table 7.2. The point estimate of RR for SSI was below 1 (favoured Plus Sutures) in all the scenarios analysed. However, the magnitude of the RR appeared to be related to study quality and size. When only high-quality studies were considered, the RR was 0.85 (95% CI 0.64 to 1.13) compared with an RR of 0.71 (95% CI 0.51 to 0.99) for low-quality studies. Similarly, studies enrolling 1000 or more patients reported an RR of 0.80 (95% CI 0.44 to 1.43) compared with 0.71 (95% CI 0.54 to 0.92) for the smaller studies enrolling less than 500 patients. However, results from additional meta-analyses with subsets of studies should be

interpreted with caution, because the smaller sample sizes used will lower power and precision. Additionally, it should be noted that in fixed effects models the weight of studies in the meta-analyses are based on the event rate of SSIs, not the overall sample size. Thus large studies that investigated clean wounds, such as that by Sprowson *et al.* (2018), will have lower event rates and less impact on the analyses, Table 7.4.

Finally, the EAC compared the RR in studies set in the UK compared with the rest of the world. The incidence of SSIs was reduced by 16% in the UK compared with 30% in other countries. However, the UK data consisted of only three studies, with most data being on clean wounds, thus there is no evidence that Plus Sutures are more or less effective in the UK than elsewhere.

Table 7.4. *EAC's additional meta-analyses: summary of results by quality, size and location.*

Subgroup analysed		Analysis used*	I^2 value†	Relative risk	Lower 95% CI	Upper 95% CI
Quality	High (N=9)	Random	36%	0.85	0.64	1.13
		Fixed		0.86	0.74	1.01
	High/moderate (N=15)	Random	39%	0.75	0.61	0.94
		Fixed		0.77	0.68	0.88
	Low (N=11)	Random	35%	0.71	0.51	0.99
		Fixed		0.65	0.54	0.79
Sample size	>1,000 (N=4)	Random	58%	0.80	0.44	1.43
		Fixed		0.83	0.68	1.01
	≤1,000 (N=24)	Random	33%	0.69	0.56	0.85
		Fixed		0.67	0.59	0.77
	>500 (N=8)	Random	58%	0.71	0.54	0.93
		Fixed		0.70	0.61	0.81
	≤500 (N=20)	Random	32%	0.71	0.54	0.92
		Fixed		0.74	0.63	0.87
Location	UK (n=3)	Random	1%	0.84	0.17	4.23
		Fixed		0.76	0.50	1.17
	Non-UK (n=25)	Random	44%	0.70	0.58	0.85
		Fixed		0.72	0.64	0.80

* Fixed or random effects analysis. Taking a conservative approach, the use of random effect analysis is most appropriate (Nikolakopoulou *et al*., 2014).
† I^2 value is a measure of inter-study heterogeneity. It can be interpreted as follows: 0% to 40%, might not be important; 30% to 60%,may represent moderate heterogeneity; 50% to 90%, may represent substantial heterogeneity; 75% to 100%: considerable heterogeneity (Higgins *et al*., 2019).

8 Interpretation of the clinical evidence

Plus Sutures are triclosan-coated sutures with the intended aim of reducing the frequency of SSIs as part of an overall package of infection control methods (NICE, 2019a). The mechanism of action of Plus Sutures, and the potential benefits of the technology, are scientifically and clinically plausible. The clinical evidence base relating to Plus Sutures is relatively high-quality and extensive, and likely to be generalizable to the NHS of England.

The EAC included 31 RCTs that reported on the use of the technology, which enrolled more than 14,000 patients in total. The populations enrolled and procedures used were varied, as was RCT study quality. The only outcome that was consistently reported was the incidence of SSI, mainly using the CDC definition (Center for Disease Control, 2021). Despite the fact that some of the studies had relatively large sample sizes, few reported statistically significant differences in SSIs between arms in either direction. This may have been because the event rate of SSIs were relatively low, particularly in populations and procedures which generated clean wounds. The EAC did not identify any other adverse events associated specifically with triclosan.

The company reported a series of meta-analyses using data from 28 of the RCTs identified in the systematic review in order to increase statistical power of analysis. The RR associated with Plus Sutures use was 0.71 (85% CI 0.59 to 0.85) overall. Subgroup analysis reported that, in all scenarios, Plus Sutures were associated with a significant reduction in the incidence of SSIs compared with control sutures. The EAC validated these analyses through replication. Additional analyses by the EAC showed that when studies were stratified by quality or size, the magnitude of effect diminished, but the direction of effect always favoured Plus Sutures. Thus the EAC was persuaded that Plus Sutures reduce the incidence of SSIs in all surgical procedures they are used in; however, the size of this reduction will depend on several other factors relating to the population and procedures undertaken, and quantifying the magnitude of effect in specific surgery types is less certain.

The EAC has examined the claimed benefits of Plus Sutures made by the company in the context of the clinical evidence included. These are listed in Table 8.1. Whilst the EAC accepted the claim that Plus Sutures reduces SSI was proven, there was little direct evidence from empirical data to support the other claimed benefits. Nevertheless, the EAC considered that these benefits were likely to be true based on extrapolation of SSI RR data and economic modelling.

Table 8.1 *Summary of evidence for claimed benefits.*

	Claimed benefits	Company supporting evidence	Company rationale	EAC opinion
Patient benefits	Reduced risk of SSI, independent of the type of surgery	SLR and meta-analysis conducted for this submission	All analyses indicated the reduction in SSI risk in the Plus Sutures arm were statistically significant. Results of the overall population meta-analysis incidence of SSI indicated that patients in the Plus Sutures group had a 28% reduction in the risk of developing an SSI compared to those in the control group. Results across subgroups were between 25% and 48% depending on subgroup reduction in incidence of SSI with the use of Plus Sutures.	Benefit proven The EAC is in broad agreement that the evidence, derived from data synthesis of 28 RCTs, for Plus Sutures being effective at reducing the incidence of SSIs is unequivocal. However, the magnitude of reduction in RR is less clear and may be dependent on the population and/or procedures used.
	Reduced SSI associated length of stay	SLR conducted for this submission (Jenks *et al*., 2014) (Badia *et al*., 2017) (de Jonge *et al*., 2017)	Plus Sutures can reduce the risk of extended length of stay associated with SSI. SSIs are known to be associated with increased length of stay, additional cost, and hospital readmission. Plus Sutures have been shown in multiple meta-analyses to reduce the risk of SSIs by 28%. Reducing the risk of SSIs can therefore release additional beds.	Benefit likely There is no direct consistent empirical evidence to support this outcome. It is logically consistent that if Plus Sutures reduce the incidence of SSIs, length of hospital stay will also be reduced. However, this is currently unquantifiable.
	Reduced antibiotics prescribed	SLR conducted for this submission	Limited evidence is available for antibiotic use. Available evidence suggests SSI is associated with an increase in antibiotic use (as per NICE recc 1.4.9 (NICE, 2019a). With the reduction in SSI reported by use of Plus Sutures in the existing published	Benefit likely There is no consistent empirical evidence on this outcome. However, NICE does recommend the use of antibiotics to treat SSI (NICE, 2019a). Therefore reduced incidence of SSI should also reduce antibiotic prescribing.

	Claimed benefits	Company supporting evidence	Company rationale	EAC opinion
			literature and meta-analysis presented within this submission, it is therefore likely that antibiotic prescribing for the treatment of SSI should logically be reduced.	
System benefits	Cost savings as a result of reduced treatment of SSI	(Leaper *et al*., 2017) *De novo* cost model to be submitted in part 2	Plus Sutures can result in mean cost savings of £91.25 per surgical procedure. Savings associated with use of Plus Sutures as reported in the *de novo* cost consequence model will be presented in part 2 of this submission.	Benefit proven The company's *de novo* economic model shows cost savings in all scenarios subject to nearly all plausible sensitivity analysis. See Section 9.4.
	Reduced bed days associated with reduced treatment of SSI	SLR conducted for this submission (Jenks *et al*., 2014)	Limited evidence from the SLR is available reporting on length of hospital stay in patients who received Plus Sutures versus those that do not (due to limited reporting and limited SSI incidence in clinical studies). However, evidence is available concluding that SSI is associated with an increase in length of stay (Jenks, 2014). The published literature and meta-analysis reported in this submission demonstrate a statistically significant reduction in SSI associated with the use of Plus Sutures. It is therefore likely that by reducing SSI incidence will reduce bed days associated with reduced treatment of SSI.	Benefit likely No direct empirical evidence is available, but is logically consistent with a reduction is SSIs.

	Claimed benefits	Company supporting evidence	Company rationale	EAC opinion
Cost benefits	Cost-effective, and cost saving compared with standard care	(Leaper *et al*., 2017) *De novo* cost model to be submitted in part 2	Plus Sutures can result in mean cost savings of £91.25 per surgical procedure. Savings associated with use of Plus Sutures as reported in the *de novo* cost consequence model will be presented in part 2 of this submission.	Benefit proven The company's *de novo* economic model shows cost savings in all scenarios subject to all plausible sensitivity analysis. Cost-effectiveness analysis not in scope.
Sustainability benefits	Contributes to the reduction of antibiotic prescribing	SLR conducted for this submission	Limited evidence is available from the SLR on the relative risk for antibiotic use in patients receiving Plus Sutures versus those that do not. However, SSI incidence was significantly reduced and SSI is associated with an increase in antibiotic use (as per NICE recommendation 1.4.9 (NICE, 2019a) hence antibiotic use should logically be reduced.	Benefit likely No direct empirical evidence is available, but is logically consistent with a reduction is SSIs and consequent reduction in antibiotic prescribing.
Abbreviations: EAC, External Assessment Centre; RR, relative risk; SLR, systematic literature review; SSI, surgical site infection.				

8.1 *Integration into the NHS*

Adoption of Plus Sutures would not alter current care pathways. The EAC is not aware of any barrier to implementation of the technology to the NHS. Introduction of Plus Sutures would be a direct replacement of non-triclosan coated sutures already employed, with no requirement for training or modifications of existing procedures. The technology is already extensively used and is available on the NHS Supply Chain.

8.2 *Ongoing studies*

The company summarized five studies which have completed recruitment but not yet published results. The EAC determined that one of these studies was included within the RCTs of the Clinical Submission (Williams *et al*., 2011, NCT00830271, typo in the trial registration reported in the published paper), and 3 others were similar to included RCTs within the Clinical Submission, however the EAC was unable to cross-reference the trial reference with any published papers.

The company also summarized 15 ongoing studies. None are recruiting within the UK so results may not be generalizable to the NHS. Five large ongoing studies (recruiting >500 patients) are summarized in Table 8.2.

Table 8.2: Summary of large (>500 patients) ongoing trials.

Study title, reference	Status, estimated completion	Population (n)	Primary outcome measure(s)	Secondary outcome measure(s)
Pragmatic Multicentre FActorial Randomised Controlled triaL Testing Measures to reduCe Surgical Site Infection in lOw and Middle Income couNtries (FALCON) published protocol [NCT03700749] Sponsored by University of Birmingham (UK) Multi-centre (low and middle income countries (including: Nigeria)	Status: Recruiting Estimated completion date: July 2021 Last update: September 2019	Inclusion: Patients of any age (age eligibility will vary by country), with at least one abdominal incision that is ≥5 cm (open or laparoscopic) with an anticipated clean-contaminated, contaminated or dirty surgical wound. Patients undergoing emergency or elective operations. Any operative indication, including trauma surgery. Exclusion: patients with documented or suspected allergy to iodine, shellfish or chlorhexidine skin preparation, patients unable to complete post-operative follow-up 4 arms (n=5,480): - 2% chlorhexidine + non-coated suture - 2% chlorhexidine + triclosan coated suture - 10% povidone-iodine non-coated suture - 10% povidone-iodine +	SSI [30 days post-surgery]	SSI at discharge [30 days post-surgery from index operation]; Mortality [30 days post-surgery]; Unplanned wound opening [30 days post-surgery]; Reoperation for SSI [30 days post-surgery]; Length of hospital stay for index admission [30 days post-surgery]; Readmission [30 days post-surgery]; Return to normal activities [30 days post-surgery]; Resistance of organisms [30 days post-surgery]; Health resource usage [30 days post-surgery];

		triclosan coated suture		
Antibacterial-coated Sutures at Time of Cesarean [NCT03386240] USA	Status: Recruiting Estimated completion date: January 2021* Last update: May 2020 *[Note the EAC contacted the study investigator who stated that there have been delays to recruitment due to COVID. Assuming that recruitment rates return to pre-COVID levels, they anticipate that the completion date will be delayed by one year.]	Inclusion: Female patients aged between 18 and 50 years, ≥ 24 weeks viable gestation, undergoing caesarean delivery. Exclusion: No prenatal care or a non-resident patient who is unlikely to be followed-up after delivery, immunosuppressed patients, decision to use other closure material (e.g. secondary wound closure, mesh closure), skin infection, coagulopathy, high likelihood of additional surgical procedure beyond caesarean (e.g. scheduled hysterectomy, bowel or adnexal surgery), allergy to triclosan, incarcerated individiuals. 2 arms (n=3,374): - VICRYL Plus, MONOCRYL Plus, PDS Plus (triclosan coated) - VICRYL, MONOCRYL, PDS (non-triclosan coated)	Composite of endometritis and/or wound infection and/or other post-caesarean infections [within 30 days of delivery]	None listed
Triclosan-coated sutures versus uncoated sutures for prevention of surgical site infection after abdominal wall closure in open/laparoscopic colorectal surgery	Status: No longer recruiting Last follow-up date:	Inclusion: Patients aged 20 years and older, undergoing scheduled colorectal cancer surgery, operable condition and organ function,	SSI	Surgical site complications other than SSI; Post-operative hospital stay

[UMIN000042605] Japan	March 2022 Last update: November 2020	performance status (ECOG) of either 0 or 1 Exclusion: history of surgical wounds on planned surgical site, surgery on other organs at same time, history of radiation therapy or chemotherapy, contamination or infection surgery. 2 arms (n=2,200): - Triclosan coated sutures - Uncoated sutures		
The efficacy of triclosan coated sutures on rate of surgical site infection in spinal surgery: a protocol for a single-center randomized controlled trial [ChiCTR2000031795] China	Status: Recruiting Recruiting until end December 2020. Last update: April 2020	Inclusion: Patients aged between 18 and 79 years, who failed to respond to conservative treatment and received primary spinal surgery. Exclusion: surgery for infectious diseases such as tuberculosis, suppurative inflammation, patients allergic to triclosan coated sutures, skin diseases that may affect wound healing, diabetics with poor blood glucose control / fasting plasma glucose (FPG) ≥ 10 mmol/L, immunodeficiency 2 arms (n=840): - Triclosan coated sutures - Non-coated sutures	SSI	Wound closure (min); Pain (VAS); Post-operative hospital stay; Satisfaction; Frequency of changing wound dressing; Inflammatory markers (WBC, CRP).
Does the use of antibacterial (Triclosan) impregnated sutures at the time of performing	Status: Not yet recruiting	Inclusion: Female patients aged between 18 and 45 undergoing elective, semi-elective and	SSI [30 days post-caesarean section]	Wound/fascial dehiscence [30 days post-

caesarean section reduce the incidence of surgical site infection in postpartum women when compared to standard sutures? [ACTRN12312000768897] New Zealand	Last update: July 2012	emergency caesarean sections. Exclusion: Pre-existing type 1 or 2 diabetes (not gestational diabetes) 2 arms (n=550): - Triclosan coated sutures (muscle sheath and skin closure) - Non-coated sutures (muscle sheath and skin closure)		caesarean section]

9 Economic evidence

9.1 *Published economic evidence*

9.1.1. Search strategy and selection

The company used a single search to identify both clinical and economic evidence (as reported in Part 2 of their submission). The EAC has assessed the literature search and concluded it was performed and reported to the required standard (Section 4.1). From this search the company identified and reported on eight studies reporting economic outcomes. These are summarized in Table 1 of the Economic Submission with individual details of each study reported in Section 2. The company did not include a narrative concerning the studies nor did the company draw overall conclusions about how the studies supported the claimed benefits of Plus Sutures. However, the company did cite the results of the studies to validate the *de novo* model, stating “Eight other cost-effectiveness analyses were identified in the economic review (as shown in Table 1), all of which reported cost savings with the introduction of Plus Sutures”. No parameters from these studies were used to inform the company’s *de novo* model.

9.1.2 Published economic evidence review

The EAC critically appraised each of the eight included studies using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist (Husereau et al., 2013) (Appendix F, Tables F1 to F8). The following is a summary of the studies’ characteristics, Table 9.1.

Table 9.1. *Summary of economic studies identified.*

Study reference	Methods and perspective	Population	Intervention(s)	Clinical and cost parameters	Summary results	EAC comments
(Leaper *et al*., 2017) UK	SR and MA Decision tree with PSA NHS of England Costed in GB pounds	Any patient undergoing surgery that requires sutures. Studies included both paediatric and adult patients	I: "Antibiotic-coated sutures" [TCS] C: "Non-antibiotic-coated sutures" [all included]	OR from MA of SR (n=14). SSI incidence and costs estimated from HES data.	TCS reduced SSI: OR 0·61 (95% CI 0.52 to 0.73, p<0·001) TCS cost saving: £91.25 (90% CI £49.62 to £142.76)	Study was costed in GB pounds and was generalizable to the NHS. Appraised in Table F1.
(Ceresoli *et al*., 2020) Italy	SR and MA Budget impact model with PSA	Patients undergoing general surgery.	I: TCS C: Conventional sutures	RR from MA Baseline SSI incidence from Italian study Cost of SSI from government sources.	RR of SSI with TCS of 0.70 (95%CI 0.49 to 0.98). T TCS cost-saving from PSA €13,935 (95%CI €9068 to €18,665).	Poor generalisability to NHS. Appraised in Table F2.
(Mahajan *et al*., 2020) India	SR and MA Deterministic decision tree.	Patients undergoing gynaecological or obstetrics surgery	I: TCS C: Control sutures	RR from one study (retrospective observational). SSI costs determined by costing studies in Indian hospitals.	TCS cost saving, INR (Indian Rupee) 14,476 in a private hospital setting in India, and saving of INR 4,145 in a public hospital setting.	Parameter inputs were not robust. Very limited generalisability to the NHS. Appraised in Table F3.
(Leaper *et al*., 2020) US	Retrospective observational cohort analysis Decision tree with PSA	Patients undergoing colorectal surgery	I: TCS C: Control sutures	Incidence of SSI from interrogation of Medicare and Medicaid databases. RR from published RCTs.	Median cost savings over 12 months for superficial and deep incisional SSI were $1170 (95% CI $146 to $4884) for commercial payers and $1036 ($111 to $4826) for MediCare. Median cost savings over 12 months for the deep incisional SSIs only were $809 (95% CI $26 to	Incidence of SSI was very high (23.9%). Study lacks generalisability to the NHS Appraised in Table F4.

					$4481) and $870 (95% CI $33 to $4624) for commercial payers and Medicare respectively.	
(Nakamura *et al*., 2013)	Costing study piggy backed onto RCT. Costed in dollars.	Patients undergoing colorectal surgery	I: TCS C: Control sutures	Patient level data taken from RCT. Costs analysis not transparent.	Median additional cost of wound infection management was $2,310. The total cost saving during the study period, aggregated across all patients where TCS were used was estimated to be $40,219.	Not generalizable to NHS. RCT considered to be of moderate quality by EAC (Table B13). Economic analysis appraised in Table F5.
(Fleck *et al*., 2007) Austria	Retrospective observational study. Patient-level cost analysis.	Patients undergoing cardiac surgery involving sternal incision	I: TCS C: Conventional sutures	Incidence of infection from patient data. Costs "The costs of a patient with sternal wound infection is $11,200 plus the costs of the normal stay ($11,400), resulting in a total cost of $22,600".	24 patient had an SSI in the control group compared with 0 [zero] in TCS group. Estimated additional cost of $11,200 per patient.	Methodology not robust and results not credible. Not generalizable to NHS. Appraised in Table F6.
(Singh *et al*., 2014) US	Cost-effectiveness analysis with decision tree PSA Third-party payer, and societal perspectives	Patients undergoing abdominal surgery	I: TCS C: Conventional sutures	Inputs from published literature and healthcare databases. Reference costs used.	TCS saved $4,109–$13,975 (hospital perspective), $4,133–$14,297 (third-party payer perspective), and $40,127–$53,244 (societal perspective) per SSI prevented [assuming 15% SSI risk].	Not generalizable to NHS. Appraised in Table F7.
(Stone *et al*., 2010)	Retrospective costing study.	Patients with CSF shunts	I: TCS C: Conventional sutures	Aggregated costs from patient level analysis.	5.3 fold increase in hospital costs associated with treating a shunt	Not generalizable to NHS nor general surgery.

US	Hospital perspective.				infection (when compared to the initial shunt placement).	Appraised in Table F8.
Abbreviations: C, comparator; CI, confidence intervals; HES, hospital episode statistics; I, intervention; MA, meta-analysis; OR, odds ratio; PSA, probabilistic sensitivity analysis; RCT, randomised controlled trial; RR, risk reduction; SR, systematic review; SSI, surgical site infection; TCS, triclosan coated sutures (Plus Sutures).						

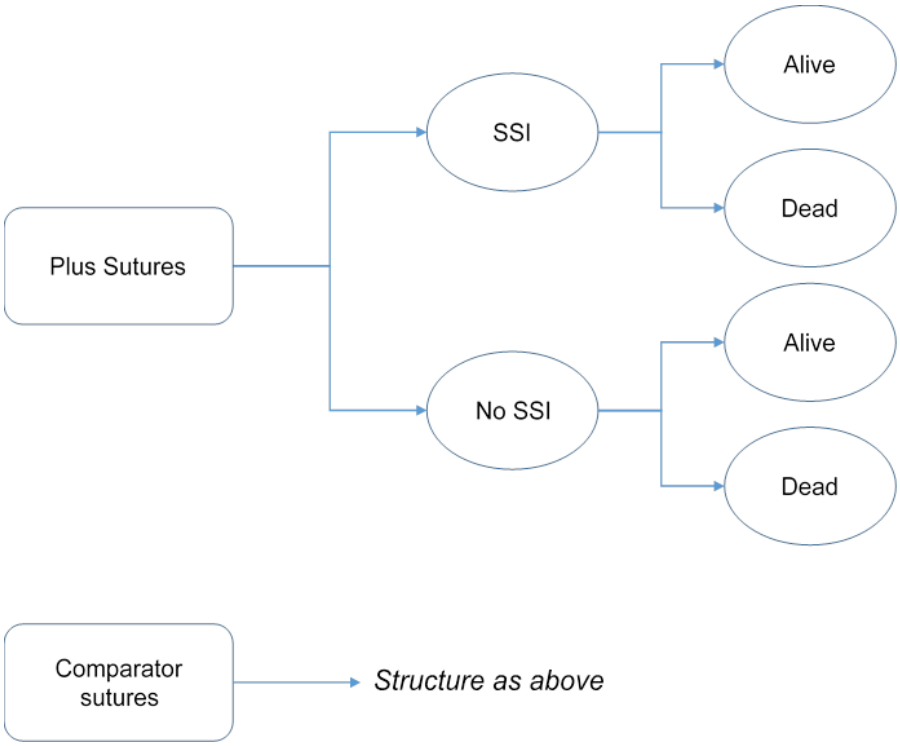
9.2 *Company de novo cost analysis*

9.2.1 Economic model structure

The company developed an economic model using a cost consequence analysis (CCA) framework, which was appropriate and consistent with the Medical Technologies Evaluation Programme (MTEP) methodology (NICE, 2017). The model is described and critiqued in the following sections.

The model was a decision tree in an executable Excel spreadsheet, across 12 worksheets. A series of embedded macros were used to generate Tornado diagrams for univariate deterministic sensitivity analysis (DSA) and run probabilistic sensitivity analysis (PSA) for the base case and scenario analyses. Patients enter the model following surgery with wound closure using either Plus Sutures or non-triclosan coated sutures (comparator sutures). They subsequently go on to develop, or not develop, an SSI. There follows an additional branch in the tree, with patients with and without SSI dying or remaining alive. The structure of the model is illustrated in Figure 9.1.

Figure 9.1. *Structure of the de novo model*.



The EAC considered the model structure was appropriate. However, the addition of mortality on the terminal branches of the tree were considered to unnecessarily complicate the model. These were used by the company to present cost-effectiveness results of cost per death avoided. However, the EAC noted that mortality was not an outcome listed in the Scope (NICE,

2021b), nor is the cost-effectiveness framework used by MTEP (NICE, 2017). Therefore the EAC has restricted its assessment to the level of incidence of SSIs only.

The layout of the spreadsheet was clear, easy to navigate, and input values were transparent. There were no hidden sheets and all values used were clearly defined in the company's Economic Submission. However, the EAC found three discrepancies between the parameter distribution values defined in the company submission and those appearing in the model. These were queried with the company and they confirmed that the model was correct, and an error had been made in the written submission. The EAC found a further three discrepancies between the parameter distribution values used in the model for the base case, and for the subgroups. The company confirmed that the base case values were correct and provided an updated model. The calculation formulae used were mostly transparent and robust, and the EAC did not need to make any assumptions to understand or replicate the model (see Section 9.2.4).

9.2.2 Model assumptions

The principal assumptions made by the company were reported in Table 2 of the Economic Submission. This table has been duplicated with the EAC's opinion on the validity of the assumption in Table 9.2. The EAC agreed all the assumptions made by the company were justified. Furthermore, several of these assumptions were conservative, and clearly did not lead to bias in favour of Plus Sutures in the economic analysis.

9.2.3 Description of PICO

Population

The company defined the population as "adults and children that need wound closure after a surgical procedure and in whom absorbable sutures are an appropriate option", which aligns with the scope. Four subgroups were also defined: adults (18 years and above), children (under 18), clean wound procedures, non-clean wound procedures. The EAC agreed the population defined was appropriate and consistent with the clinical evidence presented, in particular the evidence reported in the meta-analyses.

Intervention

The company included the four variations of Plus Sutures:

- PDS Plus Antibacterial (polydioxanone) Suture
- MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture

- Coated VICRYL Plus Antibacterial (polyglactin 910) Suture
- STRATAFIX Plus Suture

The company stated that the STRATAFIX suture was not explicitly included in the decision problem table of the final scope, but because it was mentioned in the main section, it was included the model. However, the EAC considered that STRATAFIX should be excluded from the assessment, for the reasons discussed in Section 1. The exclusion of STRATAFIX Plus has implications for the costs used in the assessment (see Section 9.2.6).

Comparator

Comparator sutures were identified as those not containing an antibacterial agent. In almost all of the studies included in the Clinical Submission (and meta-analyses) these were the equivalent “non-Plus” Ethicon sutures, thus the only difference between the intervention and comparator was the coating of triclosan.

Outcomes

The relative net costs of the technology were informed by incidence of SSI. The company also included mortality as an outcome, to calculate costs associated with deaths. However, this was considered to be out of scope by the EAC.

Time horizon

The company used a time horizon of 1 year, as “incidence and treatment of SSI is likely to occur within a much shorter timeframe than this, and this aligns with published economic evaluations of Plus Sutures”. The EAC considered this to be appropriate. Thus, no discounting of costs was necessary.

Table 9.2. *Company's de novo model assumptions.*

Assumption	Company justification	Company source	EAC comment
Risk of SSI relate only to those detected and treated during the initial inpatient episode or on readmission (SSIs detected and treated in the community not included)	In line with PHE data published for SSI incidence. The PHE report states that "The results in this national report include inpatient and readmission data only". This assumption was judged to be a conservative because Plus Sutures could also reduce SSIs in the community and therefore the baseline risk of SSI with comparator sutures would be understated in the model. Newton *et al* reports that 66.7% of patients with SSI presented in the community in their study of 1,559 colorectal surgery patients (Newton *et al.*, 2021).	(Public Health England, 2020) and validated by independent clinical experts	The EAC recognises there is a lack of data to quantify the number of SSIs identified and managed in the community/primary care. Therefore agree it is appropriate for the risk of SSI to be from an admitted patient care perspective. The EAC concurs this is a conservative assumption.
The average SSI episode cost does not include the cost of treatment for SSIs treated in the community.	This is based on the data regarding the cost of SSI from Jenks *et al* and aligns with the baseline data used for SSI risk. This was judged to be a conservative assumption because if there are follow up costs after hospital treatment for SSI that occur in the community or primary care then the cost of SSI from an NHS and PSS perspective used in the model may be understated.	(Jenks *et al.*, 2014) and validated by independent clinical experts	The EAC recognises there is a lack of data to quantify the cost of SSIs identified and managed in the community/primary care. Omission of the incidence and associated costs of SSI outside of the hospital is considered to be a conservative assumption.
The relative risk reduction in infection with Plus Sutures derived from the meta-analysis is assumed to apply to baseline risk of infection with comparator sutures based on UK data (e.g. from PHE or Jenks *et al*. (Jenks *et al*., 2014, Public Health England, 2020)).	The studies used in the meta-analysis to derive the relative risk reduction were not used to inform the baseline risk of infection with comparator sutures because many were conducted outside of a UK setting and it was judged a UK source would be more appropriate	Assumption validated by independent clinical experts	The EAC concurs that the use of absolute rates of the incidence of SSIs directly obtained from empirical studies is not generalizable to NHS populations as a whole. The EAC notes that the approach taken, to apply aggregate relative risk reduction rates from trial data to aggregate baseline rates in the NHS, estimated by PHE, is an assumption, but is the optimal use of currently available data..

Adverse events were not included in the model	No adverse events relating to use of Plus Sutures that were judged to have a substantial impact on quality of life or healthcare related resource use were identified in the clinical review and clinical expert input also confirmed this.	See section on adverse event costs for further explanation (follows Table 5). Validated by independent clinical experts.	The EAC did not identify a detectible signal from the medical literature concerning the use of Plus Sutures and adverse events. In practice, it is difficult to discern such adverse events nor prove causation with the use of triclosan.

9.2.4 Validation of the economic model

Company validation

The company reported in the Economic Submission that they had developed the economic model in-house. The structure was validated using literature identified in the economic review, as well as two sources from NICE. These were the *Health economic model* report used to inform NG125, which focussed on interventions other than triclosan-coated sutures (NICE, 2019b), and the economic analysis used to inform *Leukomed Sorbact for preventing surgical site infection* (MTG55) (2021a), which had a similar model structure and shared common inputs. The model and its inputs were quality-assured by a third party consultant. Independent NHS clinical experts, named in the company's economic submission, were also involved in validating key inputs. However, methods used to obtain the expert opinion or elicitation were not reported.

EAC validation

The EAC replicated the company's base case, scenario analyses, threshold analysis and sensitivity analyses by independently reproducing them using programming language R (R Core Team, 2020), and the rdecision package (v1.0.3). The results of this and additional analysis by the EAC (described in section 9.3.6) is given in Appendix F. Clinical and cost parameters were assessed in the following sections, and the EAC had access to NICE expert advisers, with dialogue and correspondence being logged for transparency (EAC external correspondence log, 2021).

9.2.5 Clinical parameters and variables

The company reported the values for the clinical parameters and variables used in the model in Table 3 of the Economic Submission, as well as the source and rationale for these. The model was informed by two key clinical parameters, namely the baseline risk of infection (for standard sutures) and the RR offered by using Plus Sutures. These values varied according to subgroup analysed (total, adults, children, clean, or non-clean). A third parameter, mortality associated with SSI, was thought to be out of scope by the EAC and was therefore not considered further. Omission of mortality from the model was confirmed to have no impact on the results of the cost-consequence analysis.

Baseline risk of SSIs

The company assumed a RR of SSI, derived from meta-analysis of trial data, could be applied to a baseline risk of SSI estimated from a clinical survey in

the UK. The EAC considered this was an appropriate approach to the modelling as the heterogeneous nature of the clinical data meant absolute data could not be reliably used. The company used data published in the *Surveillance of surgical site infections in NHS hospitals in England* to estimate the baseline risk of SSI (Public Health England, 2020). This report documented the methodology and results of the SSI Surveillance service (SSISS) and included data relating to surgical procedures that took place from 1 April 2010 to 31 March 2020, with a particular focus on the latest financial year (2019/20).

The surveillance data was collected prospectively on a quarterly basis and included all eligible patients undergoing surgery in pre-selected surgical categories during each three-month period. Patients were followed up to identify SSIs for 30 days after surgery for non-implant procedures and for 1 year for procedures involving a prosthetic implant. Surveillance was active and included SSI data on the index hospital admission as well as data on hospital readmission due to SSI. The risk was reported as the cumulative incidence of SSIs per 100 procedures, with 95% CI fitted assuming a binomial distribution. The company used the weighted average across all surgical specialties as their baseline estimate of SSI incidence (1.04%). The specialties included were: Abdominal hysterectomy; Bile duct, liver or pancreatic surgery; Breast surgery; Cardiac surgery (non-CABG); Cholecystectomy; CABG; Cranial surgery; Gastric surgery; Hip replacement; Knee replacement; Large bowel surgery; Limb amputation; Reduction of long bone fracture; Repair of neck of femur; Small bowel surgery; Spinal surgery; and Vascular surgery.

The EAC considered the use of the SSISS data to estimate the incidence of SSI was appropriate. It represented real-world data taken from 195 NHS hospitals representing 133 NHS trusts, comprising of more than 677,343 procedures. However, the reported data had limitations and therefore should be interpreted with caution. Firstly, data collection was largely voluntary and was not systematic, with only orthopaedic services (restricted to knee and hip replacement) being mandated by the SSISS. These are relatively clean procedures resulting a low incidence of SSIs. Over-representation of these orthopaedic data may bias the weighted average SSI incidence downwards so that it is not representative of the overall procedural risk. Secondly, data on the incidence of SSI was restricted to those events occurring during the index period of hospitalisation or on readmission; SSIs detected in the community did not contribute to the incidence rate. For these reasons, the estimate of the incidence of SSI taken from the SSISS was likely to be an underestimate.

The EAC concurred with the company that the SSI base rate was conservative; that is, it did not bias cost estimates in favour of Plus Sutures.

The company tested the assumptions informing the SSI incidence using sensitivity analysis, including using data from a detailed economic analysis of the burden of SSIs in the NHS (Jenks et al., 2014).

Risk of SSIs in subgroups

In addition to the base-case, the company performed scenario analysis in adult and children populations, and in clean and non-clean wounds. The company assumed the incidence of SSI was the same as in adults (that is, 1.04%). This was considered to be a conservative assumption on the basis that other studies had reported higher rates and on expert opinion. The EAC agreed the rate of 1.04% was likely to be conservative.

The company categorised the procedure types as clean (class I wounds) or clean-contaminated wounds (≥2 class 2 wounds) (Herman and Bordoni, 2021) based on a mapping study (Troughton et al., 2018), and weighted the rates accordingly (0.8% for clean wounds and 6.8% for non-clean wounds). This approach was validated by the company's clinical experts, and was considered satisfactory by the EAC. However, it was noted that the data used to inform these estimates were mainly derived from clean procedures (n=650,288) rather than non-clean procedures (n=27,115) owing to the mandatory reporting of orthopaedic procedures only.

Risk reduction associated with Plus Sutures

The company used a RR value of 0.71 in the *de novo* model to represent the baseline effect of using Plus Sutures to prevent SSI compared with standard sutures. This was derived from the fixed effects analysis of all studies, including those using STRATAFIX (N=30) reported in Figure 7h. The EAC considered the base case RR should have been the random effects analysis reported in Figure 7c of the Clinical Submission. However, the point estimate of this was numerically identical (0.71, 95% CI 0.59 to 0.85). Other RR parameters were derived from the specific meta-analyses performed in the relevant subgroups. The EAC agreed with this approach, but favoured the use of results from the random effects rather than fixed effects models, where available.

The clinical parameters used in the model are summarized in Table 9.3.

Table 9.3. *Clinical parameters (Incidence of SSI and risk reduction*).

	Subgroup	Point estimate	Distribution for sensitivity analysis	Source	EAC comment
Incidence of SSI	Base case	1.04%	DSA Lower and upper bound 0.5% to 9.1% (based on hip/knee replacement at the lower end to bile duct, liver or pancreatic surgery at the upper end) PSA* Distribution Beta (α: 7040, β: 670303)	PHE SSISS Weighted mean of all surgical categories.	Estimate biased by over-representation of orthopaedic procedures. Likely to be conservative.
	Adults	1.04%	1.04%	PHE SSISS Weighted mean of all surgical categories.	Data was not specific to age. Likely to be conservative.
	Children	1.04%	1.04%		
	Clean	0.8%	DSA Lower and upper bound 0.5% to 3.0% (based on hip/knee replacement at the lower end to coronary artery bypass graft at the upper end) PSA Distribution Beta (α: 5186, β: 645042)	PHE SSISS Weighted mean of clean wounds.	The EAC agreed with the approach taken to estimate baseline incidence of SSI in clean and non-clean surgical procedures. Categorisation of wounds undertaken using data from Troughton *et al*. (2018).
	Not clean	6.8%	DSA Lower and upper bound 1.8% to 9.1% (based on abdominal hysterectomy at the lower end to	PHE SSISS Weighted mean of clean-contaminated wounds.	

	Subgroup	Point estimate	Distribution for sensitivity analysis	Source	EAC comment
			bile duct, liver or pancreatic surgery at the upper end) PSA Distribution Beta (α: 1854, β: 25261)		
Risk Reduction	Base case	0.71	Company DSA Lower and upper confidence interval 0.64 to 0.79 Company PSA Distribution Lognormal (ln mean: -0.342, ln SE: 0.0537) EAC DSA Lower and upper confidence interval 0.59 to 0.85 Distribution Lognormal (ln mean: -0.342, ln SE: 0.0537)	Company meta-analyses (N=31) Company meta-analyses (N=28)	The company used FE analysis of all studies. The EAC used RE analysis of studies excluding STRATAFIX.
	Adults	Company 0.73 EAC 0.74	EAC PSA (95% CI 0.62 to 0.88) Distribution Lognormal (ln mean: -0.315, ln SE: 0.0593)	Company meta-analyses (N=25).	The company used FE analysis of adults subgroup, the EAC used RE analysis.
	Children	Company 0.52	EAC PSA (95% CI 0.32 to 0.87) Distribution Lognormal (ln mean: -0.654, ln SE: 0.2551)	Company meta-analyses (N=2).	FE analysis used (RE analysis not available for 2 studies).
	Clean	Company 0.75 EAC 0.71	EAC PSA (95% CI 0.53 to 0.96) Distribution Lognormal (ln mean: -0.288, ln SE: 0.0951)	Company meta-analyses (N=15).	The company used FE analysis of clean subgroup, the EAC used RE analysis.

	Subgroup	Point estimate	Distribution for sensitivity analysis	Source	EAC comment
	Not clean	Company 0.66 EAC 0.67	EAC PSA (95% CI 0.48 to 0.92) Distribution Lognormal (ln mean: -0.416, ln SE: 0.1003)	Company meta-analyses (N=12).	The company used FE analysis of not clean subgroup, the EAC used RE analysis.

Abbreviations: DSA, deterministic sensitivity analysis; FE, fixed effects; PHE, Public Health England; PSA, probabilistic sensitivity analysis; RE, random effects; RR, risk reduction; SE, standard error; SSI, surgical site infection; SSISS, surgical site infection surveillance service (Public Health England, 2020).

9.2.6 Resource identification, measurement and valuation

There were two costs used in the *de novo* economic model; these were the costs of the technology itself (and comparator), and the estimated costs of SSIs that Plus Sutures are designed to prevent. Issues concerning these costs are summarized in Table 9.3.

Technology costs

Various Ethicon Plus Sutures are available and are supplied in many pack sizes. The NHS Supply Chain lists several hundred devices (NHS Supply Chain, 2021)

The unit cost of the technology used by the company in the *de novo* economic model was £4.13. The company stated this was a blended price, which included all variations of Plus Suture (polymer, length, gauge, needle, including sutures with a barbed design, that is, STRATAFIX Plus). This cost was based on a weighted average of list prices based on volumes supplied to the NHS, and was said by the company to reflect an average price per suture strand, taking account of all individual suture code characteristics (listed above). The company reported that the individual products listed in the scope had weighted average costs as follows: MONOCRYL Plus £4.60; PDS Plus £5.11; VICRYL Plus £3.56. The technology costs provided by the company were inclusive of STRATAFIX Plus."

The unit cost of the comparator technology, which was the equivalent sutures without triclosan coating, calculated using the same methodology, was reported as £3.28.

The EAC had two criticisms of the costs of the technologies used in the company's model. First, the method used to calculate these costs, and the data used, were not transparent or reproducible. Secondly, the costs included STRATAFIX barbed sutures. This technology was not in the decision problem of the final scope (NICE, 2021b) and had been excluded by the EAC, in agreement with NICE expert advisers (EAC external correspondence log, 2021). However, because of the lack of transparency in the way the technology cost was calculated, and the complexity of the Supply Chain, it was not possible to disaggregate the STRATAFIX data. The company did not supply the EAC with average weighted costs without STRATAFIX. The EAC noted that STRATAFIX sutures cost several times that of non-barbed sutures, so even small volumes would increase the average cost used in the model. The company observed that this increased cost was conservative. Nevertheless, the EAC was of the opinion the inflated cost did not accurately represent the costs of the sutures being assessed and was not transparent. Consequently the EAC adopted the technology costs for both intervention and

comparator reported in MIB204 (NICE, 2020) for all its analyses (see Section 9.3.6).

Number of sutures per procedure

The company estimated that on average, 5 sutures are used per surgical procedure. This value was derived following dialogue with the authors of a previous meta-analysis and economic analysis on Plus Sutures (Leaper et al., 2017) and validated by the company's expert advisers. A plausible range of 3 to 9 sutures was estimated for sensitivity analysis.

The EAC considered that the number of sutures used would be highly dependent on the population and procedures undertaken; however it was accepted that data reported at this level of data granularity was unlikely to be available. NICE expert advisers agreed the values were plausible (EAC external correspondence log, 2021), therefore the company values were accepted .

Costs associated with SSIs

The company estimated the costs of SSIs using data from a costing study set in the Plymouth Hospitals NHS Trust using data collected between April 2010 and March 2012 (Jenks et al., 2014). The researchers accessed data from a bespoke Patient Level Information and Costing System (PLICS) used at the trust which provided linkage of financial and clinical outcomes. Inpatient episodes of SSIs were identified through a dedicated surveillance team of healthcare assistants that had been trained to recognize the signs and symptoms of SSI in accordance with CDC definitions. Post-discharge episodes were identified using a surveillance questionnaire, although only the costs of SSIs requiring readmission were included. Costs were determined at an individual patient level using healthcare resource group (HRG) specific tariffs, with additional remuneration included for use of high-cost medical devices and extended LoS costed on a *per diem* basis. The cost of SSIs was categorised according to surgical speciality and compared with non-SSI cohorts using retrospective analysis.

Of 14,300 procedures included in the analysis, 282 resulted in an SSI during the reference hospital stay or required readmission. The median additional cost attributable to SSI for all surgical categories over the two-year period was £5,239 (95% CI 4,622 to £6,719). The company inflated this value to reflect current costs, and used £6,016 as the value for the base case. The EAC considered this was appropriate. In the submission, the company commented "It is acknowledged that the Jenks source is quite outdated and likely to be a conservative estimate, however, no other source was identified which was

judged to better represent the cost of treating an SSI in the NHS today". The EAC agrees with this assessment and notes:

- The data was conservative in that it did not include costs associated with the management of SSIs in the community.
- The cost had already been considered as appropriate by NICE in a previous relevant clinical guideline (NICE, 2019b) and previous MTG (NICE, 2021a).

The company used the base case cost of SSI for both adult and children subgroups, as more granular data to inform these was lacking. However, the company used the cost data from the Jenks study with classification data from Troughton *et al*. (2018) and weighted incidence data from the PHE SSISS (Public Health England, 2020) to estimate the costs in clean and non-clean subgroups. The company stated "The PHE data was used for the number of infections because it is a larger data set than that used in the Jenks study and was judged to better reflect the distribution of surgery types in the NHS today for the subgroups". The EAC considered this was probably not true considering the voluntary nature of reporting and inherent bias towards (clean) orthopaedic procedures. The values calculated were £7,543 for SSIs resulting from clean wounds and a cost of £6,227 for non-clean wounds, which were both greater than the base line cost, due to the inconsistent use of datasets. The company explained the counterintuitive higher value of management of SSIs resulting from clean wounds was due to the patient demographics (including age and presence of comorbidities) and increased management costs associated (for example, repeated debridement costs in orthopaedic patients) with these wound types. For these reasons, the EAC retained the base case cost in its analyses (that is, £6,016 in both groups).

Table 9.3. *Costs used in the de novo economic model.*

Cost parameter	Subgroup	Point estimate	Distribution for sensitivity analysis	Source	EAC comment
Plus Sutures cost	All groups	£4.13	Company DSA (±20%) Upper estimate £4.96 Lowe estimate £3.30 Company PSA Distribution Gamma (α: 96.036, β: 0.043)	Company estimate based on weighted average of sales volumes	The EAC considered the source of the cost of the technology and comparator were not transparent, and wrongly included costs associated with STRATAFIX. The EAC therefore adopted costs published in MIB204 for its analysis (NICE, 2020). As there was insufficient distributional data from this source, fixed costs were used for PSA.
	Comparator sutures	£3.28	Company DSA (±20%) Upper estimate £3.94 Lowe estimate £2.62 Company PSA Distribution Gamma (α: 96.036, β: 0.034)		
Unit number of sutures per procedure	All groups	5	Company DSA Upper estimate 9 Lower estimate 3 Company PSA Distribution Gamma (α: 10.67, β: 0.47)	Private communication with authors of an economic study (Leaper *et al.*, 2020). Expert opinion from company's clinical experts.	The EAC has verified these data with NICE clinical advisers and has deemed the value appropriate (EAC external correspondence log, 2021). The number of sutures will be dependent on the population (e.g. adult/children) and procedure used which is not reflected in the model. This is acceptable as the impact of this parameter is low.
Cost of SSI	All	£6016	Company DSA Upper estimate £5307 Lower estimate £7715 Company PSA Distribution Gamma (α: 95.909, β: 62.726)	Data from (Jenks *et al.*, 2014), adjusted for inflation (PSSRU, 2021) . Distribution derived from 95% CI.	The considered this estimate to be appropriate. It has been used and accepted by other assessments in the NICE programme.

	Clean	£7543	Company DSA Upper estimate £6035 Lower estimate £9052 Company PSA Distribution Gamma (α: 96.035, β: 78.545)	Data from (Jenks *et al*., 2014), adjusted for inflation (PSSRU, 2021). Classification by Troughton *et al*. (2018), with proportion of surgery types weights by SSISS data, and validated by clinical experts. .	The EAC noted that the cost associated with clean and non-clean wounds were both higher than the overall average cost of SSI, which was counterintuitive. Clean wound were also more costly to treat than unclean wounds; the EAC was satisfied with the rationale for this provided by the company.
	Non-clean	£6227	Company DSA Upper estimate £7472 Lower estimate £4981 Company PSA Distribution Gamma (α: 96.036, β: 64.837)		

Abbreviations: DSA, deterministic sensitivity analysis; PHE, Public Health England; PSA, probabilistic sensitivity analysis; SSI, surgical site infection; SSISS, surgical site infection surveillance service (Public Health England, 2020).
Note: The EAC interprets α parameters listed for gamma distributions as the shape (k), and β parameters listed for gamma distributions as the scale (θ). EAC has assumed that the company has used "method of moments" to derive gamma distribution parameters.

9.2.7 Sensitivity analysis

The company reported extensive sensitivity analysis in the clinical submission and *de novo* model. The following analyses were undertaken:

Scenario analysis

The company reported two self-reported scenario analyses, reported in Table 10 of the Economic Submission. These were:

- Using SSI incidence rate reported by Jenks *et al*. (2013) rather than that calculated from the SSISS data (Public Health England, 2020). This was done by substituting the 1.04% SSI incidence value with 1.97% (282/14300). The EAC noted the higher value reported by Jenks *et al*. was based on substantially fewer events. However, both were considered to be conservative estimates.

- Using RR data from the random effects model (0.70) rather than the fixed effects model (0.71). Note: the EAC's preference was to use the random effects data to reflect the heterogeneity of the data.

Whilst these were the scenario analyses described by the company, the EAC considered the individual analysis of adult, children, clean, and non-clean wounds could also be considered as scenario analyses. Furthermore, sensitivity analysis incorporating the extremes of SSI incidence also reflected data from different procedure types and so also reflected different scenarios.

Deterministic sensitivity analysis

The company performed one-way (univariate) deterministic sensitivity analysis (DSA) on all the parameters that informed the model.

- The baseline incidence of SSI was varied by the lower and upper bound estimates based on the procedure reported in the SSISS (Public Health England, 2020). These were 0.5% based on hip/knee replacements and 9.1% based on bile duct, liver or pancreatic surgery.

- The cost of SSI was varied by the reported lower and upper 95% CI (£4,622 to £6,719) inflated to current prices (£5,307 to £7715).

- The cost of Plus Sutures and comparator sutures were varied by ±20%. The EAC considered that there was a case for fixing the cost of Plus Sutures to the value used by the company in the Economic Submission, but acknowledged that this might not be appropriate because there was genuine uncertainty concerning technology costs caused by the wide range of suture products available.

- A lower and upper limit of 3 to 9 sutures used per procedure was used, based on clinical expert opinion.
- Relative risk (base case value 0.71) was varied according to the lower and upper 95% CI (0.64 and 0.79).

Results were presented as a tornado diagram. In addition to one-way DSA, the company reported two-way DSA, by investigating the effect of varying both RR with the incidence of SSI, and the cost of SSI with the incidence of SSI together. Results of two-way DSA were presented in tabular format.

The EAC agreed the DSA undertaken by the company was appropriate using values at the edge of feasibility, and did therefore not perform additional DSA.

Threshold analysis

The company performed threshold analysis on four input variables in order to determine the breakeven cost point. These were the cost of SSI; the baseline risk of SSI with comparator sutures; the RR reduction with Plus Sutures; and the average number of sutures per procedure. The EAC considered these analyses were appropriate.

Probabilistic Sensitivity Analysis

The company performed PSA on all the input parameters used in the base case, running 1000 iterations which was shown to be sufficient to achieve data stability. The EAC reviewed these and considered the distributions used and their informing values were appropriate. Results were presented as a histogram, a boxplot, and by the proportion of simulations that were cost-saving.

The EAC considered the PSA used was appropriate. However, it was noted that the PSA could have been expanded to include the clinical "scenarios" used in the model (adults/children and clean/non-clean). The EAC included this in its analysis (Section 9.3.6).

9.2.8 EAC changes to base case parameters

The EAC made some modifications to the company's base case and scenario parameter inputs. These are reported in Table 9.4. All EAC analysis was performed using R (R Core Team, 2020), which may cause some small discrepancies due to rounding.

Table 9.4. *Input parameters used by EAC in its analysis.*

	Parameter	Company value	EAC value	EAC rationale
Relative risk	Base case	0.71	0.71	EAC estimate was based on meta-analysis of all studies, excluding STRATAFIX (N=28); the company included STRATAFIX studies (N= 30). Random effects model data used rather than fixed effect.
	Adult	0.73	0.71	EAC used random effects data rather than fixed effect, except in children subgroup which had too few studies to perform random effects analysis (N=2).
	Children	0.52	0.52	
	Clean	0.75	0.71	
	Non-clean	0.66	0.67	
Technology costs	Plus Sutures cost	£4.13	£4.25	EAC costs based on the arithmetic mean of MONOCRYL Plus, PDS II Plus and VICRYL Plus sutures, and equivalent non-triclosan sutures, published in MIB204 (NICE, 2020). These costs were not inflated. Costs fixed for PSA as distributional data is insufficient.
	Comparator cost	£3.28	£3.35	
Abbreviations: PSA, probabilistic sensitivity analysis; PSSRU, Personal Social Services Research Unit				

9.3 *Results from the economic modelling*

9.3.1 Base case analysis

The results of the deterministic analysis of the base case model reported by the company (in Excel) and the EAC (adjusted to reflect EAC inputs and executed in R) are reported in Table 9.5. Plus sutures was found to be cost saving, by a mean of £13.88 per patient reported by the company, and £13.62 by the EAC.

9.3.2 Scenario analysis

The company reported on two scenario analyses. In the first scenario, the baseline risk of SSI was changed from PHE SSISS data (1.04%) to data reported by Jenks *et al*. (1.97%). Nearly doubling the underlying incidence SSI approximately doubled the saving potential with Plus Sutures, with savings of £30.15 reported. In the second, using RR data derived from the random effects model rather than the fixed effects model, the cost saving associated with Plus Sutures was £14.51.

Although not described as scenario analyses by the company, analyses were performed on four subgroups, namely adults and children; and clean and non-clean wounds. Results of these subgroup analyses reported by the company and by the EAC using adjusted inputs are reported in Table 9.6. All these scenarios reported the use of Plus Sutures was associated with *significant per procedure* cost savings. The highest cost-savings were made in patients undergoing procedures resulting in non-clean wounds, as the incidence of SSI was highest in this population.

Table 9.5. *Base case deterministic results of de novo model reported by company and EAC*.

	Company estimate*			EAC estimate**		
	Plus Sutures	Comparator sutures	Difference (Plus Sutures minus Comparator)†	Plus Sutures	Comparator sutures*	Difference (Plus Sutures minus Comparator) †
Device cost (Mean cost per patient)	£20.65	£16.40	£4.25	£21.31	£16.80	£4.51
Cost of SSI treatment (Mean cost per patient)	£44.39	£62.53	-£18.13	£44.38	£62.51	-£18.13
Total cost per patient	£65.04	£78.93	-£13.88	£65.69	£79.31	-£13.62
Total (per 1,000 patients)	£65,045	£78,928	-£13,883	£65,690	£79,310	-£13,620

* Taken from Table 9 of company's Economic Submission.
** Using random effects analysis of RR for all included studies (excluding studies reporting on STRATAFIX). Cost of technology and comparator were taken from MIB204 (which did not incorporate STRATAFIX). All other parameters were the same as those used by the company.
† Negative values (shaded green) indicate a cost saving.

Table 9.6. Deterministic scenario (subgroup) analyses of *de novo* model reported by company and EAC (*per patient*).

Subgroup	Company estimate*			EAC estimate**		
	Plus Sutures	Comparator sutures	Difference (Plus Sutures minus Comparator)†	Plus Sutures	Comparator sutures*	Difference (Plus Sutures minus Comparator) †
Adults	£66.30	£78.93	-£12.63	£65.71	£79.33	-£13.62
Children	£53.16	£78.93	-£25.76	£53.83	£79.33	-£25.50
Clean	£65.77	£76.56	-£10.79	£55.38	£64.78	-£9.40
Non-clean	£301.65	£442.16	-£140.51	£296.90	£428.10	-£131.20

* Data reported in “miscellaneous” section of the company’s Economic Submission.
** Using random effects analysis of RR for all included studies. For the clean and non-clean wounds subgroup analysis, the EAC used the fixed base case cost of SSI for both groups. All other parameters were the same as those used by the company.
† Negative values (shaded green) indicate a cost saving.

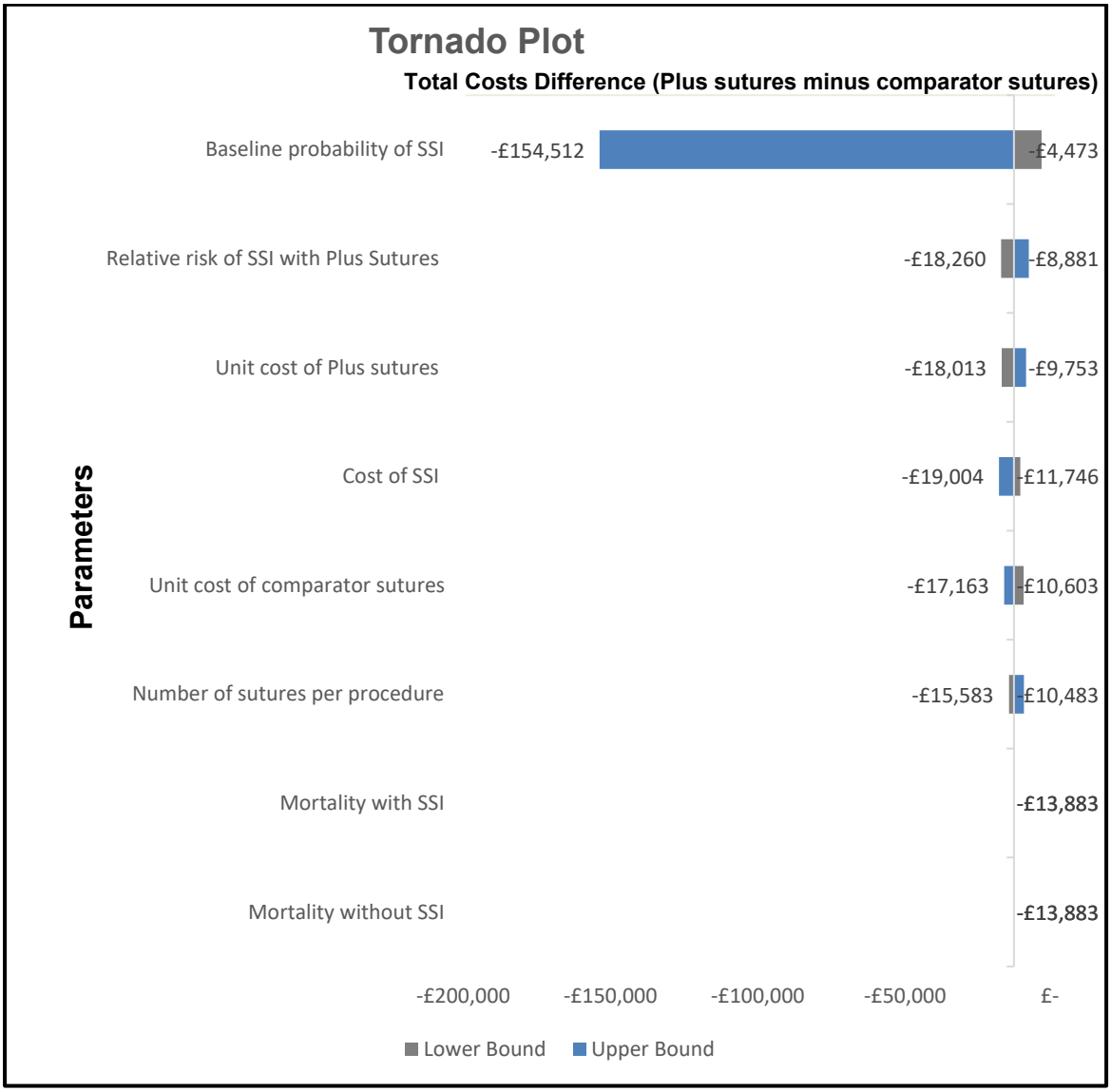
9.3.3 Deterministic analysis

The company reported one-way DSA as a tornado diagram, reproduced in Figure 9.2. The model was most sensitive to changes in the incidence of SSIs. This was because SSI had a high cost impact on the model, and the upper and lower range was wide, reflecting the large range of procedure types the model captured. However, Plus Sutures remained cost-saving even when the lowest plausible SSI value was used (0.5% for knee replacement operations). The authors commented that the PHE SSISS data was also prone to bias due to under-reporting, so all the SSI estimates were likely to be conservative. The EAC broadly concurred with this, especially as community SSIs were not captured, but noted that inclusion of orthopaedic infections in SSISS is mandatory, so the lower range of SSIs may be relatively accurate.

Variation of other parameters in the model had much lower impact on the model and no single change resulted in Plus Sutures being cost incurring, including the RR of SSI. However, the EAC noted the variation for this parameter was informed from the 95% CI of the base case data only. The EAC thus ran additional analyses to further investigate this (Section 9.3.6).

The company reported two-way sensitivity data in Figure 2 (RR of SSI combined with baseline risk of SSI) and Figure 3 (cost of SSI combined with baseline risk of SSI) of the Economic Submission. The data were cost saving in all cases.

Figure 9.2. *Tornado diagram illustrating one-way DSA in the de novo model.*



9.3.4. Threshold analysis

The company reported the following threshold (breakeven) points from univariate DSA:

- Cost of SSI: £1410
- Incidence of SSI: 0.24%
- Relative risk reduction: 0.93
- Number of sutures used: 21

The EAC agreed with the company that these values were in general not plausible. The EAC did note that the RR was greater than 0.93 in some individual studies, however this was not the case in any scenario involving aggregated data.

9.3.5 Probabilistic sensitivity analysis

The company reported PSA of the base case scenario only, reporting results of 1000 iterations in the Economic Submission as a histogram (Figure 4) and boxplot (Figure 5). These indicated Plus Sutures were cost saving, with no runs visibly less than zero. The company reported that Plus Sutures was cost saving in 99.8% of iterations performed. Using data directly from the company's model, the EAC calculated the 95% Credibility Intervals (CrI) of the base case data (York Health Economics Consortium, 2016). The summary result was Plus Sutures was associated with cost savings of £13.96 (95% CrI £4.97 to £22.22) per patient.

9.3.6 EAC's additional analysis

The EAC performed several additional analyses which are reported in Table 9.6. All analyses were conducted using R (R Core Team, 2020) (Section 9.2.4). The main purpose of the EAC's analyses was to further test the *de novo* model by using alternative data inputs, primarily by changing RR estimates to reflect data generated by studies based on quality, size, and location. Secondarily, the EAC included PSA on all the scenarios so the uncertainty relating to point estimates could be captured.

Plus Sutures was found to be cost saving in all the scenarios investigated, however, there was some uncertainty in the clean wounds scenario, with the 95% CrI crossing zero (£9.30; 95% CrI -£2.24 to £19.26; 94.6% probability cost saving). As noted in Section 7.2, when only the higher quality studies, or larger studies, were included in the meta-analyses, the benefits of Plus Sutures (RR of SSI) were reduced. Whilst in all cases the point estimate remained cost saving in favour of Plus Sutures, there was some uncertainty in this. For instance, when only the highest quality studies were included, the cost saving was £4.62 (95% CrI -£13.92 to £19.34, 73.8% probability cost saving); and when only the largest studies were included the corresponding cost saving was £9.10 (95% -£27.11 to £33.86, 76.8% probability cost saving). There was also some uncertainty when only UK studies were included. However, as has been previously discussed, these results should be interpreted with caution, as the exclusion of RCT data lowers the precision of estimates, which causes increased uncertainty downstream during economic analysis.

Table 9.6. *EAC deterministic and probabilistic analysis of all scenarios.*

	Data used (sensitivity analysis)	N	Costs		Δ Costs		95% CrI		Proportion cost-saving (%)
			Plus Sutures	Comparator	Deterministic value	Probabilistic value	Lower	Upper	
Scenarios	Company base case*	28	65.10	78.90	13.80	14.02	5.12	22.88	99.8
	EAC base case	28	65.71	79.33	13.62	13.60	4.71	23.15	99.5
	Adults	21	65.71	79.33	13.62	13.67	4.08	22.74	99.3
	Children	2	53.83	79.33	25.50	25.06	5.54	42.56	98.9
	Clean wounds	15	55.38	64.78	9.40	9.30	-2.24	19.26	94.6
	Non-clean wounds	12	296.90	428.10	131.20	128.95	33.86	216.92	99.2
Quality	High quality	9	74.46	79.33	4.87	4.62	-13.92	19.34	73.8
	High/mod quality	15	68.21	79.33	11.12	10.96	-0.83	21.89	96.5
	Low quality	11	65.71	79.33	13.62	13.49	-3.23	29.07	94.3
Size	n>1000	4	71.34	79.33	7.99	9.10	-27.11	33.86	76.8
	n<=1000	24	64.46	79.33	14.87	14.74	4.93	24.30	99.4
	n>500	8	65.71	79.33	13.62	13.27	0.39	25.74	97.9
	n<=500	20	65.71	79.33	13.62	13.30	0.05	25.58	97.5
Other	UK	3	73.84	79.33	5.49	10.86	-124.67	56.83	74.8
	Non-UK	25	65.08	79.33	14.25	14.32	4.59	24.21	100.0
	Lowest SSI†	-	41.01	44.54	3.53	3.45	-3.82	9.35	84.7
	Highest SSI†	-	387.70	563.70	176.00	173.22	38.81	298.40	99.0

Abbreviations: CrI, credibility interval; N, number of studies; SSI, surgical site infection.
Key: Green shading indicates Plus Sutures is cost saving; red shading indicates Plus Sutures are cost incurring.
* Results generated by EAC using R script.
† Sensitivity analysis of procedures with lowest SSI incidence (knee replacement, 0.5%) and highest SSI incidence (bile duct, liver, and pancreatic surgery, 9.1%).

9.4 *The EAC's interpretation of the economic evidence*

The company provided a *de novo* economic model using a CCA framework in the form of a decision tree to determine the cost-saving potential of Plus Sutures. The supporting Economic Submission and the model were clearly reported and the model inputs were transparent and credible. The model was a rudimentary decision tree, with costs restricted solely to the intervention and comparator technologies and the incidence of SSIs. This was appropriate given the nature of the technology. The clinical parameters used were transparent and fully aligned with the clinical evidence base. The costs of SSIs were plausible and had been previously validated in other NICE assessments. The EAC agreed with the company that, in general, the assumptions and values used in the model were conservative and not likely to be biased in favour of Plus Sutures. Additionally, extensive sensitivity analysis was performed to stress test the values used. In short, the EAC was satisfied the *de novo* model was of high quality and robust.

The EAC had two criticisms of the economic model. The first related to the fact that additional sensitivity analysis could have been undertaken, particularly PSA, which the company limited to the base case only. The EAC therefore performed additional sensitivity analysis. The second concern related to the cost of the technologies used. The technology costs were not transparent and could not be replicated by the EAC, as they were based on sales volumes that were commercial in confidence. Additionally, they included the costs of STRATAFIX, which the EAC had excluded from analysis, but which could not be disaggregated. To improve transparency and reflect the exclusion of STRATAFIX, the EAC used fixed technology cost data from the published MIB (NICE, 2020).

In the base case, the company reported (using PSA) that Plus Sutures saved the NHS an average of £13.88 per procedure (95% CrI £4.97 to £22.22). This included all populations and specialties, with the greatest savings being in procedures which generate non-clean wounds, such as bowel surgery. The company reported Plus Sutures was cost saving in all clinical scenarios using all plausible input parameters. The EAC reran the company's analysis using adjusted data inputs and applying PSA to all scenarios. The EAC found that Plus Sutures was cost saving in the base case (£13.60, 95% CrI £4.71 to £23.15). However, the cost saving potential of Plus Sutures was less certain when some scenarios were analysed and PSA was applied. These scenarios included patients with clean wounds and scenarios where only high-quality evidence or data from large trials were included. Nevertheless, the EAC recognised that the point estimates in these scenarios remained cost saving, and there were limits to the interpretation of the distributional data. Therefore the EAC concluded that, on balance, there was strong evidence that the

widespread use of Plus Sutures, through replacement of equivalent standard sutures, would save the NHS of England resources.

10 Conclusions

10.1 *Conclusions from the clinical evidence*

The company performed a high-quality, systematic, literature search that identified 31 RCTs as being relevant to the decision problem. The EAC could not improve on the search and so it was not repeated or repurposed. The EAC excluded 3 RCTs that were primarily focussed on the barbed suture STRATAFIX due to these being considered out of scope. Three additional studies were included by the EAC, meaning 31 studies in total informed this assessment, 30 of which reported on unique patients. The EAC was satisfied no relevant studies had been omitted.

The studies were heterogeneous in nature and were performed in a range of clinical settings including gastrointestinal/abdominal, orthopaedic, cardiovascular, and soft-tissue surgery. Only 2 studies were set exclusively in children. The RCTs were appraised by the EAC and categorised according to quality; 8 were considered high quality, 6 moderate quality, and 16 low quality. Studies ranged in size from n=61 to n=2,546; in total over 14,000 unique patients were included. Nearly all the studies reported on the post-operative incidence of SSI according to CDC criteria as their primary outcome. Other outcomes included in the scope were not consistently reported.

Most of the studies reported point estimate reductions in the incidence of SSI, but these were not statistically significant on a study-by-study basis. The company performed a meta-analysis in order to determine the aggregated effect on reduction in SSI. The EAC replicated and reviewed the meta-analysis and considered it to be of high quality and at low risk of bias. In the base case, the company included 28 studies and reported Plus Sutures were associated with a RR of 0.71 (95% CI 0.59 to 0.85, fixed effect analysis). The technology showed similar *relative* reductions in the incidence of SSI when considered in adult, children, clean, and non-clean wounds.

The EAC undertook additional meta-analyses by investigating the effect of stratifying data by study quality, size, and location (UK or non-UK). In all cases, the point estimate favoured SSI reduction in favour of Plus Sutures. However, the analysis revealed some statistical uncertainty, for instance when only high-quality studies were considered (N=8), the confidence limits included 1 (RR 0.85, 95% CI 0.64 to 1.13). Nevertheless, it was acknowledged by the EAC that reducing the sample population size correspondingly reduced the power and precision of the meta-analysis, so these results should be interpreted with caution. Overall, the EAC was satisfied that the company had provided good evidence that Plus Sutures reduce the incidence of SSIs. Whilst there was no consistent empirical evidence to prove the other claimed benefits of the technology, the EAC

considered these outcomes could be reasonably extrapolated as positive from the SSI incidence data. Thus, in the opinion of the EAC, the clinical benefits of Plus Sutures have been proven beyond reasonable doubt.

10.2 *Conclusions from the economic evidence*

The company identified eight economic studies from the literature search that were relevant to the decision problem. All the studies reported potential cost-savings due to reduced SSIs associated with the use of Plus Sutures.

The company provided a *de novo* economic model in the form of decision tree, with results reported within a CCA framework from the perspective of the NHS. Baseline SSI data were from PHE, and RR data were aligned with the company's meta-analyses. Costs associated with SSI were derived from a costing study used in previous NICE assessments and considered to be conservative. Technology costs were blended from company sales volumes; the data used to derive these costs were not transparent and included STRATAFIX which had been excluded by the EAC. The company performed extensive DSA and limited PSA.

The EAC appraised the model and its inputs and concluded it was clearly reported, was of high-quality, and was at low risk of bias. In the company's base case (N=31 studies, fixed effect analysis), Plus Sutures were associated with savings of £13.88 per procedure (95% CrI £4.97 to £22.22). The company reported that Plus Sutures were cost saving in all included scenarios (adult, children, clean, non-clean) and that these were robust to all DSA and threshold analysis using feasible values. The greatest savings were associated with procedures generating non-clean wounds because of the high baseline SSI in this group.

The EAC removed the STRATAFIX studies and costs and adopted random effects analysis for its base case. The base case cost saving (N=28 studies) was £13.60 (95% CrI £4.71 to £23.15). The EAC performed additional scenario analysis and PSA based on study quality, size, and location. This introduced some statistical uncertainty into the results. For instance, it was found that when only high-quality studies were included, Plus Sutures was associated with a per procedure cost saving of £4.62 (95% CrI -£13.92 to £19.34). However, the EAC was aware that reducing the sample data would reduce the precision of the clinical and economic evidence, and even in this scenario there was a 73.8% probability that Plus Sutures was cost saving.

In summary, the EAC was of the opinion there was strong evidence that the introduction of Plus Sutures would lead to healthcare resource savings for the NHS of England. These savings would be made regardless of population and procedures undertaken, although the greatest savings would be in procedures that generate non-clean wounds. The magnitude of the savings will also be

dependent on the direct costs associated with the technology, which need to be clarified.

11 Summary of the combined clinical and economic sections

The clinical evidence on Plus Sutures is extensive and of generally good quality, with 31 RCTs totalling more than 14,000 unique patients included in this assessment. The studies were conducted in a wide range of populations and clinical specialties, with the large majority reporting post-procedural incidence of SSI, according to CDC criteria, as their primary outcome. Most studies reported non-significant RRs in SSI when considered on a study-by-study basis. The company performed a high-quality meta-analysis (N=28 studies) which reported significant reductions in SSI associated with Plus Sutures (RR 0.71, 95% CI 0.59 to 0.85). Similar RRs were observed in subgroups, although the EAC noted the effect was less certain when only large or high-quality studies were included.

The company reported a *de novo* economic model consisting of a decision tree. The EAC appraised the model and considered it was clearly presented, was of high quality, and, in general, had appropriate inputs. The EAC made some adjustments to the model and found that Plus Sutures were cost-saving in the base case, with savings of £13.60 (95% CrI £4.71 to £23.15) per procedure. Savings were greater when Plus Sutures were used in procedures resulting in non-clean wounds, and there was some uncertainty in the cost benefits in clean procedures. Additionally, there was some uncertainty when only data from high-quality or large trials were used. However, overall the EAC concluded that Plus Sutures were highly likely to reduce costs to the NHS of England in most settings.

12 Implications for research

There has been extensive experimental research published on the use of triclosan-coated sutures, with over 14,000 patients studied. Protocols for several large studies have been published and these will further add to the evidence base when published (Table 8.2). Additionally, numerous systematic reviews and meta-analyses have synthesised the data. One review performed trial sequential analysis (a form of interim analysis) and stated that “sufficient evidence exists for a 15% relative RR in surgical-site infection when triclosan-coated sutures are used” (de Jonge *et al*., 2017). Current gaps in the evidence base are limited to particular populations or surgical specialties; these could be addressed through further experimental research if this was considered necessary. However, it is unclear if the value of such research

would be justified considering other research opportunities that might be foregone.

13 References

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14 Appendices

Appendix A: Literature searching

Appendix B: Critical appraisal of clinical evidence

Appendix C: Studies included in systematic reviews

Appendix D: Literature search for adverse events

Appendix E: Forest plots

Appendix F: Critical appraisal of economic evidence

Appendix A: Literature searching

PRESS 2015 Checklist for search strategy peer review

Project name: MT507 Plus Sutures		
Searcher: Choose an item.	**Checker: Catherine Richmond**	**Date:03/03/2021**
The PICO format is not appropriate for this topic. The search strategy took the format of [sutures AND Triclosan]		
Search Strategy (Medline)	1 Sutures/ (17365) 2 Suture Techniques/ (43238) 3 sutur$.ti,ab,kf. (81242) 4 stitch$.ti,ab,kf. (5666) 5 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) and (ligat$ or loop$ or thread$)).ti,ab,kf. (81457) 6 or/1-5 (185804) 7 Surgical Fixation Devices/ (189) 8 Wound Closure Techniques/ (1628) 9 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kf. (103269) 10 (device$ adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kf. (14057) 11 ((fascia$ or skin or skins or tissue$ or wound$) adj6 device$).ti,ab,kf. (7848) 12 or/7-11 (122588) 13 6 or 12 (293804) 14 Triclosan/ (2951) 15 triclosan$.ti,ab,kf,rn,nm. (4315) 16 (cgp433$ or cgp-433$ or ch3565$ or ch-3565$ or cloxifenol$ or dndi1246774$ or dndi-1246774$ or dp300$ or dp-300$ or fat-80$ or fat80$ or gp41-353$ or gp41353$ or irgacare$ or irgacide$ or irgagard$ or irgasan$ or lexol-300$ or lexol300$ or ster-zac$ or sterzac$ or tcs or tricosan$).ti,ab,kf,rn,nm. (6302) 17 (222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5).ti,ab,kf,rn,nm. (2951) 18 or/14-17 (9767) 19 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj20 (coat$ or impregnat$)).ti,ab,kf. (6564) 20 13 and (18 or 19) (456) 21 plus$ suture$.ti,ab,kf. (38) 22 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj sutur$).ti,ab,kf. (102) 23 ((pds$ or pds-ii) adj plus$).ti,ab,kf. (19) 24 ((pds$ adj4 plus$) and sutur$).ti,ab,kf. (27) 25 (MONOCRYL$ adj4 plus$).ti,ab,kf. (9) 26 (VICRYL$ adj4 plus$).ti,ab,kf. (60)	

	27 (pds$ or MONOCRYL$ or VICRYL$).ti,ab,kf. and (18 or 19) (70) 28 stratafix$.ti,ab,kf. (39) 29 tissue control device$.ti,ab,kf. (8) 30 ((polydioxanon$ or poliglecapron$ or polyglactin$) adj3 plus$).ti,ab,kf. (28) 31 (polydioxanon$ or poliglecapron$ or polyglactin$).ti,ab,kf. and (18 or 19) (63) 32 or/21-31 (251) 33 20 or 32 (589) 34 exp animals/ not humans/ (4782208) 35 (news or editorial).pt. (761558) 36 33 not (34 or 35) (489) 37 limit 36 to english language (449) 38 limit 37 to yr="2000 -Current" (422)
Databases searched	• Medline • Embase • Cinahl • Cochrane CENTRAL • Cochrane CDSR • DARE • NHS EED • HTA database • Econlit • Web of Science Conference Proceedings Index • Epistemonikos • ClinicalTrials.gov • ICTRP • NIHR • IDEAS/RePEC Also, J&J Ethicon provided details of ongoing or unpublished trials sponsored by or associated with J&J Ethicon.

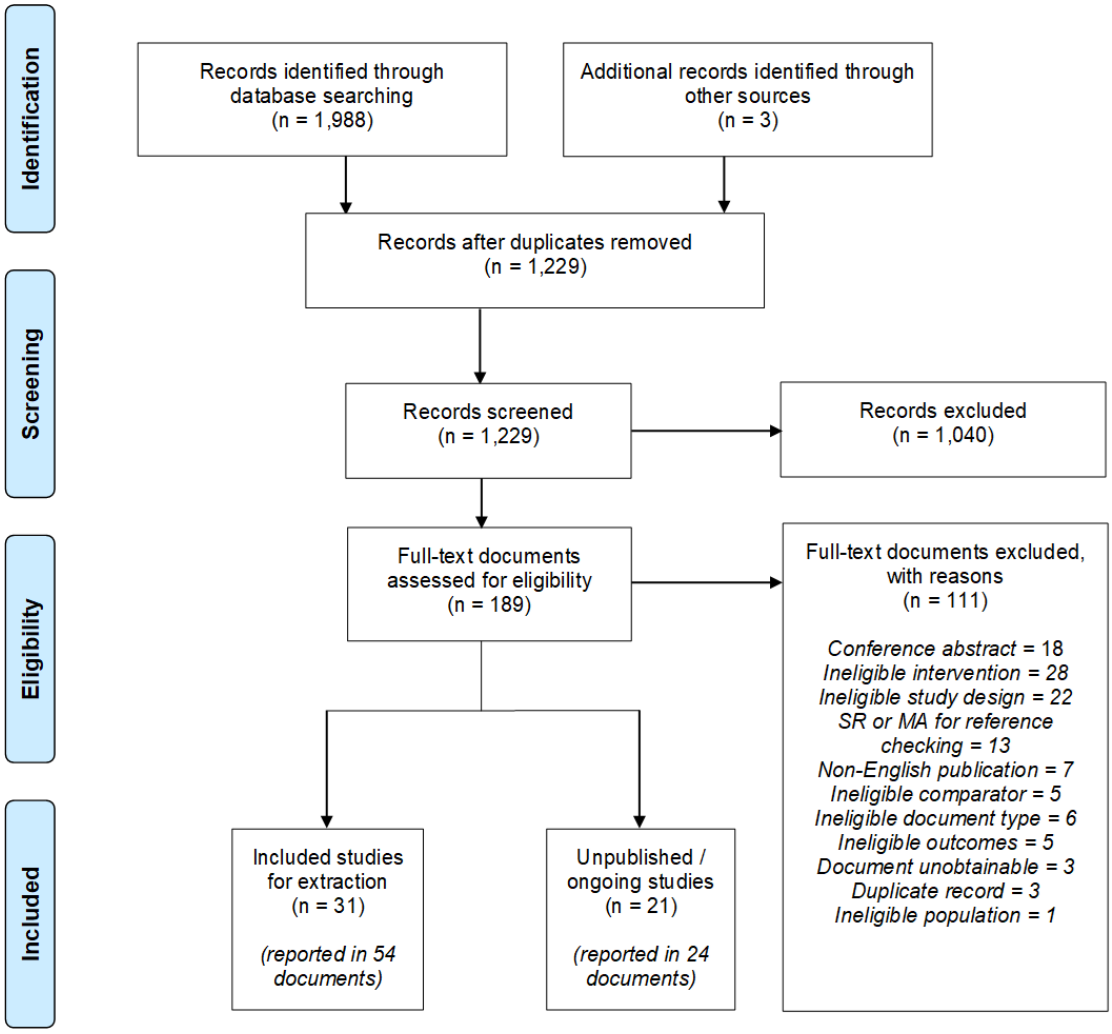
Question	Y/N	Notes
Translation of the research question		
Does the search strategy match the research question/PICO?	Yes	Although a PICO format was not used, the search structure was appropriate
Are the search concepts clear?	Yes	
Are there too many or too few PICO elements included?	Okay	
Are the search concepts too narrow or too broad?	Okay	
Does the search retrieve too many or too few records? (Please show number of hits per line.)	Okay	
Are unconventional or complex strategies explained?	N/A	
Boolean and proximity operators (these vary based on search service)		
Are Boolean or proximity operators used correctly?	Yes	

Is the use of nesting with brackets appropriate and effective for the search?	Yes	
If NOT is used, is this likely to result in any unintended exclusions?	No	NOT has only been used to exclude animal studies and news/editorial items which is appropriate
Could precision be improved by using proximity operators (eg, adjacent, near, within) or phrase searching instead of AND?	No	I think proximity operators have been used well and thought has been given to the width of proximity used.
Is the width of proximity operators suitable (eg, might adj5 pick up more variants than adj2)?	Yes	
Subject headings (database specific)		
Are the subject headings relevant?	Yes	
Are any relevant subject headings missing; for example, previous index terms?	No	
Are any subject headings too broad or too narrow?	No	
Are subject headings exploded where necessary and vice versa?	Yes	MeSH terms are not exploded in any line, but this is reasonable as either narrower terms are not relevant (e.g. cat gut in the case of sutures) or are included themselves (e.g. sutures in the case of surgical fixation devices)
Are major headings (“starring” or restrict to focus) used? If so, is there adequate justification?	N/A	
Are subheadings missing?	No	Subheadings are not used, but I think this is appropriate.
Are subheadings attached to subject headings? (Floating subheadings may be preferred.)	N/A	
Are floating subheadings relevant and used appropriately?	N/A	
Are both subject headings and terms in free text (see the following) used for each concept?	Yes	
Text word searching (free text)		
Does the search include all spelling variants in free text (eg, UK vs. US spelling)?	N/A	
Does the search include all synonyms or antonyms (eg, opposites)?	Yes	A very thorough range of synonyms is included
Does the search capture relevant truncation (ie, is truncation at the correct place)?	Yes	
Is the truncation too broad or too narrow?	Okay	
Are acronyms or abbreviations used appropriately? Do they capture irrelevant material? Are the full terms also included?	Yes	
Are the keywords specific enough or too broad? Are too many or too few keywords used? Are stop words used?	Okay	

Have the appropriate fields been searched; for example, is the choice of the text word fields (.tw.) or all fields (.af.) appropriate? Are there any other fields to be included or excluded (database specific)?	Yes	Abstract, Keyword Heading Word, Name of Substance Word, and CAS Registry/EC Number/Name of Substance fields were used where appropriate
Should any long strings be broken into several shorter search statements?	No	
Spelling, syntax, and line numbers		
Are there any spelling errors?	No	
Are there any errors in system syntax; for example, the use of a truncation symbol from a different search interface?	No	A description of any issues with each interface is provided e.g, lack of proximity searching
Are there incorrect line combinations or orphan lines (ie, lines that are not referred to in the final summation that could indicate an error in an AND or OR statement)?	No	
Limits and filters		
Are all limits and filters used appropriately and are they relevant given the research question?	Yes	The only limits applied are excluding animal studies, editorials and news which is appropriate, and a date limit relating to the product release, which is very generous.
Are all limits and filters used appropriately and are they relevant for the database?	Yes	
Are any potentially helpful limits or filters missing? Are the limits or filters too broad or too narrow? Can any limits or filters be added or taken away?	No	
Are sources cited for the filters used?	N/A	

Further comments:
This is an excellent and comprehensive search strategy. It has been developed by an Information specialist in conjunction with a project team, and has also been peer reviewed, which is the gold standard. A very thorough range of search terms have been used, including CAS registry numbers and alternative product names/codes where appropriate. The searcher has provided information about each resource where necessary and has described why decisions were made when a direct translation has not been carried out. A wide range of resources have been searched, my only query would be why Epistmonikos and WoS Conference abstracts were searched when systematic reviews and conference abstracts were excluded, but this would only make the search more comprehensive rather than less so. There is nothing I would add to this strategy.

Figure 1A. *Company's PRISMA diagram of study search and sift.*


Identification
Screening
Eligibility
Included
Records identified through database searching (n = 1,988)
Additional records identified through other sources (n = 3)
Records after duplicates removed (n = 1,229)
Records screened (n = 1,229)
Records excluded (n = 1,040)
Full-text documents assessed for eligibility (n = 189)
Full-text documents excluded, with reasons (n = 111)
Conference abstract = 18
Ineligible intervention = 28
Ineligible study design = 22
SR or MA for reference checking = 13
Non-English publication = 7
Ineligible comparator = 5
Ineligible document type = 6
Ineligible outcomes = 5
Document unobtainable = 3
Duplicate record = 3
Ineligible population = 1
Included studies for extraction (n = 31)
(reported in 54 documents)
Unpublished / ongoing studies (n = 21)
(reported in 24 documents)

Appendix B: Critical appraisal of clinical evidence

Critical appraisal of RCTs

All RCTs were assessed using the Cochrane tool for assessing risk of bias (Higgins *et al*., 2011).

Table B1. *Arslan 2018 (n = 177).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Patients were tiered into two groups using block randomization at 1:1 ratio" Method of randomisation unclear	Unclear
	Allocation concealment	Treating surgeon not blinded to allocation or randomisation. Comparison of demographics and surgical details shows no difference between arms.	High
Performance bias	Blinding of participants and personnel*	Blinding of participants and personnel not reported. Possible performance bias on the surgeon's behalf.	High
Detection bias	Blinding of outcome assessment*	Assessor not reported as being blinded to intervention allocation.	High
Attrition bias	Incomplete outcome data*	Unclear reporting of loss to follow up. Six patients in intervention arm excluded due to antibiotic use.	High
Reporting bias	Selective reporting	Primary and secondary outcomes defined, but power calculations for sample size not performed. Study protocol not published. ITT and PP not reported.	High
Other bias	Anything else, ideally pre-specified.	Funding sources not reported.	Unclear

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention-to-treat; PP, per protocol; SSI, surgical site infection

Table B2. *Baracs et al. (2011) n=468 randomised, 385 (included).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"randomization was made by computer software (stored in a password protected website) and could not be influenced manually". Software not specified.	Low
	Allocation concealment	Allocation concealment not reported. No indication surgeon was blinded to allocation. Significant difference in BMI between treatment arms.	High
Performance bias	Blinding of participants and personnel*	Patients and treating surgeon do not appear to have been blinded to treatment. Performance bias by surgeon possible.	High
Detection bias	Blinding of outcome assessment*	Investigators not blinded to intervention. Possible subjectivity in measurement and definition of SSIs.	High
Attrition bias	Incomplete outcome data*	Loss to follow up not clearly reported, appears to be large following randomisation. Patient flow diagram not reported.	High
Reporting bias	Selective reporting	Primary outcome defined. Power calculations reported. Protocol reported (NCT01123616). However, reporting of results through ITT and PP not specified.	Low
Other bias	Anything else, ideally pre-specified.	Funding not disclosed, although "No conflicting financial interests exist" reported.	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: BMI, body mass index; ITT, intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B3. *Diener et al. (2014) n=1224 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"We used a centralised web-based device (Randomizer Software) for randomisation, with a specific code for each participating centre, to achieve equivalent groups. Permuted-block randomisation with an allocation ratio of 1:1 and a block size of 4 was used".	Low
	Allocation concealment	"Patients, surgeons, and the outcome assessors were masked to the suture material used".	Low
Performance bias	Blinding of participants and personnel*	Patients and treating surgeon were blinded to treatment allocation. Sutures and needles were identical in both groups.	Low
Detection bias	Blinding of outcome assessment*	Outcome assessors were blinded to treatment allocation.	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram with reason for loss to follow up clearly reported. Attrition was minimal in mITT cohorts but high in PP (trial violations).	Low
Reporting bias	Selective reporting	Trial protocol reported in German Clinical Trials Register (number DRKS00000390). Primary and secondary endpoints clearly defined with power calculations reported.	Low
Other bias	Anything else, ideally pre-specified.	Funding from J&J. "PROUD was an investigator-initiated trial and the funder had no role in study design, data collection, data analysis, data interpretation, or the writing of the report".	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: mITT, modified intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B4. *Ford et al. (2005) n=151 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Randomized in a 2:1 ratio to treatment with either coated polyglactin 910 suture with triclosan or coated polyglactin 910 suture." "A commercial software package, SAS 8.02 (SAS Institute Inc, Cary, NC), was used to calculate statistics and generate the randomization schedule"	Low
	Allocation concealment	No information presented on concealment of allocation.	High
Performance bias	Blinding of participants and personnel*	Blinding of personnel and method of blinding not clear from the paper.	Unclear
Detection bias	Blinding of outcome assessment*	Assessors were reported as blinded, but it is not clear how this was achieved.	Unclear
Attrition bias	Incomplete outcome data*	Insufficient data reported on flow of patients.	Unclear
Reporting bias	Selective reporting	No trial protocol reported. Null hypothesis not reported. Primary outcome highly subjective. Sample size not determined with power calculation. ITT and PP groups not defined.	High
Other bias	Anything else, ideally pre-specified.	"This study was supported by a grant from ETHICON, Inc". Role of funder not described.	High

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B5. *Galal et al. (2011) n=450 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"A computer-generated random list was used for randomization".	Low
	Allocation concealment	"The use of the suture material was made for each procedure at random using a sealed pack for dispensing one of the suture packs at a time". Baseline characteristics compared between arms (no difference)	Low
Performance bias	Blinding of participants and personnel*	"None of the research team or the patients were aware of the type of suture material used in the procedure (the research team included the surgeon, the nurse, and the microbiologist)."	Low
Detection bias	Blinding of outcome assessment*	Assessors were blinded.	Low
Attrition bias	Incomplete outcome data*	No information on loss to follow up and how this was dealt with is reported (e.g. ITT and PP analysis).	High
Reporting bias	Selective reporting	Study protocol was not published in advance of study. Primary and secondary endpoints not defined. No power calculation provided.	High
Other bias	Anything else, ideally pre-specified.	No information on funding provided.	Unclear

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B6. *Ichida et al. (2018) n=1023 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Permuted-block randomization with an allocation ratio of 1:1 and a block size of 2 was used".	Low
	Allocation concealment	"A research doctor who was not involved in the operation placed pieces of paper containing the randomized allocations into sealed envelopes according to a randomized allocations list. A research nurse who was not involved in the patients' follow-up opened the randomization envelope and delivered the allocated sutures to the operating room."	Low
Performance bias	Blinding of participants and personnel*	"Neither the surgeons, the nurses in the surgical ward, nor the patients knew to which group a patient had been randomized"	Low
Detection bias	Blinding of outcome assessment*	"Surgeons assessing the wound status were also blinded, because the used suture material could not be identified postoperatively".	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram was reported. Patient attrition was very low, with mITT analysis being implemented.	Low
Reporting bias	Selective reporting	Study protocol was published in advance of study on the University Hospital Medical Information Network-Clinical Trials Registry, identification nnumber UMIN000013054. Primary endpoint defined (incidence of SSIs) and power calculation for sample size reported.	Low
Other bias	Anything else, ideally pre-specified.	No information on funding provided.	Unclear

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: mITT, modified intention-to-treat; SSI, surgical site infection.

Table B7. *Isik et al. (2012) n=510 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	Randomisation procedure not described.	Unclear
	Allocation concealment	Described as double blinded but concealment of allocation not described. However, patient characteristics between groups appear similar.	Unclear
Performance bias	Blinding of participants and personnel*	Described as double blinded but concealment of allocation not described. Potential for performance bias from surgeons.	High
Detection bias	Blinding of outcome assessment*	Described as double blinded but concealment of allocation not described. Potential for detection bias from assessors.	High
Attrition bias	Incomplete outcome data*	Patient flow diagram not reported.. Loss to follow up not reported. ITT or PP analysis not reported.	High
Reporting bias	Selective reporting	Study protocol does not appear to be registered. Primary outcome (incidence of SSI) defined and power calculation for sample size reported. Secondary outcomes unclear.	Unclear
Other bias	Anything else, ideally pre-specified.	No conflicts of interest listed. Study funded through University research grant.	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, modified intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B8. *Justinger et al. (2013) n=1042 (n=856 included in analysis).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Patients were randomized in blocks of 50 to 100 patients to have the fascia closed with either a 2-0 polydioxanone loop". Very large block size, methodology unclear.	Unclear
	Allocation concealment	Allocation not described. "PDS II and PDS Plus sutures cannot be distinguished from each other in terms of physical properties such as color, feel of the suture, or tying properties."	Unclear
Performance bias	Blinding of participants and personnel*	"Surgeons, patients, as well as wound monitors were blinded towards the use of either PDS II or PDS Plus"	Low
Detection bias	Blinding of outcome assessment*	Assessors were blinded to allocation.	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram was reported, but detail was poor. Patient attrition was substantial and uneven. ITT or PP analysis not clear.	High
Reporting bias	Selective reporting	Protocol was registered prospectively (NCT00998907). Primary outcome reported with power calculation. Implications are PP analysis used and not ITT.	Low
Other bias	Anything else, ideally pre-specified.	Funded from company grant: "This trial was funded by a restricted grant (Johnson&Johnson, Summerville, NJ)". The role of the funder in the trial is not clear.	High

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, modified intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B9. *Karip et al. (2016) n=106 (randomised sutures).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Patients were randomized in blocks of 50 to 100 patients to have the fascia closed with either a 2-0 polydioxanone loop". Very large block size, methodology unclear.	Unclear
	Allocation concealment	Allocation not described. "PDS II and PDS Plus sutures cannot be distinguished from each other in terms of physical properties such as color, feel of the suture, or tying properties."	Unclear
Performance bias	Blinding of participants and personnel*	"Surgeons, patients, as well as wound monitors were blinded towards the use of either PDS II or PDS Plus"	Low
Detection bias	Blinding of outcome assessment*	Assessors were blinded to allocation.	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram was reported, but detail was poor. Patient attrition was substantial and uneven. ITT or PP analysis not clear.	High
Reporting bias	Selective reporting	Protocol was registered prospectively (NCT00998907). Primary outcome reported with power calculation. Implications are PP analysis used and not ITT.	Low
Other bias	Anything else, ideally pre-specified.	Funded from company grant: "This trial was funded by a restricted grant (Johnson&Johnson, Summerville, NJ)". The role of the funder in the trial is not clear.	High

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, modified intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B10. *Lin et al. (2018) n=102 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	Consecutively labelled envelope containing intervention or comparator. But randomisation protocol is undefined.	Unclear
	Allocation concealment	Direct allocation via concealed envelopes.	Low
Performance bias	Blinding of participants and personnel*	"During the study, the allocation of these suture materials was blinded to the patients, theclinical staff, the operating surgeons, and the independent study nurse who prospectively collected all perioperative information and outcome measures."	Low
Detection bias	Blinding of outcome assessment*	Assessors and patients were blinded to allocation.	Low
Attrition bias	Incomplete outcome data*	CONSORT diagram of patient flow reported. There was no loss to follow up in either arm at any stage.	Low
Reporting bias	Selective reporting	Protocol registered (NCT02533492). Primary outcome (incidence of SSIs) and Null and Alternative hypotheses stated. Power calculation, although may have been conducted retrospectively. ITT or PP analysis not reported; however as no loss to follow up ITT can be assumed.	Low
Other bias	Anything else, ideally pre-specified.	"All authors state that they have no conflicts of interest." Funding source not reported.	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, modified intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B11. *Matavelli et al. (2015) n=300 (randomised, 281 analysed).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Treatment allocation was by means of a computerized randomization list with 1:1 ratio. Each center had an independent list".	Low
	Allocation concealment	"Assignment was done by sealed, opaque, numbered envelopes that were opened in sequence by a registered nurse not involved in the study".	Low
Performance bias	Blinding of participants and personnel*	The treating surgeon was not blinded to the allocation of the intervention. Patients were blinded.	High
Detection bias	Blinding of outcome assessment*	Assessors and patients were blinded to allocation.	Low
Attrition bias	Incomplete outcome data*	Patient flow chart (CONSORT) reported with loss to follow up documented. Drop-out rate was modest.	Low
Reporting bias	Selective reporting	Protocol registered (NCT01869257). Primary outcome (incidence of SSI) defined; however power calculation not performed. Secondary endpoints predefined. ITT analysis not reported.	Low
Other bias	Anything else, ideally pre-specified.	"This was an independent, unsponsored study and each hospital purchased the sutures." "This trial was funded by a research grant of the University of Milano-Bicocca". "No competing financial interests exist".	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, modified intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B12 Mingmalairik *et al.* (2009) n=100 (randomised and analysed).

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Suture was random by random table and packed in order". Randomisation cannot always be performed robustly with tables.	Unclear
	Allocation concealment	Sutures packed in randomisation order, but method of concealment not described. No statistically significant differences in demographic characteristic, preoperative information and operative information between groups.	Unclear
Performance bias	Blinding of participants and personnel*	Study described as double-blind "Both sutures were similar in physical properties. Surgeons and collected assistant were blind to the type of suture".	Low
Detection bias	Blinding of outcome assessment*	No information on whether assessors were blinded to allocation.	Unclear
Attrition bias	Incomplete outcome data*	Patient flow chart provided indicating no loss to follow up after 1 year. Only first 100 patients out of 672 were enrolled and included in this preliminary safety report.	High
Reporting bias	Selective reporting	Protocol was not registered. Sample size for primary outcome (SSI) was determined with a power calculation, although this was not adhered to (this was a pilot study).	High
Other bias	Anything else, ideally pre-specified.	University funded. "The authors declare that they have no completing interests."	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: SSI, surgical site infection.

Table B13. *Nakumara et al. (2013) n=410 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	Randomisation protocol not described.	Unclear
	Allocation concealment	"Patients were randomly assigned by the envelope method into the 2 groups". Unclear how effectively allocation was performed.	Unclear
Performance bias	Blinding of participants and personnel*	Treating surgeons were not blinded to allocation.	High
Detection bias	Blinding of outcome assessment*	Assessing surgeons were blinded.	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram was reported showing no loss to follow up following randomisation. Therefore ITT and PP equivalent	Low
Reporting bias	Selective reporting	Study protocol published UMIN000003322. Primary outcome defined prospectively with accompanying power calculation.	Low
Other bias	Anything else, ideally pre-specified.	No information on funding provided.	Unclear

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B14. *Olmez et al. (2019) n=890 (selected).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"The patients were randomised to closing the fascia with standard PDS or triclosan-coated PDS after operations using a computer-generated list created by an independent computer consultant".	Low
	Allocation concealment	No reported concealment of allocation. Significant difference in BMI, smoking status, comorbidities, ASA class, and target organ for operation between arms.	High
Performance bias	Blinding of participants and personnel*	Treating surgeons were not blinded to allocation.	High
Detection bias	Blinding of outcome assessment*	"Patient follow-up and control tests were done by a blinded researcher, and findings were recorded on the seventh, 14th and 30th post-operative days". .	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram not reported. ITT and PP analysis not undertaken.	High
Reporting bias	Selective reporting	Study protocol not published in a trial database. Outcomes not prospectively defined. Power calculation reported with focus is on SSIs.	High
Other bias	Anything else, ideally pre-specified.	"The authors have no conflicts of interest related to this manuscript". Funding source not stated.	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B15. *Rasic et al. (2011) (n=184)*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Randomization was generated by a computer in blocks of 10".	Low
	Allocation concealment	"Sealed and numbered opaque envelopes containing suture packets were prepared. The envelopes were kept in the operating theatre and assigned in order".	Low
Performance bias	Blinding of participants and personnel*	Blinding not reported	High
Detection bias	Blinding of outcome assessment*	Blinding not reported	High
Attrition bias	Incomplete outcome data*	No patient flow diagram reported. No reporting of loss to follow up. ITT and PP analysis not reported.	High
Reporting bias	Selective reporting	Primary outcome not defined, definition of other outcomes poor. No published trial protocol. No power calculation	High
Other bias	Anything else, ideally pre-specified.	Role of funding and conflicts of interest not declared.	Unclear

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B16. *Renko et al. (2017) n=1633 (children).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"The children were randomly allocated (1:1) to receive either sutures with triclosan or ordinary absorbable sutures during surgery. A statistician created a computerised randomisation list in permuted blocks of four in a random order."	Low
	Allocation concealment	"Numbered opaque envelopes containing a code for the study group were prepared and sealed accordingly."	Low
Performance bias	Blinding of participants and personnel*	The protocol included steps intended to blind surgeons, patients (and their parents)to allocation.	Low
Detection bias	Blinding of outcome assessment*	Assessing clinicians and investigators were blinded.	Low
Attrition bias	Incomplete outcome data*	Clear CONSORT flow chart reported, with all loss to follow up accounted for and within acceptable limits. Results reported using mITT and PP analysis.	Low
Reporting bias	Selective reporting	Trial protocol registered (NCT01220700). Primary outcome prospectively reported and sample size determined with power calculation.	Low
Other bias	Anything else, ideally pre-specified.	"The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report".	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: mITT, modified intention-to-treat; PP, per protocol; SSI, surgical site infection.

Table B17. *Rozelle et al. (2008) n=61 (enrolled).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Randomization was performed by the assignment of letter codes to study and placebo suture types. The suture type corresponding to a particular letter code was known only to operating room nurses and scrub technicians. An equal number of study and placebo letter code cards was prepared and placed individually in sealed envelopes grouped by patient characteristic categories".	Low
	Allocation concealment	Stratification by weight, age and recent shunt infections with low patient numbers risks unmasking allocation.	Unclear
Performance bias	Blinding of participants and personnel*	"Participants and investigators were blinded to treatment assignment, because study and placebo sutures are indistinguishable after removal of the package labelling".	Low
Detection bias	Blinding of outcome assessment*	It is unclear whether assessing clinicians or investigators were blinded. Overall loss to follow up unclear.	Unclear
Attrition bias	Incomplete outcome data*	Patient flow chart not reported. Hazard plots did not report censored patients.	High
Reporting bias	Selective reporting	Study protocol not published in a trial registry. Primary outcome reported (CSF infection, non-standard), but no power calculation provided. ITT and PP analysis not reported.	High
Other bias	Anything else, ideally pre-specified.	"This study was designed and conducted with no extramural research funding or commercial relationships. Curtis J. Rozzelle, M.D., has subsequently served on a medical advisory board for Ethicon/Johnson & Johnson. The other authors have no	Low

	commercial or current research relationship with Ethicon/Johnson & Johnson.”.	

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: CSF, cerebral spinal fluid; ITT, modified intention-to-treat; PP, per protocol.

Table B18. *Ruiz-Tovar et al. (2015) n=110 randomised (101 analysed).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	" "The randomization was performed by the surgeon when the intra-operative diagnosis of fecal peritonitis was made". "The randomisation was stratified for etiology of fecal peritonitis (acute diverticulitis perforation, neoplastic tumor perforation, or colorectal anastomotic leak) and performed depending on the intra-operative findings" Actual method of randomisation not described.	High
	Allocation concealment	"The patients were randomized by means of a sequentially numbered container method into two groups". "The opacity of the container prevents from selecting a particular number." Randomisation and allocation concealment confused and undertaken by treating surgeon.	High
Performance bias	Blinding of participants and personnel*	"Epidemiology nurse who evaluated the outcome of the surgical incision was the only person blinded to the allocated treatment". Patients and treating surgeon were not blinded to the allocation.	High
Detection bias	Blinding of outcome assessment*	"All incisions were inspected by an epidemiology nurse who was blinded to group allocation".	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram (CONSORT) reported. Patients were excluded from analysis only if they had died before follow up was undertaken. Attrition appears equal on each arm.	Low

Reporting bias	Selective reporting	Study protocol not published in a trial registry. Primary and secondary outcomes not explicitly stated. Power calculation based on superficial SSI reported. Presumed PP analysis performed; data flow diagram and text/tables do not align.	High
Other bias	Anything else, ideally pre-specified.	"No competing financial interests exist." Funding source of study not reported.	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: PP, per protocol; SSI, surgical site infection.

Table B19. *Santos et al. (2019) n=583 randomised (508 analysed).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"At randomization, a table was generated using a specific computational routine." "A blocked randomization scheme was used, with block sizes of 2, 4, or 6". Centralised randomisation appears adequate.	Low
	Allocation concealment	"Allocation was concealed". Treating surgeons were blinded.	Low
Performance bias	Blinding of participants and personnel*	"This table remained blinded to all participants in the surgical procedure, as well as to all those who were involved in its follow-up" "Surgeons, the researchers and their assistants, and the patients were masked".	Low
Detection bias	Blinding of outcome assessment*	Researchers were blinded to allocation.	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram (CONSORT) reported. Loss to follow up was documented and appeared equivalent in each arm.	Low
Reporting bias	Selective reporting	Study protocol "was registered on the Registro Brasileiro de Ensaios Clínicos - ReBEC – number RBR-4gfk87". Primary outcome was infection in the saphenectomy wound. Power calculation not reported. Secondary outcomes not clearly identified and conflated with patient characteristics.	Unclear
Other bias	Anything else, ideally pre-specified.	Supported by Ethicon (J&J), but the company had no stated role in study design or reporting.	Low

	"The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report". .

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI, surgical site infection.

Table B20. Siem *et al.* (2012) n=323 (randomised)

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"The randomization sequence was performed by the main surgeon by opening sealed envelopes on the day of surgery" Method of randomisation not described.	Unclear
	Allocation concealment	Sealed envelopes used, but no other information to ascertain how concealment was achieved.	High
Performance bias	Blinding of participants and personnel*	"The surgeons were not blinded to the suture material used".	High
Detection bias	Blinding of outcome assessment*	There is no indication investigators were blinded to allocation; in the absence of information it is assumed they were not.	High
Attrition bias	Incomplete outcome data*	No patient flow diagram reported. No information on withdrawals, exclusions, or loss to follow up. No information on ITT and PP analysis.	High
Reporting bias	Selective reporting	Study protocol not published. Primary outcome surgical leg wound infections. Definition of SSI not standardised. Power calculation reported.	High
Other bias	Anything else, ideally pre-specified.	"Conflict of interest: none declared". Role of funding in study not reported. .	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI, surgical site infection.

Table B21. *Soomro et al. (2017) n=378 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	Method of randomisation not described.	High
	Allocation concealment	Concealment of allocation not adequately described.	High
Performance bias	Blinding of participants and personnel*	"The principal investigator who was blinded with the type of the suture material being used". It is not reported that the operating surgeon was blinded to treatment allocation.	High
Detection bias	Blinding of outcome assessment*	"Findings were recorded by the 2nd researcher." It is not reported that the staff conducting the wound assessment at follow-up were blinded to treatment allocation.	High
Attrition bias	Incomplete outcome data*	No patient flow diagram reported. No information on withdrawals, exclusions, or loss to follow up. No information on ITT and PP analysis.	High
Reporting bias	Selective reporting	Study protocol not published. "Sample size was calculated by the statistician." Definition of primary and secondary outcomes not described.	High
Other bias	Anything else, ideally pre-specified.	"Conflict of Interest: The study has no conflict of interest to declare by any author." Role of funding in study not reported. .	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI, surgical site infection.

Table B22. *Sprowson et al. (2018) n=2546 (quasi-randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	Quasi-randomisation employed: "This was based on random monthly assignment into one of the two interventions, each centre providing one form of treatment for a calendar month". Randomisation was conducted (not at patient level; but pragmatic).	Low
	Allocation concealment	"The allocation of treatment was undertaken using opaque envelopes randomized according to the date of surgery". "Envelopes were opened at the start of a month, so allocation was not known at the time of putting the patient on the waiting list, which was a mean of three months prior to surgery." Allocation was not concealed from the treating surgeon. Note: Other than the location of the treating site, there were no significant differences between groups.	Low
Performance bias	Blinding of participants and personnel*	"The participating surgeons were not blinded to the allocation".	High
Detection bias	Blinding of outcome assessment*	"The patients, research team, statistician, clinical staff and associates involved in assessment of outcomes, were all blinded". It is unclear how effective this would have been considering the large block randomisation method.	Low
Attrition bias	Incomplete outcome data*	CONSORT patient flow diagram reported. All patients received intended allocation, loss to follow up was relatively low and even between groups.	Low

		Analysis performed on an ITT basis.	
Reporting bias	Selective reporting	Protocol was published in a peer-reviewed journal article and at ISRCTN 17807356. Primary outcome well defined. Power calculation used to determine sample size.	Low
Other bias	Anything else, ideally pre-specified.	No conflicts of interest or funding motivation reported: "No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article".	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI, surgical site infection.

Table B23. *Sukeik et al. (2019) n=150 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Randomisation and blinding were performed by Sealed Envelope Ltd. With assignment of letter codes to cases and controls". "Block randomisation was used, with unequal block sizes in order to keep the sizes of treatment groups similar".	Low
	Allocation concealment	"The nurses used consecutive allocation, which was concealed from all professionals delivering patient care including the surgeons and the team involved in assessment of the wounds".	Low
Performance bias	Blinding of participants and personnel*	"Patients, surgeons and the team assessing the wounds were all blinded to treatment assignment (double-blinded study), because both sets of sutures are indistinguishable after removal of the package labelling by the nurses".	Low
Detection bias	Blinding of outcome assessment*	Investigators and assessors were blinded.	Low
Attrition bias	Incomplete outcome data*	CONSORT patient flow diagram reported. Groups were quite uneven following randomisation, with more receiving the intervention. All randomised patients were followed up. Trial was stopped prematurely: "our institute terminated the contract with Ethicon to move to another supplier and hence the sutures were no longer available and the trial had to be ended prematurely with inclusion of 150 out of the 420 intended	High

		patients and the results analysed”	
Reporting bias	Selective reporting	Trial protocol was not published on a clinical trial registry. Primary outcome was ASEPSIS score, with power calculation. However, the required sample size was not achieved. Secondary outcomes defined, but correction was not applied to account for multiple comparisons.	High
Other bias	Anything else, ideally pre-specified.	“No potential conflicts of interest to declare. No external financial support.”	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI, surgical site infection.

Table B24. *Tabrizi et al. (2019) n=320 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"The patients were randomly divided into two groups using a computer-generated randomization list".	Low
	Allocation concealment	No description is given on how interventions were allocated. However, patient demographics are not significantly different between arms.	Unclear
Performance bias	Blinding of participants and personnel*	Study described as single-blind. Only patients were blinded to their allocation.	High
Detection bias	Blinding of outcome assessment*	Investigators were not blinded to the allocation.	High
Attrition bias	Incomplete outcome data*	Patient flow diagram was not reported. No information reported pm withdrawals or loss to follow up. No information reported on ITT and PP analysis.	High
Reporting bias	Selective reporting	Trial protocol published (NCT03659344). Outcomes defined as SSI and rate of dehiscence. Power calculation reported (based on a reduction in infection).	Low
Other bias	Anything else, ideally pre-specified.	Study funded from a University grant. " The authors declare no conflict of interest. The manuscript did not meet any conflict of interest"	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI surgical site infection.

Table B25. Thimour-Bergstrom *et al.* (2013) n=392 randomised (374 analysed).

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"The randomization sequence was performed with sealed envelopes. The patients were block randomized with 25 patients randomized to triclosan-coated sutures and 25 to no-triclosan sutures in each block. The randomization was stratified for diabetes".	Low
	Allocation concealment	"A research nurse who was not involved in the patients' follow-up opened the randomization envelope and delivered the sutures to the operating room".	Low
Performance bias	Blinding of participants and personnel*	"Both the coated and non-coated sutures that looked identical were taken from their packages and put on the assist table without any identification marks before the operating surgeons arrived at the operating room".	Low
Detection bias	Blinding of outcome assessment*	"All the research nurses involved in the follow-up of the patients were blinded to group allocation". The trial was double blind.	Low
Attrition bias	Incomplete outcome data*	CONSORT patient flow diagram was reported. Withdrawal and loss to follow up reported. This was modest and equivalent in each arm.	Low
Reporting bias	Selective reporting	Trial protocol published (NCT01212315). Primary endpoint defined (leg wound from associated SSI) and secondary endpoints reported. Power calculation undertaken (based on reduction of infections). Assume PP analysis undertaken, ITT not reported.	Low

Other bias	Anything else, ideally pre-specified.	“This study was supported by the Västra Götaland Healthcare Region (ALF/LUA grant number 146281 to A.J.) and Ethicon, Inc., Somerville, NJ, USA”. No conflicts of interests declared.	Unclear

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI surgical site infection.

Table B26. *Turtiainen et al. (2012) n=276 randomised.*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"The coordinating center performed block randomization with a block size of four. The block randomization was performed separately for each center".	Low
	Allocation concealment	"A research secretary placed pieces of paper containing the randomization allocations into sealed envelopes". "The nurses took the suture out of the package and gave it to the operating vascular surgeon".	Low
Performance bias	Blinding of participants and personnel*	"Only the nurses in the operating theater knew to which group each patient had been randomized". "Neither the vascular surgeons, the nurses in the surgical ward, nor the patients knew to which group a patient had been randomized." Operating surgeons were blinded to allocation.	Low
Detection bias	Blinding of outcome assessment*	"The randomization code was kept separate from the trial data until the end of the study"	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram was reported. Pre-randomisation exclusion and post-randomisation loss to follow up reported. All randomised patients analysed except those who had died, Withdrawal and loss to follow up reported. This was modest and equivalent in each arm. ITT and PP analysis not described.	Low
Reporting bias	Selective reporting	Trial protocol not published in accessible database.	Unclear

		Primary endpoint clearly defined (SSI). Power calculation reported. Secondary outcomes appear arbitrary.	
Other bias	Anything else, ideally pre-specified.	Funding of study and potential conflicts of interest not reported.	Unclear

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI surgical site infection.

Table B27. *Williams et al. (2011) n=150 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"Randomization was undertaken in blocks of 50 using random computer numbers.".	Low
	Allocation concealment	"Randomization was performed in the operating theaters using sequential sealed envelopes." "Sutures used during the operations corresponded to the randomization code"	Low
Performance bias	Blinding of participants and personnel*	"the surgeon, patient, and the assessor at follow-up were blinded to which type had been used."	Low
Detection bias	Blinding of outcome assessment*	"All investigators were conversant with the CDC definition of SSI and the ASEPSIS and Southampton wound scores and were blinded to the type of suture that had been used."	Low
Attrition bias	Incomplete outcome data*	Study diagram was reported, but did not inform on patient numbers. All randomised patients were treated according to allocation. Table reported patient withdrawals and loss to follow up, but how this impacted on analysis was not clear. Assumption is PP analysis was used.	Unclear
Reporting bias	Selective reporting	Typo in ClinicalTrials.gov identifier (real record NCT00830271. Primary outcome not clearly defined.Power calculation provided but informing rationale not clear. Statistical analysis of results not reported.	High
Other bias	Anything else, ideally pre-specified.	"This study was supported by an investigator-initiated grant from Ethicon"	High

	"Professor Leaper has been a consultant for the Ethicon division of Johnson & Johnson. The remaining authors have no conflicting interests."

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI surgical site infection.

Table B28. *Zhang et al. (2011) n=101 (randomised).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	"To ensure an equal distribution of treatments in each center, a block randomization procedure on a site basis was used with a block size of 4". " from an ETHICON computer-generated randomization schedule."	Low
	Allocation concealment	"The patients and surgeons remained blinded up to the time of wound closure when a sealed randomization envelope was opened by a member of the operating room staff".	High
Performance bias	Blinding of participants and personnel*	Comparator was Chinese silk suture which is identifiably different to Plus Sutures.	High
Detection bias	Blinding of outcome assessment*	Assessment of wound was done from a digital photograph. "After all subjects completed the day 30 visit, Canfield Scientific. Inc. blinded the photographs and forwarded them for Central Assessor for review and scoring". "The primary effectiveness endpoint of this study was the score for the cosmetic outcome, evaluated by the blinded Central Assessor."	Low
Attrition bias	Incomplete outcome data*	Patient flow diagram reported with withdrawals reported (with reasons). Numbers available for ITT and PP analysis reported.	Low
Reporting bias	Selective reporting	Protocol published: ClinicalTrials.gov identifier (NCT00768222). Primary outcome was subjective (cosmetic	High

		outcome) and not powered: "This was a pilot study and not statistically powered". Secondary outcomes not statistically adjusted for analysis of multiple outcomes.	
Other bias	Anything else, ideally pre-specified.	"This research was supported by Ethicon Inc., a Johnson & Johnson Company, New Jersey.". Nature of study means there is little generalisability to decision problem.	High

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: ITT, intention to treat; PP, per protocol; SSI surgical site infection.

Table B29. *Chen et al. (2011) n=241 (randomised and analysed*).

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	Coin flip	High
	Allocation concealment	Method of allocation concealment not described. However no difference in demographics between arms.	Unclear
Performance bias	Blinding of participants and personnel*	Blinding of patients and surgeon not described	Unclear
Detection bias	Blinding of outcome assessment*	Blinding of assessors not described	Unclear
Attrition bias	Incomplete outcome data*	No data flow diagram. No reporting of loss to follow-up. ITT and PP analysis not reported.	High
Reporting bias	Selective reporting	Primary and secondary outcomes not defined No published trial protocol. No power calculation.	High
Other bias	Anything else, ideally pre-specified.	"None of the contributing authors has any conflict of interests, including specific financial interests and relationships or affiliations relevant to the subject matter or materials discussed in the manuscript." "Funding acknowledgement: Civilian Administration Division of Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan."	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: CSF, cerebral spinal fluid; ITT, modified intention-to-treat; PP, per protocol.

Table B30. *Sala-Perez (2016) n=20 (randomised and analysed).*

Bias domain	Source of bias	Support for Judgement	Review authors' judgement (assess as low, unclear, or high risk of bias)
Selection bias	Random sequence generation	Permutation table (details not included). One side of mouth PlusSutures, one side braided natural black silk.	Unclear
	Allocation concealment	Allocation concealment not described.	Unclear
Performance bias	Blinding of participants and personnel*	"The different color of the filaments precluded operator and patient blinding with respect to the type of material used on each side."	High
Detection bias	Blinding of outcome assessment*	As above	High
Attrition bias	Incomplete outcome data*	No patient flow diagram reported. No reporting of loss to follow-up. ITT and PP not reported.	High
Reporting bias	Selective reporting	Primary and secondary outcomes not explicitly reported. No published trial protocol. Power calculation reported (based on reducing colony formation); but not enough information to replicate.	High
Other bias	Anything else, ideally pre-specified.	University funded. "financial support from the oral surgery teaching healthcare agreement among the University of Barcelona, the Consorci Sanitari Integral and the Servei Català de la Salut of the Generalitat de Catalunya". "Conflicts of interest: None to declare"	Low

*Assessments should be made for each main outcome or class of outcomes.
Abbreviations: CSF, cerebral spinal fluid; ITT, modified intention-to-treat; PP, per protocol.

Table B31. *ROBIS: Tool to assess risk of bias in systematic reviews (https://www.bristol.ac.uk/population-health-sciences/projects/robis/robis-tool/) applied by the EAC to the meta-analysis conducted by the company*

Phase 1: Assessing relevance (Optional)	
PICO category	Target question (e.g. overview or guideline)
Patients/population	"Adults and children that need wound closure after a surgical procedure and in whom absorbable sutures are an appropriate option"
Intervention(s)	Triclosan coated sutures as per scope. Addition of STRATAFIX™ barbed design for knotless suturing.
Comparator(s)	"Sutures that do not contain an antibacterial agent"
Outcome(s)	Incidence of SSIs.
Phase 2: Identifying concerns with the review process	
DOMAIN 1: STUDY ELIGIBILITY CRITERIA Describe the study eligibility criteria, any restrictions on eligibility and whether there was evidence that objectives and eligibility criteria were pre-specified:	
1.1 Did the review adhere to pre-defined objectives and eligibility criteria?	Y
1.2 Were the eligibility criteria appropriate for the review question?	Y
1.3 Were eligibility criteria unambiguous?	Y
1.4 Were any restrictions in eligibility criteria based on study characteristics appropriate (e.g. date, sample size, study quality, outcomes measured)?	PY
1.5 Were any restrictions in eligibility criteria based on sources of information appropriate (e.g. publication status or format, language, availability of data)?	Y
Concerns regarding specification of study eligibility criteria	LOW
Rationale for concern: Study eligibility criteria was clearly reported in the submission and was consistent with the scope. STRATAFIX sutures, which were determined to not be in scope, were included in sensitivity analysis.	
DOMAIN 2: IDENTIFICATION AND SELECTION OF STUDIES Describe methods of study identification and selection (e.g. number of reviewers involved):	
2.1 Did the search include an appropriate range of databases/electronic sources for published and unpublished reports?	Y
2.2 Were methods additional to database searching used to identify relevant reports?	Y
2.3 Were the terms and structure of the search strategy likely to retrieve as many eligible studies as possible?	Y

2.4 Were restrictions based on date, publication format, or language appropriate?	Y
2.5 Were efforts made to minimise error in selection of studies?	Y
Concerns regarding methods used to identify and/or select studies	LOW
Rationale for concern: Studies were directly identified from the literature review. No errors were identified in the methodology uses and it was considered to be comprehensive. The EAC has cross referenced the included studies with other systematic reviews and has not identified any RCTs that should have been included.	
DOMAIN 3: DATA COLLECTION AND STUDY APPRAISAL Describe methods of data collection, what data were extracted from studies or collected through other means, how risk of bias was assessed (e.g. number of reviewers involved) and the tool used to assess risk of bias:	
3.1 Were efforts made to minimise error in data collection?	Y
3.2 Were sufficient study characteristics available for both review authors and readers to be able to interpret the results?	Y
3.3 Were all relevant study results collected for use in the synthesis?	Y
3.4 Was risk of bias (or methodological quality) formally assessed using appropriate criteria?	Y
3.5 Were efforts made to minimise error in risk of bias assessment?	Y
Concerns regarding methods used to collect data and appraise studies	LOW
Rationale for concern: Studies were appraised using a modified Cochrane risk of bias tool, as specified by the submission template. However, it the narrative on study limitations, risk of bias, and implications for results was lacking.	
DOMAIN 4: SYNTHESIS AND FINDINGS	
4.1 Did the synthesis include all studies that it should?	Y
4.2 Were all pre-defined analyses reported or departures explained?	Y
4.3 Was the synthesis appropriate given the nature and similarity in the research questions, study designs and outcomes across included studies?	Y
4.4 Was between-study variation (heterogeneity) minimal or addressed in the synthesis?	Y
4.5 Were the findings robust, e.g. as demonstrated through funnel plot or sensitivity analyses?	PY
Were biases in primary studies minimal or addressed in the synthesis?	PN/N
Concerns regarding the synthesis and findings	UNCLEAR
Rationale for concern:	

Synthesis of data was conducted appropriately with recognised techniques for measuring study heterogeneity and appropriate sensitivity analysis (including influence analysis and “leave-one-out” plots. However, this did not included sensitivity analysis stratified by study quality, meaning that lower quality studies had equal weighting with high quality studies.		
Phase 3: Judging risk of bias		
Domain	Concern	Rationale for concern
1. Concerns regarding specification of study eligibility criteria	LOW	No specific concerns.
2. Concerns regarding methods used to identify and/or select studies	LOW	No specific concerns.
3. Concerns regarding methods used to collect data and appraise studies	LOW	No specific concerns.
4. Concerns regarding the synthesis and findings	UNCLEAR	Sensitivity analysis based on study quality not performed; otherwise no concerns.
RISK OF BIAS IN THE REVIEW		
A. Did the interpretation of findings address all of the concerns identified in Domains 1 to 4?		Y
B. Was the relevance of identified studies to the review's research question appropriately considered?		Y
C. Did the reviewers avoid emphasizing results on the basis of their statistical significance?		PY
Risk of bias in the review		LOW
Rationale for risk: This was a well-performed systematic review and meta-analysis with an overall low risk of bias. However, the interpretation of the results is limited by the quality of some of the informing studies, in particular the quality of reporting in these studies. It would have been appropriate to investigate issues pertaining to this more thoroughly through the use of sensitivity analysis concerning study quality and size.		
Key: Y, yes; PY, probably yes; PN, probably no; N, no; NI, no information.		

Appendix C: Studies included in systematic reviews

Table C1. *Results from snowballing of systematic reviews and meta-analyses reported in the MedTech Innovation Briefing (MIB) 204 (NICE, 2020) and NG125 (NICE, 2019a).*

		Leaper (2017) 34 studies	de Jonge (2017) 21 RCTs (n=6462)	Wu (2017) 13 RCTs, 5 non-RCTs	Apisarnthanarak (2015) 22 RCTs, 7 non-RCTs	Onesti (2018) 15 RCTs	Ahmed (2019) 25 RCTs (n=11,957)	NG125 (April 2019)	Plus Sutures Clinical Submission (02/03/2021)
1	Arlsan *et al.* (Dis Colon Rectum, 2014)*		☒						
2	Arlsan *et al.* (Int J Colorectal Dis, 2018)						☒		☒
3	Baracs *et al.* (Surg Infect, 2011)	☒	☒	☒	☒	☒	☒	☒	☒
4	Chen *et al.* (Eur J Surg Oncol, 2011)	☒	☒	☒	☒		☒	☒	
5	Defazio *et al.* (Fertil Steril, 2005; J Min Invasive Gynaecol, 2005)*		☒		☒				
6	Deliaert et al (J Plast Reconstr Aesthet Surg, 2008)†				☒				
7	Diener *et al.* (Lancet, 2014)	☒	☒	☒	☒	☒	☒	☒	☒
8	Ford *et al.* (Surg Infect, 2005)	☒	☒	☒	☒		☒		☒
9	Fraccalvieri *et al.* (Cir Esp, 2014)‡	☒							
10	Galal and El-Hindawy (Am J Surg, 2011)	☒	☒	☒	☒	☒	☒	☒	☒
11	Hedde-Parison *et al.* (Prog Urol, 2013)‡	☒							
12	Hoshino *et al.* (Int Surg, 2013)†	☒		☒	☒				
13	Huszár *et al.* (Magyar Sebeszet, 2012) [Hungarian]	☒			☒				
14	Ichida *et al.* (Surgery, 2018)						☒	☒	☒
15	Isik *et al.* (Heart Surg Forum, 2012)	☒	☒	☒	☒	☒	☒	☒	☒
16	Justinger *et al.* (Surgery, 2009)†	☒			☒				

		Leaper (2017) 34 studies	de Jonge (2017) 21 RCTs (n=6462)	Wu (2017) 13 RCTs, 5 non-RCTs	Apisarnthanarak (2015) 22 RCTs, 7 non-RCTs	Onesti (2018) 15 RCTs	Ahmed (2019) 25 RCTs (n=11,957)	NG125 (April 2019)	Plus Sutures Clinical Submission (02/03/2021)
17	Justinger *et al.* (Langenbecks Arch Surg, 2011)†	☒			☒				
18	Justinger *et al.* (Surgery, 2013)	☒	☒	☒	☒	☒	☒	☒	☒
19	Karip *et al.* (Surg Infect, 2016)	☒					☒		☒
20	Khachatryan *et al.* (Surg Infect, 2011)*		☒		☒				
21	Laas *et al.* (Int J Breast Cancer, 2012)†	☒		☒	☒				
22	Lin *et al.* (Biomed Res Int 2018)						☒		☒
23	Mattavelli *et al.* (Surg Infect, 2015)	☒	☒			☒	☒	☒	☒
24	Mattavelli *et al.* (Surg Infect, 2011)*				☒				
25	Mingmalairak *et al.* (J Med Assoc Thai, 2009)	☒	☒	☒	☒	☒	☒		☒
26	Nakamura *et al.* (Surgery, 2013)	☒	☒	☒	☒	☒	☒	☒	☒
27	Nakamura *et al.* (Surg Infect, 2016)†	☒							
28	Okada *et al.* (Surg Infect, 2014)†	☒		☒	☒				
29	Olmez (Surgical Infections, 2019)								☒
30	Olmez and Colak (50th Conrgess, 2015)*	☒							
31	Rasic *et al.* (Coll Antropol, 2011)	☒	☒	☒	☒	☒	☒		☒
32	Renko *et al.* (Lancet Infect Dis, 2017)	☒					☒	☒	☒
33	Roy *et al.* (Int J Pharmaceut Sci Res, 2019)**						☒		
34	Rozzelle *et al.* (J Neurosurg Pediatr, 2008)	☒	☒		☒	☒			☒
35	Ruiz-Tovar *et al.* (Surg Infect, 2015)	☒					☒		☒
36	Ruiz-Tovar *et al.* (J Am Coll Surg, 2020)								☒

		Leaper (2017) 34 studies	de Jonge (2017) 21 RCTs (n=6462)	Wu (2017) 13 RCTs, 5 non-RCTs	Apisarnthanarak (2015) 22 RCTs, 7 non-RCTs	Onesti (2018) 15 RCTs	Ahmed (2019) 25 RCTs (n=11,957)	NG125 (April 2019)	Plus Sutures Clinical Submission (02/03/2021)
37	Santos (Braz J Cardiovasc Surg, 2019)								☒
38	Seim *et al.* (Interact Cardiovasc Thorac Surg, 2012)	☒	☒	☒	☒	☒	☒	☒	☒
39	Singh *et al.* (Heart Surg Forum, 2010)*		☒		☒				
40	Soomro (Med Forum, 2017)								☒
41	Sprowson *et al.* (Bone Joint J, 2018)						☒		☒
42	Stadler and Fleck (Interact Cardiovasc Thorac Surg, 2011)†	☒							
43	Sundaram (Musculoskeletal Surgery, 2020)								☒
44	Sundaram (HIP International, 2020)								☒
45	Sukeik (World J Orthop, 2019)								☒
46	Steingrimsson *et al.* (Eur J Clin Microbiol Infect Dis, 2015)	☒						☒	☒
47	Tabrizi *et al.* (Int J Oral Maxillofac Surg, 2019)						☒		☒
48	Takeno *et al.* (Surg Infect, 2016)†	☒							
49	Thimour-Bergstrom *et al.* (Eur J Cardiothorac Surg, 2013)		☒	☒	☒	☒	☒	☒	☒
50	Turtiainen *et al.* (World J Surg, 2012)	☒	☒	☒	☒	☒	☒	☒	☒
51	Ueno *et al.* (Spine J, 2015)†	☒		☒	☒				
52	Williams *et al.* (Surg Infect, 2011)	☒	☒	☒	☒	☒	☒		☒
53	Yam & Orlina (Surg Infect, 2013)*		☒						
54	Yamashita *et al.* (J Surg Res, 2016)†	☒							

		Leaper (2017) 34 studies	de Jonge (2017) 21 RCTs (n=6462)	Wu (2017) 13 RCTs, 5 non-RCTs	Apisarnthanarak (2015) 22 RCTs, 7 non-RCTs	Onesti (2018) 15 RCTs	Ahmed (2019) 25 RCTs (n=11,957)	NG125 (April 2019)	Plus Sutures Clinical Submission (02/03/2021)
55	Zhang *et al.* (Chin Med J, 2011)	☒			☒		☒		☒
56	Zhuang *et al.* (J Clin Rehab Tissue Eng Res, 2009)‡				☒	☒			
Total included studies		**34**	**21**	**18**	**29**	**15**	**25**	**14**	**32**
	Abbreviations: RCT randomised controlled trial; * Conference abstract/poster † Non-RCT study design (including pilot with no hypothesis testing, cohort with historical controls ‡ Full paper only available in non-English language ** Not PlusSutures (different manufacturer)								

Appendix D: Literature search for adverse events

Search strategies:
Database(s): **Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R)** 1946 to March 09, 2021
Search Strategy:

#	Searches	Results
1	Sutures/	17438
2	Suture Techniques/	43323
3	sutur$.ti,ab,kf.	81552
4	stitch$.ti,ab,kf.	5695
5	((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) and (ligat$ or loop$ or thread$)).ti,ab,kf.	81697
6	or/1-5	186367
7	Surgical Fixation Devices/	189
8	Wound Closure Techniques/	1646
9	((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kf.	103692
10	(device$ adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kf.	14145
11	((fascia$ or skin or skins or tissue$ or wound$) adj6 device$).ti,ab,kf.	7890
12	or/7-11	123123
13	6 or 12	294824
14	Triclosan/	2971
15	triclosan$.ti,ab,kf,rn,nm.	4341
16	(cgp433$ or cgp-433$ or ch3565$ or ch-3565$ or cloxifenol$ or dndi1246774$ or dndi-1246774$ or dp300$ or dp-300$ or fat-80$ or fat80$ or gp41-353$ or gp41353$ or irgacare$ or irgacide$ or irgagard$ or irgasan$ or lexol-300$ or lexol300$ or ster-zac$ or sterzac$ or tcs or tricosan$).ti,ab,kf,rn,nm.	6345
17	(222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5).ti,ab,kf,rn,nm.	2971
18	or/14-17	9823
19	((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj20 (coat$ or impregnat$)).ti,ab,kf.	6629
20	13 and (18 or 19)	463
21	plus$ suture$.ti,ab,kf.	38
22	((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or	102

	antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj sutur$).ti,ab,kf.	
23	((pds$ or pds-ii) adj plus$).ti,ab,kf.	20
24	((pds$ adj4 plus$) and sutur$).ti,ab,kf.	28
25	(monocryl$ adj4 plus$).ti,ab,kf.	9
26	(vicryl$ adj4 plus$).ti,ab,kf.	61
27	(pds$ or monocryl$ or vicryl$).ti,ab,kf. and (18 or 19)	73
28	stratafix$.ti,ab,kf.	41
29	tissue control device$.ti,ab,kf.	9
30	((polydioxanon$ or poliglecapron$ or polyglactin$) adj3 plus$).ti,ab,kf.	29
31	(polydioxanon$ or poliglecapron$ or polyglactin$).ti,ab,kf. and (18 or 19)	64
32	or/21-31	255
33	20 or 32	598
34	exp animals/ not humans/	4797816
35	(news or editorial).pt.	765050
36	33 not (34 or 35)	497
37	limit 36 to english language	457
38	limit 37 to yr="2004 -Current"	412
39	complicat*.ti,ab.	1136074
40	ae.fs.	1780579
41	safe*.ti,ab.	923352
42	exp postoperative complications/	560486
43	failure*.ti,ab.	737822
44	adverse.ti,ab.	535335
45	co.fs.	2018649
46	failed.ti,ab.	282131
47	exp equipment failure/	88366
48	removal.ti,ab.	359811
49	equipment safety/	10364
50	problem*.ti,ab.	1083639
51	side effect*.ti,ab.	257885
52	Harmful.ti,ab.	63313
53	Tolerated.ti,ab.	142970
54	loosen*.ti,ab.	21820
55	Intraoperative Complications/	32471
56	migration.ti,ab.	268653
57	breakag*.ti,ab.	15744
58	discomfort.ti,ab.	47427
59	displacement.ti,ab.	93272
60	(detrimental adj2 effect*).ti,ab.	29235
61	untoward effects.ti,ab.	2163

62	or/39-61	7582847
63	38 and 62	291
64	exp Hypersensitivity/	350132
65	(allerg* or hypersensitiv* or anaphyla*).ti,ab,kw.	277561
66	exp Inflammation/	351277
67	inflamma*.ti,ab,kw.	994275
68	Incisional Hernia/	788
69	(incisional adj2 (hernia or rupture)).ti,ab,kw.	3557
70	Surgical Wound Dehiscence/	7519
71	(wound adj3 (dehiscence or reopen* or re open*)).ti,ab,kw.	4920
72	(fail* adj5 (suture* or resorption or absorb*)).ti,ab,kw.	1874
73	Pain, Postoperative/	40799
74	((post operative or postoperative or post surgical or postsurgical or wound) adj3 (pain* or discomfort or uncomfortable or comfort* or irritat*)).ti,ab,kw.	39166
75	Erythema/	11830
76	erythema.ti,ab,kw.	30185
77	or/64-76	1685695
78	38 and (62 or 77)	300

Database(s): Embase 1996 to 2021 Week 09
Search Strategy:

#	Searches	Results
1	exp suture/	58622
2	suture technique/ or suturing method/ or suture material/ or absorbable suture material/ or nonabsorbable suture material/	25842
3	sutur$.ti,ab,kw,dq,dv,my.	95806
4	stitch$.ti,ab,kw,dq,dv,my.	8015
5	((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) and (ligat$ or loop$ or thread$)).ti,ab,kw,dq,dv,my.	98541
6	or/1-5	214408
7	orthopedic fixation device/	1802
8	wound closure/	17309
9	((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kw,dq,dv,my.	116235
10	(device$ adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kw,dq,dv,my.	22183
11	((fascia$ or skin or skins or tissue$ or wound$) adj6 device$).ti,ab,kw,dq,dv,my.	10437
12	or/7-11	149994
13	6 or 12	344098
14	triclosan/	5163
15	triclosan$.ti,ab,kw,rn,tn,dq,dy.	5596
16	(cgp433$ or cgp-433$ or ch3565$ or ch-3565$ or cloxifenol$ or dndi1246774$ or dndi-1246774$ or dp300$ or dp-300$ or fat-80$ or fat80$ or gp41-353$ or gp41353$ or irgacare$ or irgacide$ or irgagard$ or irgasan$ or lexol-300$ or lexol300$ or ster-zac$ or sterzac$ or tcs or tricosan$).ti,ab,kw,rn,tn,dq,dy.	8670
17	(222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5).ti,ab,kw,rn,tn,dq,dy.	4870
18	or/14-17	13272
19	((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj20 (coat$ or impregnat$)).ti,ab,kw,dq,dv,my.	7429
20	13 and (18 or 19)	650
21	plus$ suture$.ti,ab,kw,dq,dv,my,dm.	39
22	((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj sutur$).ti,ab,kw,dq,dv,my,dm.	125

23	((pds$ or pds-ii) adj plus$).ti,ab,kw,dq,dv,my,dm.	51
24	((pds$ adj4 plus$) and sutur$).ti,ab,kw,dq,dv,my,dm.	50
25	(monocryl$ adj4 plus$).ti,ab,kw,dq,dv,my,dm.	23
26	(vicryl$ adj4 plus$).ti,ab,kw,dq,dv,my,dm.	111
27	(pds$ or monocryl$ or vicryl$).ti,ab,kw,dq,dv,my,dm. and (18 or 19)	117
28	stratafix$.ti,ab,kw,dq,dv,my,dm.	121
29	tissue control device$.ti,ab,kw,dq,dv,my,dm.	17
30	((polydioxanon$ or poliglecapron$ or polyglactin$) adj3 plus$).ti,ab,kw,dq,dv,my,dm.	33
31	(polydioxanon$ or poliglecapron$ or polyglactin$).ti,ab,kw,dq,dv,my,dm. and (18 or 19)	103
32	or/21-31	444
33	20 or 32	911
34	(animal/ or animal experiment/ or animal model/ or animal tissue/ or nonhuman/) not exp human/	4274077
35	editorial.pt.	599571
36	33 not (34 or 35)	732
37	limit 36 to english language	691
38	limit 37 to yr="2004 -Current"	664
39	co.fs.	1422177
40	complicat*.ti,ab.	1421019
41	safe*.ti,ab.	1296359
42	failure*.ti,ab.	940486
43	exp medical device complication/	133363
44	adverse.ti,ab.	780948
45	failed.ti,ab.	302324
46	exp postoperative complication/	609324
47	problem*.ti,ab.	1076626
48	side effect*.ti,ab.	315611
49	discomfort.ti,ab.	63794
50	loosen*.ti,ab.	22260
51	removal*.ti,ab.	367007
52	complications.kw.	67104
53	migration.ti,ab.	306360
54	ae.fs.	1015485
55	device related events.ti,ab.	149
56	adverse effects/	40095
57	device safety/	13716
58	safety/	245062
59	peroperative complication/	45471
60	tolerated.ti,ab.	206851
61	failing.ti,ab.	35666
62	or/39-61	6965212

63	38 and 62	519
64	hypersensitivity/ or allergic reaction/	54254
65	anaphylaxis/	35640
66	(allerg* or hypersensitiv* or anaphyla*).ti,ab,kw.	300440
67	inflammation/	433865
68	inflamma*.ti,ab,kw.	1340346
69	incisional hernia/	7229
70	(incisional adj2 (hernia or rupture)).ti,ab,kw.	5563
71	wound dehiscence/	17359
72	(wound adj3 (dehiscence or reopen* or re open*)).ti,ab,kw.	6544
73	(fail* adj5 (suture* or resorption or absorb*)).ti,ab,kw.	1888
74	postoperative pain/	66036
75	((post operative or postoperative or post surgical or postsurgical or wound) adj3 (pain* or discomfort or uncomfortable or comfort* or irritat*)).ti,ab,kw.	52956
76	erythema/	64357
77	erythema.ti,ab,kw.	37650
78	or/64-77	1821873
79	38 and (62 or 78)	533

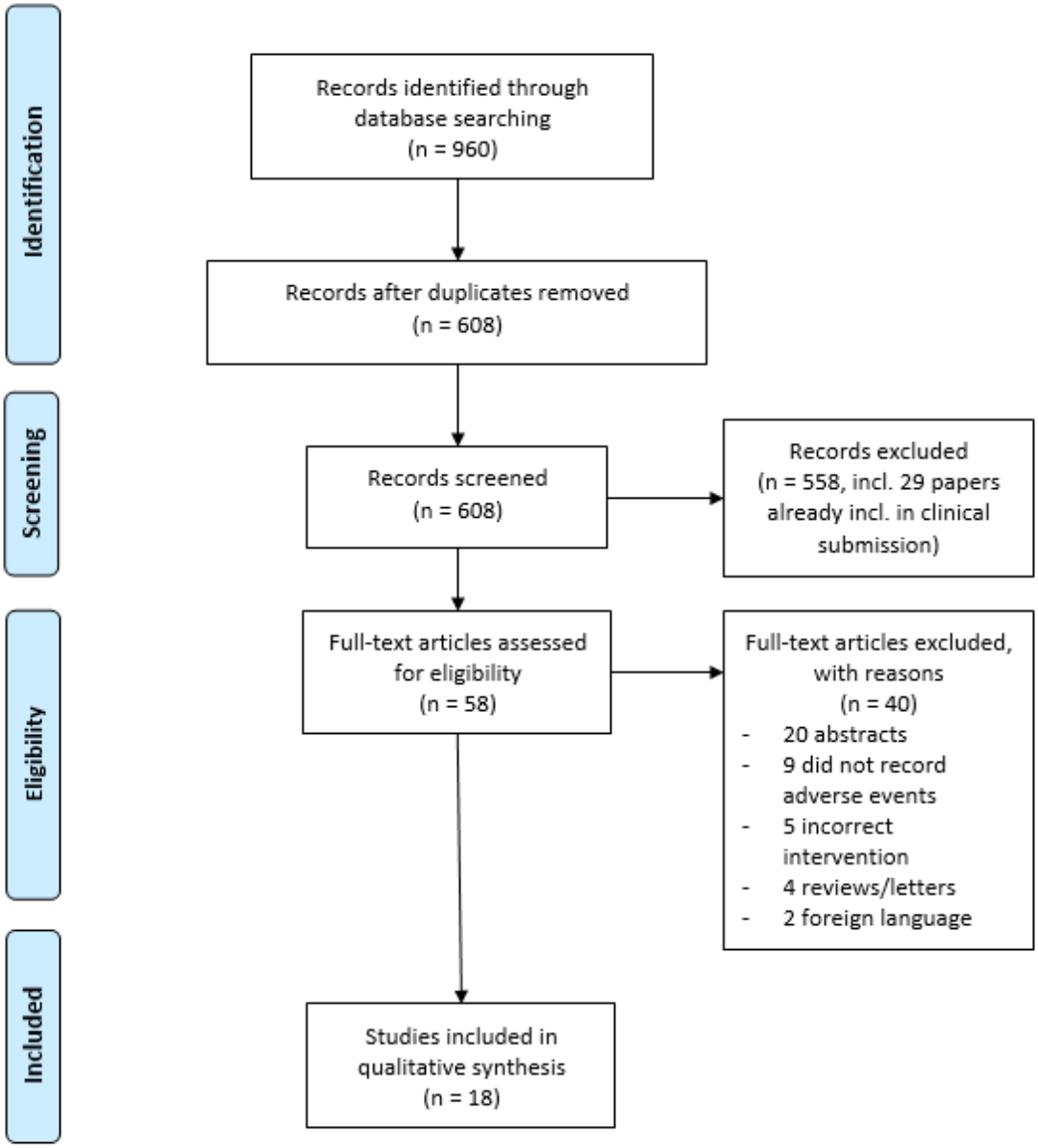
Cinahl via EBSCOHost

#	Query	Results
S1	(MH "Sutures")	3,700
S2	(MH "Suture Techniques")	6,219
S3	TI sutur* or AB sutur*	12,065
S4	TI stitch* or AB stitch*	1,029
S5	TI((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*)) or AB((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*))	8,046
S6	S1 OR S2 OR S3 OR S4 OR S5	23,642
S7	(MH "Surgical Fixation Devices")	157
S8	TI((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) N6 (approximat* or clos* or fasten* or fixat* or secur*)) or AB((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) N6 (approximat* or clos* or fasten* or fixat* or secur*))	21,525
S9	TI(device* N6 (approximat* or clos* or fasten* or fixat* or secur*)) or AB(device* N6 (approximat* or clos* or fasten* or fixat* or secur*))	4,103
S10	TI((fascia* or skin or skins or tissue* or wound*) N6 device*) or AB((fascia* or skin or skins or tissue* or wound*) N6 device*)	1,837
S11	S7 OR S8 OR S9 OR S10	26,451
S12	S6 OR S11	47,110
S13	(MH "Triclosan")	271
S14	TI triclosan* or AB triclosan*	397
S15	TI(cgp433* or cgp-433* or ch3565* or ch-3565* or cloxifenol* or dndi1246774* or dndi-1246774* or dp300* or dp-300* or fat-80* or fat80* or gp41-353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol-300* or lexol300* or ster-zac* or sterzac* or tcs or tricosan*) or AB(cgp433* or cgp-433* or ch3565* or ch-3565* or cloxifenol* or dndi1246774* or dndi-1246774* or dp300* or dp-300* or fat-80* or fat80* or gp41-353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol-300* or lexol300* or ster-zac* or sterzac* or tcs or tricosan*)	708
S16	TI(222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5) or AB(222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5)	514

S17	S13 OR S14 OR S15 OR S16	1,174
S18	TI((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N20 (coat* or impregnat*)) or AB((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N20 (coat* or impregnat*))	933
S19	S12 AND (S17 OR S18)	120
S20	TI("plus* suture*") OR AB("plus* suture*")	8
S21	TI((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N0 sutur*) or AB((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N0 sutur*)	27
S22	TI((pds* or pds-ii) N0 plus*) or AB((pds* or pds-ii) N0 plus*)	11
S23	TI((pds* N4 plus*) and sutur*) or AB((pds* N4 plus*) and sutur*)	9
S24	TI(monocryl* N4 plus*) or AB(monocryl* N4 plus*)	10
S25	TI(vicryl* N4 plus*) or AB(vicryl* N4 plus*)	5
S26	(TI(pds* or monocryl* or vicryl*) or AB(pds* or monocryl* or vicryl*)) AND (S17 OR S18)	11
S27	TI stratafix* or AB stratafix*	20
S28	TI("tissue control device*") or AB("tissue control device*")	5
S29	TI((polydioxanon* or poliglecapron* or polyglactin*) N3 plus*) or AB((polydioxanon* or poliglecapron* or polyglactin*) N3 plus*)	8
S30	(TI(polydioxanon* or poliglecapron* or polyglactin*) or AB(polydioxanon* or poliglecapron* or polyglactin*)) AND (S17 OR S18)	17
S31	S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30	77
S32	S19 OR S31 (Published Date: 20040101-20201231)	158
S33	MW "co" AND MW "complications"	399,460
S34	MW "ae"	418,511
S35	TI complicat* or AB complicat*	231,102
S36	TI safe* or AB safe*	293,306
S37	(MH "Postoperative Complications+")	121,544
S38	TI failure* or AB failure*	162,269
S39	TI adverse or AB adverse	151,258
S40	TI failed or AB failed	39,957
S41	(MH "Equipment Failure+")	21,413
S42	TI removal or AB removal	33,988

S43	(MH "Equipment Safety")	4,763
S44	TI problem* or AB problem*	276,254
S45	TI side effect* or AB side effect*	46,355
S46	TI harmful or AB harmful	14,473
S47	TI tolerated or AB tolerated	27,429
S48	TI loosen* or AB loosen*	5,342
S49	(MH "Intraoperative Complications")	7,722
S50	TI migration or AB migration	22,723
S51	TI breakag* or AB breakag*	1,385
S52	TI discomfort or AB discomfort	15,192
S53	TI displacement or AB displacement	13,428
S54	TI detrimental N2 effect* or AB detrimental N2 effect*	5,455
S55	TI untoward effects or AB untoward effects	454
S56	S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55	1,672,279
S57	S32 AND S59	125
S58	(MH "Hypersensitivity+")	71,954
S59	TI ((allerg* or hypersensitiv* or anaphyla*)) OR AB ((allerg* or hypersensitiv* or anaphyla*))	38,012
S60	(MH "Inflammation+")	65,213
S61	Ti inflamma* or AB inflamma*	141,979
S62	TI ((incisional N2 (hernia or rupture))) OR AB ((incisional N2 (hernia or rupture)))	1,055
S63	(MH "Surgical Wound Dehiscence")	1,563
S64	TI ((wound N3 (dehiscence or reopen* or re open*))) OR AB ((wound N3 (dehiscence or reopen* or re open*)))	1,145
S65	TI ((fail* N5 (suture* or resorption or absorb*))) OR AB ((fail* N5 (suture* or resorption or absorb*)))	485
S66	(MH "Postoperative Pain")	18,036
S67	TI (((post operative or postoperative or post surgical or postsurgical or wound) N3 (pain* or discomfort or uncomfortable or comfort* or irritat*))) OR AB (((post operative or postoperative or post surgical or postsurgical or wound) N3 (pain* or discomfort or uncomfortable or comfort* or irritat*)))	14,169
S68	(MH "Erythema")	1,948
S69	TI erythema or AB erythema	4,166
S70	S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69	286,212
S71	S35 AND (S56 OR S70)	127

Figure C1. *PRISMA diagram of EAC's literature search and sift for adverse events (Moher et al., 2009)*.



Appendix E: Forest plots

Figure E1. *Adult subgroup, updated to include Ruiz-Tovar 2015.*

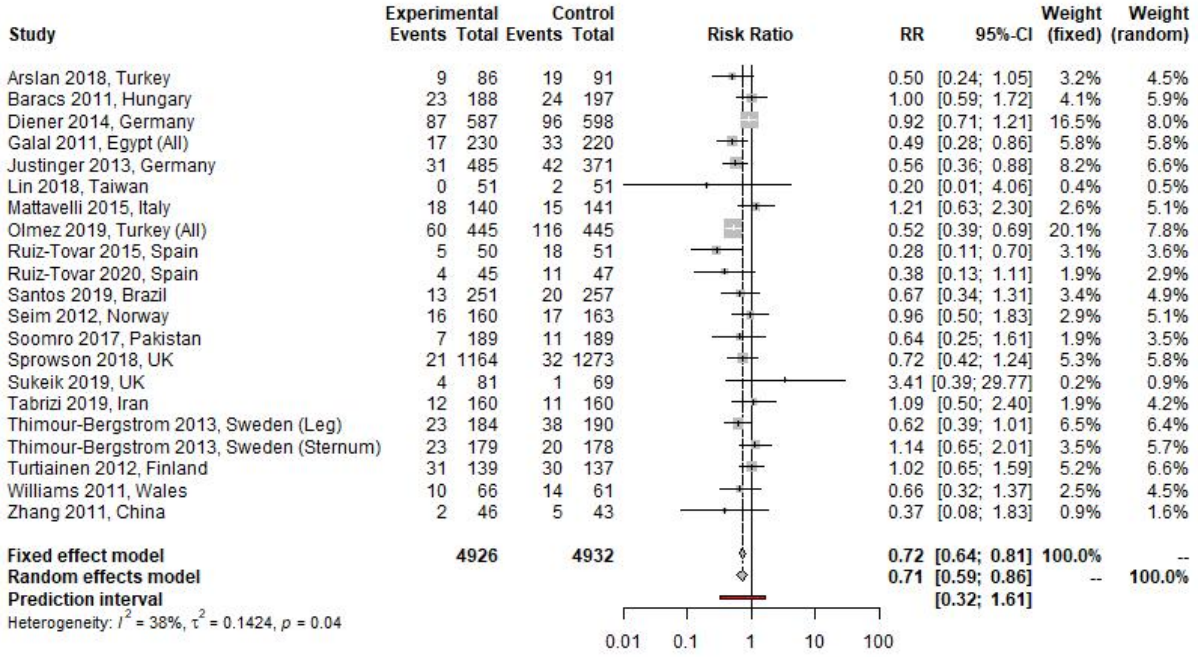


Figure E2. *High-quality studies only.*

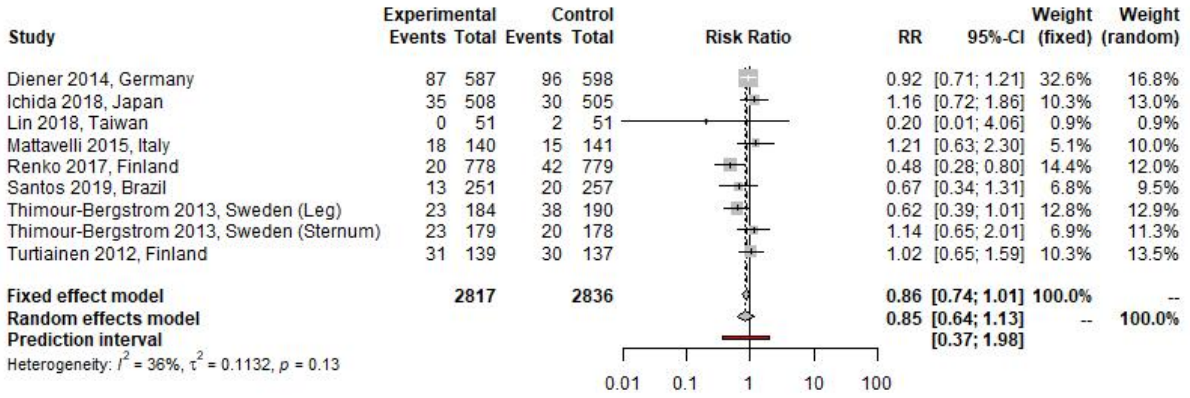


Figure E3. *High and moderate-quality studies only.*

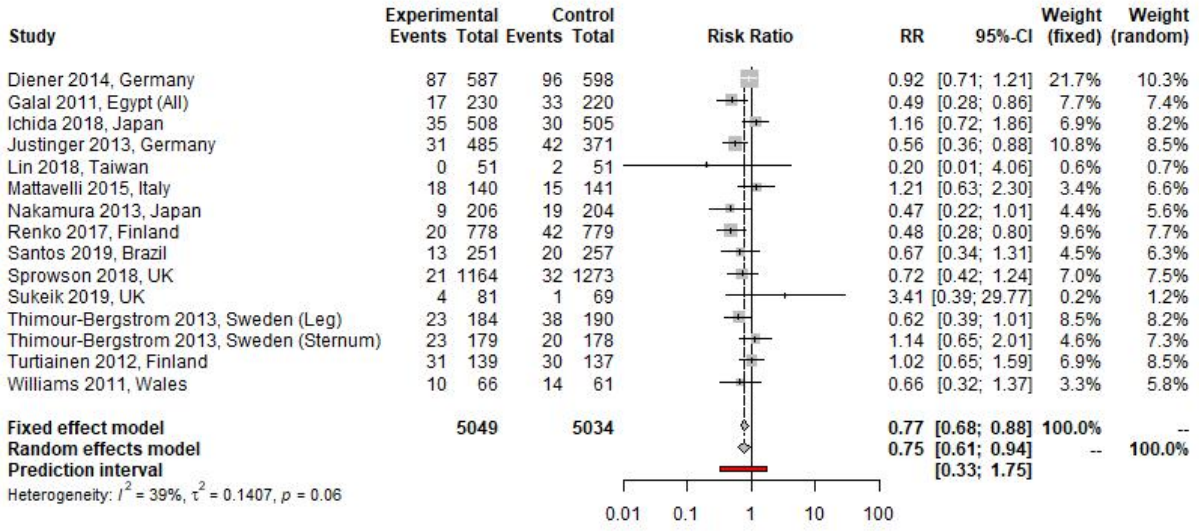


Figure E4. *Low-quality studies only.*

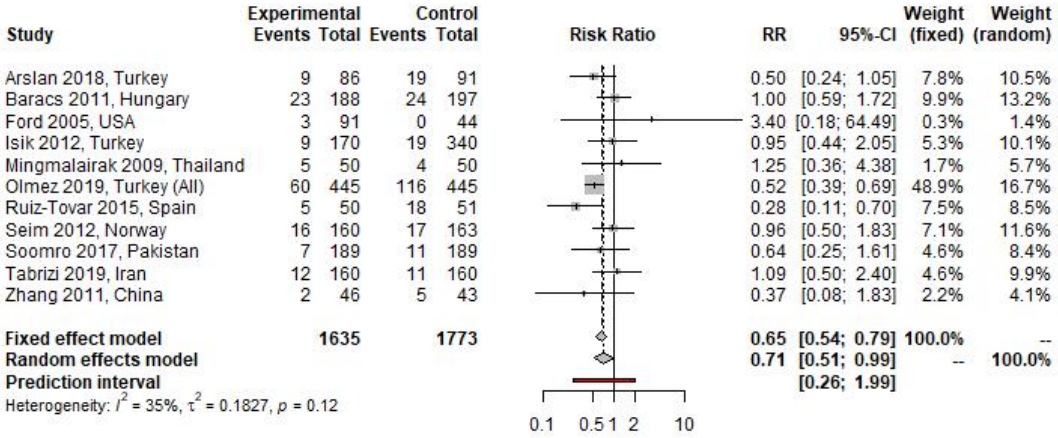


Figure E5. *Sample size >1000.*

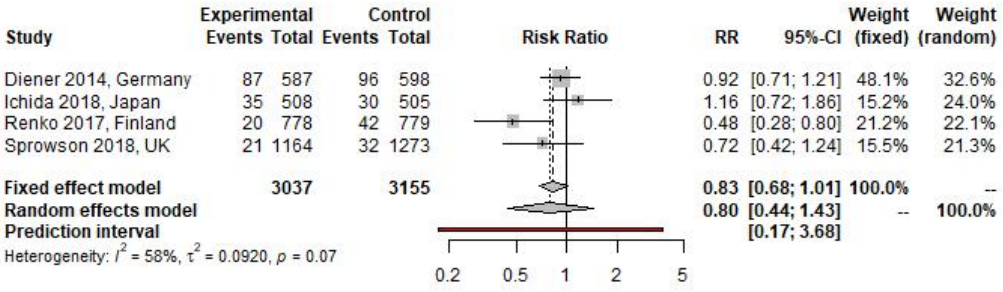


Figure E6. *Sample size ≤1000.*

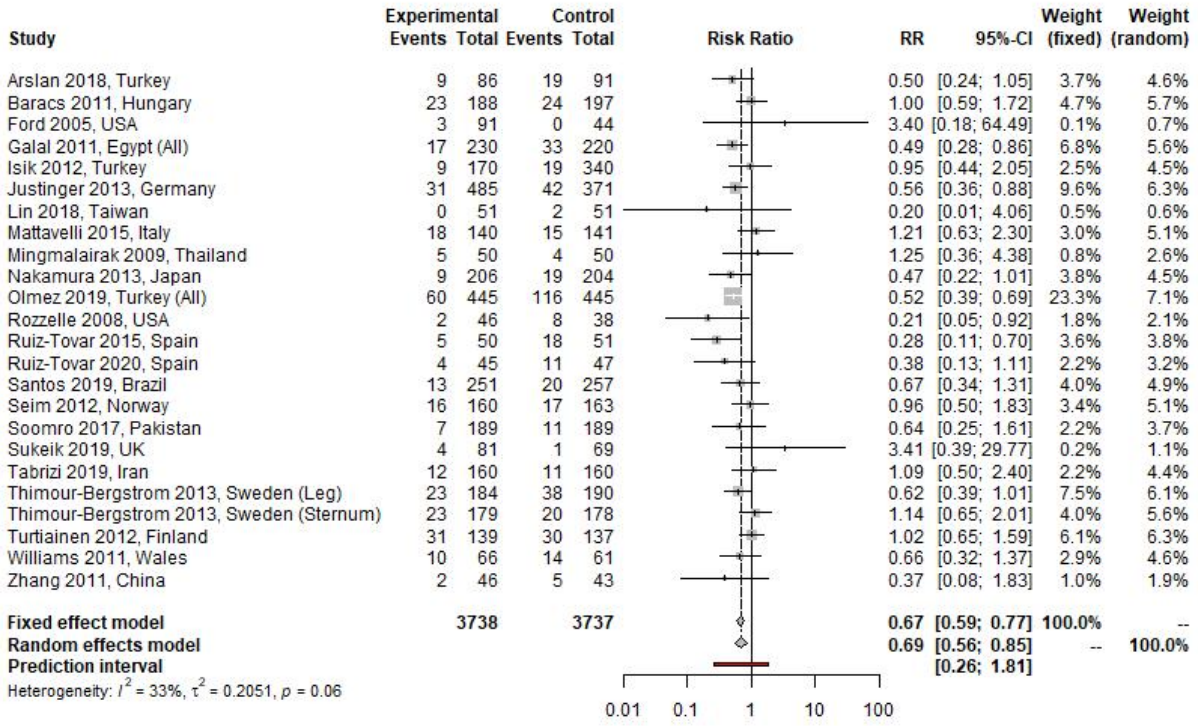


Figure E7. *Sample size >500.*

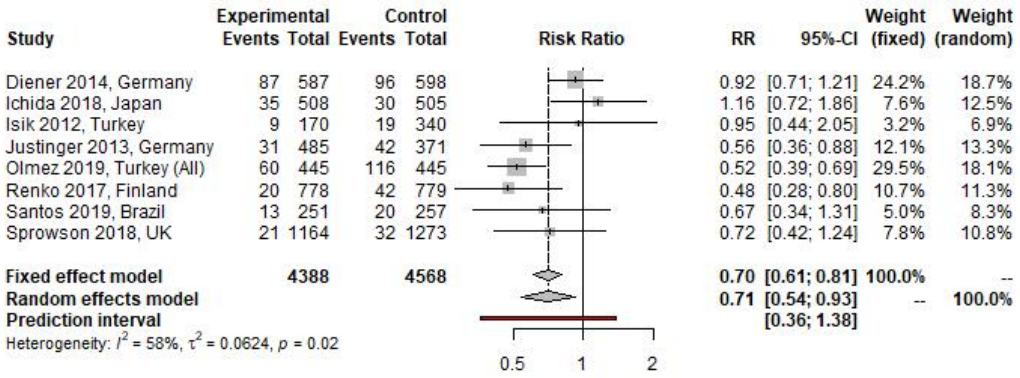


Figure E8. *Sample size ≤500.*

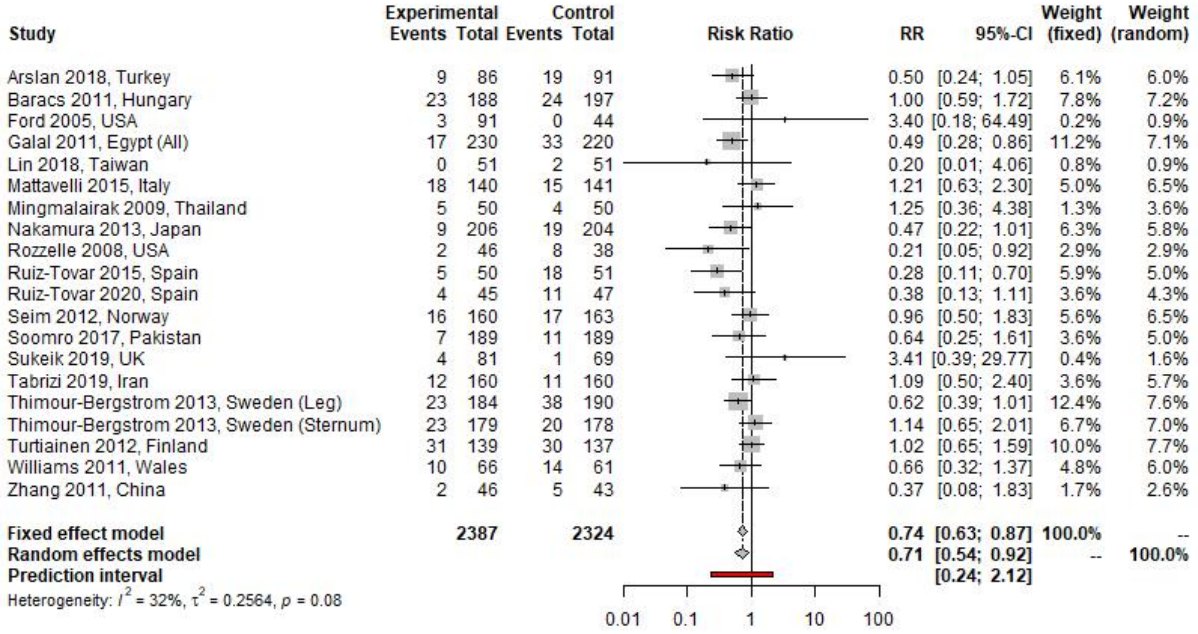


Figure E9. *UK studies only.*

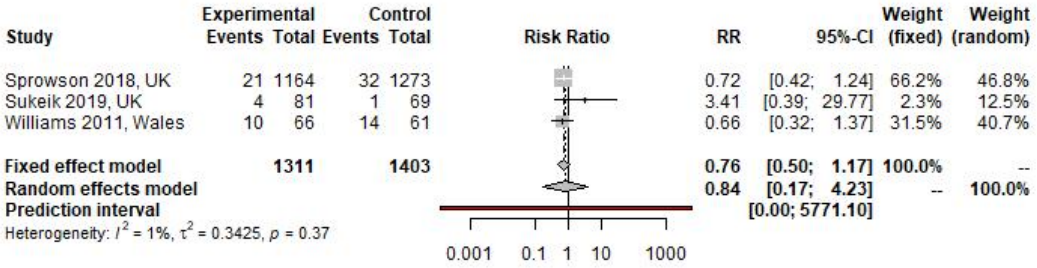
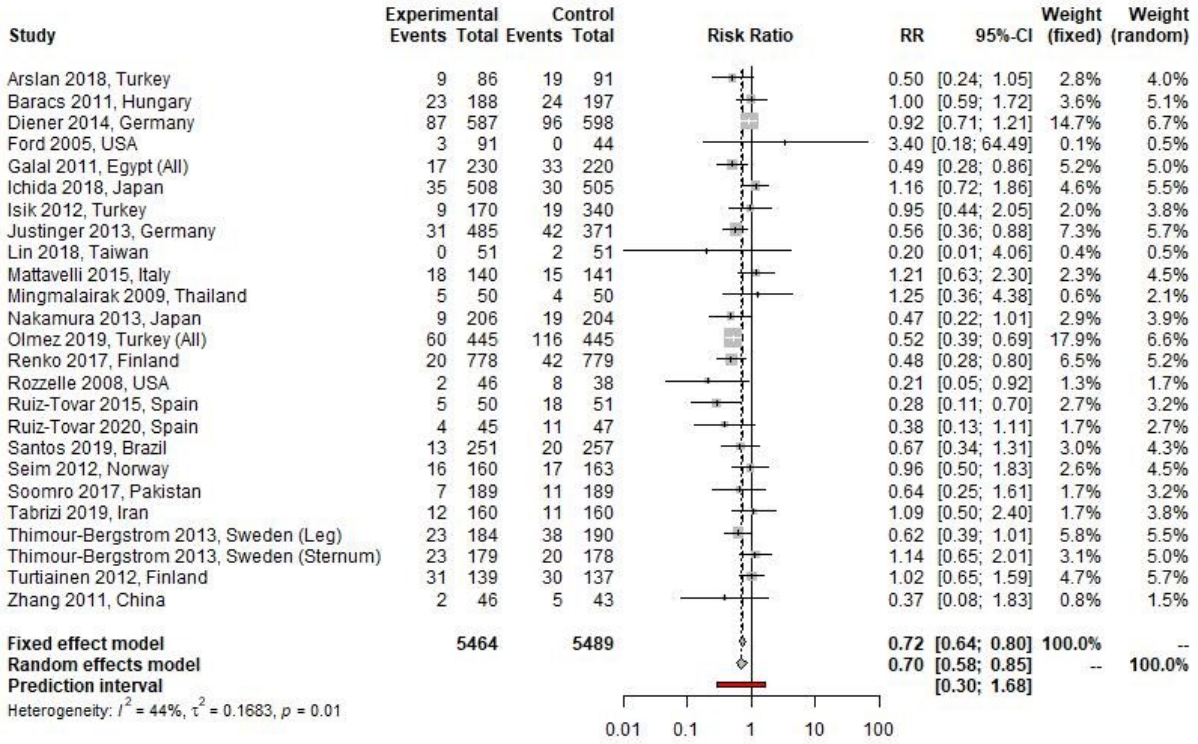


Figure E10. Non-*UK studies only.*


Study
Experimental Events Total
Control Events Total
Risk Ratio
RR 95%-CI
Weight (fixed)
Weight (random)
Arslan 2018, Turkey 9 86 19 91 0.50 [0.24; 1.05] 2.8% 4.0%
Baracs 2011, Hungary 23 188 24 197 1.00 [0.59; 1.72] 3.6% 5.1%
Diener 2014, Germany 87 587 96 598 0.92 [0.71; 1.21] 14.7% 6.7%
Ford 2005, USA 3 91 0 44 3.40 [0.18; 64.49] 0.1% 0.5%
Galal 2011, Egypt (All) 17 230 33 220 0.49 [0.28; 0.86] 5.2% 5.0%
Ichida 2018, Japan 35 508 30 505 1.16 [0.72; 1.86] 4.6% 5.5%
Isik 2012, Turkey 9 170 19 340 0.95 [0.44; 2.05] 2.0% 3.8%
Justinger 2013, Germany 31 485 42 371 0.56 [0.36; 0.88] 7.3% 5.7%
Lin 2018, Taiwan 0 51 2 51 0.20 [0.01; 4.06] 0.4% 0.5%
Mattavelli 2015, Italy 18 140 15 141 1.21 [0.63; 2.30] 2.3% 4.5%
Mingmalairak 2009, Thailand 5 50 4 50 1.25 [0.36; 4.38] 0.6% 2.1%
Nakamura 2013, Japan 9 206 19 204 0.47 [0.22; 1.01] 2.9% 3.9%
Olmez 2019, Turkey (All) 60 445 116 445 0.52 [0.39; 0.69] 17.9% 6.6%
Renko 2017, Finland 20 778 42 779 0.48 [0.28; 0.80] 6.5% 5.2%
Rozzelle 2008, USA 2 46 8 38 0.21 [0.05; 0.92] 1.3% 1.7%
Ruiz-Tovar 2015, Spain 5 50 18 51 0.28 [0.11; 0.70] 2.7% 3.2%
Ruiz-Tovar 2020, Spain 4 45 11 47 0.38 [0.13; 1.11] 1.7% 2.7%
Santos 2019, Brazil 13 251 20 257 0.67 [0.34; 1.31] 3.0% 4.3%
Seim 2012, Norway 16 160 17 163 0.96 [0.50; 1.83] 2.6% 4.5%
Soomro 2017, Pakistan 7 189 11 189 0.64 [0.25; 1.61] 1.7% 3.2%
Tabrizi 2019, Iran 12 160 11 160 1.09 [0.50; 2.40] 1.7% 3.8%
Thimour-Bergstrom 2013, Sweden (Leg) 23 184 38 190 0.62 [0.39; 1.01] 5.8% 5.5%
Thimour-Bergstrom 2013, Sweden (Sternum) 23 179 20 178 1.14 [0.65; 2.01] 3.1% 5.0%
Turtiainen 2012, Finland 31 139 30 137 1.02 [0.65; 1.59] 4.7% 5.7%
Zhang 2011, China 2 46 5 43 0.37 [0.08; 1.83] 0.8% 1.5%
Fixed effect model 5464 5489 0.72 [0.64; 0.80] 100.0% --
Random effects model 0.70 [0.58; 0.85] -- 100.0%
Prediction interval [0.30; 1.68]
Heterogeneity: I^2 = 44%, τ^2 = 0.1683, p = 0.01
0.01
0.1
1
10
100

Appendix F: Critical appraisal of economic evidence

All studies were appraised using the CHEERS tool (Husereau *et al*., 2013).

Table F1. *Appraisal of Leaper et al. (2017).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	*"Meta-analysis of the potential economic impact following introduction of absorbable antimicrobial sutures".* Comparator not in title.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Yes	Comparison with conventional non-coated absorbable sutures, NHS setting, SA and MA fed into a decision tree using NHS cost of admissions. Savings per surgical procedure determined across all wound types (not defined in abstract). Significant savings across surgical wound types.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	Burden of SSI and excess length of stay and associated cost (using a study set in NHS).
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Yes	PICO defined (table 1). Included comparative studies with n>30 in each arm, conference abstract if less than 2 years old.
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Yes	Decision tree (Fig1) provided.
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Partially	NHS cost perspective using HES cost data (not enough information to replicate where costs came from).
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	PICO defined (table)
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Yes	*"SSI at any postoperative time point. When more than one time point was provided, the latest time point was selected so that one SSI rate per cohort was included in the final analysis."*

Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A	Decision tree with follow-up largely 30days. Discounting not required.
Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	Yes	SSI only.
Measurement of effectiveness	11 a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.		
	11 b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.	Yes	Literature search defined fully in Suppl Mat (replicable), as is categorization of surgical sites.
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted
Estimating resources and costs	13 a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
	13 b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Partially	Odds ratios taken from MA used to determine cost impact. Mean episode cost associated with primary diagnosis ICD10 code T81.4 “Infection following a procedure, not elsewhere classified” used. Insufficient detail on costs used.
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	No	Costs not explicitly defined. Conversion from GBP to Euros (date of exchange rate applied provided, exchange rate not explicitly reported).

Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	Yes	Decision tree run for each surgical wound type. Key variable included: differential cost of sutures, probability of developing SSI with each suture type, and inpatient cost of SSI.
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Yes	Structurally simple (proportion of SSI, and cost from mean infection episode). Assumed no costs from subsequent care (after discharge), although not explicitly stated.
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	Partially	Deterministic and probabilistic models constructed in order to address sensitivity of values. Categorisation by surgery type to account for wound variability. However paper states "relative frequency of clean, clean-contaminated and direct wound categories as described in the HES public data for 2015" but does not explicitly state which frequencies were applied in the model.
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	No	Distribution of parameter choices not explicitly stated. No table of inputs.
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	Partially	Mean savings reported (not reported separately per arm). No ICERs reported.
Characterising uncertainty	20 a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).		
	20 b	*Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input	Partially	Tornado diagram included (Fig5), *"Inpatient cost variability for SSI had the greatest impact on total savings".* However distribution of each parameter not

		parameters, and uncertainty related to the structure of the model and assumptions.		explicitly defined, and no discussion of structural uncertainty or assumptions.
Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost- effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	Partially	Mean savings per operation reported overall, and separately for clean, and contaminated/dirty wound operations. Savings for clean-contaminated wound operations not reported.
Discussion Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Partially	*"The decision-tree deterministic and stochastic economic cost model used in this study found that the use of antimicrobial sutures results in a significant cost saving for all surgical wound types".* States that results of study are in line with previous SR/MA (confirming benefit of triclosan coated sutures in reducing SSI). No limitations explicitly stated.
Other Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	No	No funding statement included.
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	Yes	*"The authors acknowledge K. Corso (epidemiologist at Johnson & Johnson) for her work in manuscript title and abstract searching, and data quality control. C.E.H. is an employee of Johnson & Johnson. Disclosure: The authors declare no other conflict of interest".*

Table F2. *Appraisal of Ceresoli et al. (2020).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	"*The Clinical and Economic Value of Triclosan-Coated Surgical Sutures in Abdominal Surgery*". Comparator not explicitly stated but implied.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Yes	SSI prevention in abdominal surgery between triclosan and non-triclosan absorbable sutures. Italian hospital perspective, general surgery setting. DSA and PSA conducted. Annual net saving reported. Additional suture cost offset by reduction in SSI.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	"*Despite established preventive measures [2], SSI remains the most frequent complication following abdominal surgery—defined as any surgical procedure on the abdominal cavity followed by abdominal wall closure—with an incidence rate of 10%–20% in contaminated and dirty surgery*". Aims stated
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Yes	Abdominal surgery in adults, any layer closed with triclosan suture.
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Partially	Budget impact analysis (section 2.2) but no figure provided
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Yes	Italian hospital perspective (model inputs described in section 2.2.1)
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	Triclosan and non-triclosan coated absorbable sutures.
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	No	Time horizon not explicitly reported (although assumed to be short term due to nature of outcome).
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A	Assumed short time horizon, not required
Choice of health	10	Describe what outcomes were used as the	Yes	SSI only

outcomes		measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.		
Measurement of effectiveness	11a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.		
	11b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.	Yes	Search terms defined (section 2.1.2), study selection (2.1.3), MA review (Table 2),
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted
Estimating resources and costs	13a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Yes	Meta-analysis of Henriksen *et al* was included in economic model base case (stated as largest and best matched inclusion/exclusion criteria). Unit costs and their sources described (section 2.2.1)
	13b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	Yes	*"The cost that was identified for each wound infection was inflated to 2019 costs according to the Italian Institute of Statistics Consumer Price Index of 1.296."*
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	No	Figure not provided, reason for model structure not explicitly defined (although is deemed best model structure for the decision problem).

Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Yes	*"An SSI cost—specific for an abdominal surgery and referred to the Italian environment—of €4,838 was therefore considered in this economic analysis. The cost breakdown was attributed to additional resource use (14%) and prolonged length of stay (LOS) (86%),as previously described [32]."*
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	Yes	One-way sensitivity analysis conducted using 95% CI where possible or +/- 25% range of variation. PSA performed (1000 iterations).
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	Yes	Distributions stated (Table 1).
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	Partially	Mean saving reported (cost per arm not explicitly reported). No ICERs reported.
Characterising uncertainty	20 a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).		
	20 b	*Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.	Yes	Tornado diagram (Figure 1), PSA results (Figure 2 and 3)

Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost- effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	No	No subgroup analysis conducted.
Discussion Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Yes	*"The relevance of this study to the Italian healthcare system lies in the use of Italian-specific inputdata for SSI risk and SSI cost."* *"the limitations of the model lie in some of the inputs being extrapolated from literature research, not being real-world data, or being inflated to current values from outdated data like the SSI cost."*
Other Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	Yes	*"Funding: Johnson and Johnson funded medical writing services for this research. The authors received no financial support for the research, authorship, and publication of this article."*
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	Yes	*"Conflicts of Interest: Alessandra Piemontese, Giovanni Tommaselli, Thibaut Galvain and Vito Parago all declare to be employees of Johnson & Johnson."*

Table F3. *Appraisal of Mahajan et al. (2020).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	*"An economic model to assess the value of triclosan-coated sutures in reducing the risk of surgical-site infection in coronary artery bypass graft in India".* Comparator not stated but implied.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Yes	To determine additional costs and LoS due to SSIs after CABG, systematic review conducted (date ranges included, including private and public hospitals (India)), decision-tree model applied.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	*"The WHO Guidelines (2016) have recommended the use of TCS irrespective of the type of surgery. This study presents the incidences of SSI and the efficacy and cost-effectiveness of anti-bacterial-coated sutures, triclosan, in reducing the incidences of SSI in CABG surgery in India".*
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Yes	CABG. No subgroups analysed.
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Yes	Decision tree structure provided (Figure 3).
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Yes	*"We determined the cost associated with treating patients with SSI and without SSI by obtaining and calculating the cost information from two tertiary care hospitals (private and public hospitals) in India"*
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	Antimicrobial and non-antimicrobial sutures.
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	No	Time horizon not reported.
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A	Decision tree with short follow-up. Discounting not required.

Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	Yes	SSI only
Measurement of effectiveness	11 a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.		
	11 b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.	Yes	Literature search used to identify SSI rates (Figure 1), and separate search for efficacy of triclosan-coated sutures (Figure 2), full papers retrieved for accepted articles and references were checked manually to identify relevant review articles.
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted
Estimating resources and costs	13 a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Partially	*"Total SSI cost included SSI management, additional hospitalization cost, and cost of each admission loss due to bed occupancy, called as an opportunity cost for this study".* Research methods for valuing each resource item not reported.
	13 b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	No	No dates reported, results reported in Indian currency (no conversion reported).

Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	Yes	Decision tree structure provided (Figure 3), and authors state: *"The decision tree analysis is the most widely used model which provides a framework for the calculation of the expected value of each available alternative"*.
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Yes	Cost of sutures assumed to be the same in private and public hospitals and the maximum retail price used for each suture. SSI incidence assumed same for private and public hospitals. SSI incidence and effect of antimicrobial sutures obtained from literature.
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	Yes	Tornado plot (efficacy, SSI incidence, cost of non-antimicrobial sutures +/- 20%, cost of antimicrobial sutures +/- 20%) provided (Figure 4). Separate analysis conducted for private and public hospitals.
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	No	Individual costs and distributions (other than cost of sutures +/-20%) not reported.
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	No	Cost savings reported as % (not mean currency value). ICER not reported.
Characterising uncertainty	20 a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).	Partially	Tornado diagram provided (looking at 4 parameters)

	20b	*Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.		
Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost- effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	No	Not discussed.
Discussion Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Partially	*"Although TCS is almost 0.4 times expensive than NCS, the cost saving provided by preventing CABG SSIs not only counterbalances this expense but also observed to be saving cost, even when the cost saving was as low as 1.6% and efficacy of TCS in preventing SSIs was at the lowest (5%)."* Limitations not reported, but difference in efficacy of triclosan coated sutures described *"The potential reasons for disagreement among study results are the clinical sample size, different study designs, blindness of patients and assessors, length of follow-up, heterogeneity of surgical procedures, methods, the definition of SSI, evaluation of risk factors in the analysis, inclusion and exclusion criteria, suture material used, parameters evaluated and unrecorded data at follow-up*".
Other Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	Yes	*"Financial support and sponsorship: Nil".*
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors	Yes	*"Conflicts of interest: There are no conflicts of interest".*

		recommendations.		

Table F4. *Appraisal of Leaper et al. (2020).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	*"Assessment of the Risk and Economic Burden of Surgical Site Infection Following Colorectal Surgery Using a US Longitudinal Database: Is There a Role for Innovative Antimicrobial Wound Closure Technology to Reduce the Risk of Infection?"* Intervention (triclosan sutures) nor comparator explicitly mentioned.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Yes	US setting, cost of infections after colorectal surgery over 24 months (commercial payers and Medicare). SSI costs higher than previously reported.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	*"In the United States, elective colorectal surgery ranks in the top 10 of operating room procedures, with over 300,000 procedures reported in 2012."* *"The rate of SSI after colorectal surgery is one of the highest of any surgical specialty, with a reported incidence ranging from 9% to 41%."*
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Yes	*"adult patients (≥18 years) undergoing colorectal surgery in the United States between 2014 and 2018."* Cohort defined using clinical codes. Patient categorized by comorbidities (Elixhauser Comorbidity Index)
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Yes	*"Key variables for each of the model branches included the differential cost of antimicrobial wound closure compared with traditional suture technology, the probability of developing an SSI with antimicrobial sutures compared to traditional sutures, and the inpatient cost of SSI."*
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Yes	Commercial payers and Medicare

Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	Antimicrobial wound closure (assumed to be sutured, but not specific to triclosan), and traditional suture technology.
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Partially	Time horizon reported as 24 months, but appropriateness not explained.
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A	
Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	Yes	SSI 3rd-180th post-operative day (note: Infections identified within the first 2 days after surgery were not included because they may have been present on admission), Infection up to 24 months. Deep incisional and organ-space infections were separated, and the latter did not inform the cost analysis.
Measurement of effectiveness	11a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	No	*"The SSI risk reduction with antimicrobial wound closure was taken from available publications on contaminated and dirty (class 3 or class 4) wound types."* No justification provided.
	11b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.		
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted
Estimating resources and costs	13a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Yes	SSI costs taken from retrospective observational database cohort. Unit costs of sutures from vendor.
	13b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods		

		for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	No	Incremental cost of antimicrobial sutures stated, but list of costs included in model not explicitly reported. *"All payments were adjusted to a 2018 consumer price index"* but no further details given.
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	Yes	Structure of decision-tree cost model provided (Figure 1).
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Yes	*"Because antimicrobial sutures are not likely to impact organ-space infection rates, the cost analysis was performed on superficial and deep incisional SSIs only."*
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	Partially	*"Results of the model consisted of a primary analysis that examined the incremental costs per patient over the first postoperative 12 months for superficial and deep incisional SSI. A secondary analysis, removing superficial infection rates and costs, was performed to examine the impact of deep incisional SSI only. To address uncertainty in input parameters, the results of the primary and secondary analyses were conducted probabilistically."*
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	No	Distributions of each parameter not reported.
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	No	Median costs avoided reported (not explicitly reported per arm). No ICERs reported.

Characterising uncertainty	20a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).	Partially	Distribution of savings per patient illustrated (Figure 5 and 6) from commercial payer and Medicare perspective. Impact of model assumptions not reported.
	20b	*Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.		
Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost- effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	No	Difference in SSI input shown in Table 3, but impact on model not discussed.
Discussion Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Yes	*"The results of this study have some important limitations. As with all retrospective database observational studies, results are limited to the captured information. All information within the IBM MarketScan Commercial, Multi-State Medicaid and Medicare Supplemental databases is provided by individual health care settings and is subject to errors in incomplete hospital reporting, coding errors, or misclassification of patients; causality cannot be inferred. We were unable to control for potentially important factors including physical function, socioeconomic status, wound care, and nutritional status."*
Other Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	Yes	*"Funding/Support: Funding was provided by Ethicon, Inc."*

Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	Yes	*"Financial Disclosures: Drs Edmiston and Leaper, and M. Spencer are members of the Johnson and Johnson Speakers Bureau. M. Spencer is on the speaker's bureau for Ethicon. Drs Holy and Chitnis, and B.P.-H. Chen are employees of Johnson and Johnson, Inc. A. Hogan and Dr Wright are employees of CRG-Eversana Canada Inc, which was contracted by Ethicon, Inc, which provided funding to assist in the analysis and review of the manuscript."*

Table F5. *Appraisal of Nakamura et al. (2012).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	*"Triclosan-coated sutures reduce the incidence of wound infections and the costs after colorectal surgery: A randomized controlled trial".* Comparator not explicitly defined but is implied.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Partially	Colorectal surgery. Perspective not explicitly defined. Note not a model therefore uncertainty analyses not included.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	*"Surgical site infections (SSIs) account for the most common cause of nosocomial infections in surgical patients, increase medical costs, and prolong hospital stays. In colorectal surgery, SSIs frequently cause morbidity, with an incidence of up to 20%, as indicated by previous studies."*
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Yes	Elective colorectal operations at a single private hospital. Demographics in Table 1. Subgrouped by laparoscopic/open approach for clinical outcomes but not costs.
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	N/A	No modelling or decision, cost summed for each patient based on infection wound management costs.
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	No	Implied to be hospital perspective using hospital resource costs, but not explicitly reported.
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	VICRYL Plus and VICRYL.
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Yes	30 days
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A	Short time horizon, no discounting applied.

Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	Yes	Wound infection (using CDC definition)
Measurement of effectiveness	11a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	Yes	RCT
	11b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.		
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted
Estimating resources and costs	13a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Yes	*"Using the fee-for-service calculation method (the standardized national Japanese set costs of health care) based on the medical fee table of the fiscal years 2008 and 2010, medical costs were calculated by aggregating the medical costs generated during the additional treatment period of wound infections."* Not modelled, costs just summed per patient. Unclear what was included in "cost of wound infection", but it did include inpatient and outpatient costs as some patients with infected wounds were discharged and managed in an outpatient setting.
	13b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	Yes	*"Medical costs were converted into US dollars at the exchange rate of U1 = US $0.0125 during the study period."*

Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	N/A	Not modelled
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	N/A	Not modelled
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	N/A	Not modelled
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	No	*"Using the fee-for-service calculation method (the standardized national Japanese set costs of health care) based on the medical fee table of the fiscal years 2008 and 2010, medical costs were calculated by aggregating the medical costs generated during the additional treatment period of wound infections."*
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	N/A	Not modelled
Characterising uncertainty	20 a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).	N/A	Not modelled
	20 b	*Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.		

Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost- effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	No	Subgroup analysis for SSI rates separated for laparoscopic/open approaches however not investigated in terms of costs.
Discussion Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Partially	*"Although the triclosan-coated polyglactin suture is more expensive, it may be more cost effective for health care resources in the long term. The additional cost per patient of using triclosan-coated polyglactin suture is about $10.80; therefore, the total additional cost for all 200 patients in 1 year is $2,160. The median additional cost of wound-infection management is $2,310 per patient. The annual cost of the antimicrobial-coated sutures, therefore, roughly corresponds with the cost of treating and managing 1 patient's wound infection. Hence, if 0.5% (1 in 200 patients) of wound infections are prevented by using triclosan-coated polyglactin sutures in a year, it will be more cost-effective for health care resources in the long term."* No limitations acknowledged.
Other Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	No	Not reported
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	No	Not reported

Table F6. *Appraisal of Fleck et al. (2007).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	*"Triclosan-coated sutures for the reduction of sternal wound infections: economic considerations".* Comparator not stated but implied.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Partially	Comparison of triclosan and non-triclosan coated sutures. Setting, methods and uncertainty analysis not provided.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	*"The aim of our study was to evaluate whether the incidence of sternal wound infection can be reduced when triclosan-coated sutures are used for sternal wound closure and the impact on the overall costs and the costs associate with sternal wound infections".*
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.		Patients undergoing cardiac surgery. Pre-op demographics provided (Table 1). National Nosocomial Infections Surveillance System (NNIS) risk score used to classify patients in terms of risk of developing a surgical site infection. No subgroup analysis
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	N/A	No decisions, just economic cost-consequence analysis.
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Partially	Retrospective design, cardiac surgical department (setting and location not explicitly stated, but assumed to be Austria).
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	Triclosan and non-triclosan coated sutures. Note all patients with a sternal wound infection were treated with vacuum-assisted closure.
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Yes	Date of procedures between May to December 2005. All patients seen in outpatients at 2 and 8 weeks post-surgery. Mean follow-up 7.6 months (range 2 to 15 months).*"Estimated costs for the entire study group and*

				the estimated costs of a 12-month period (for example, January to December 2005) are given in Table 3."
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A	Economic evaluation of local data (discounting not required).
Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	Yes	SSI (CDC definition) only.
Measurement of effectiveness	11a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	Yes	Not stated why study is a sufficient source of clinical effectiveness data, but authors acknowledge that this is a preliminary study, with limited sample size and therefore a lack of statistical power, and state that a larger study is in progress.
	11b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.		
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted.
Estimating resources and costs	13a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Partially	Cost of interventions, cost of sternal wound infection (vacuum-assisted closure, operating costs, hospital stay) (Table 3) provided but approaches to estimating these / sources of these, not provided in full.
	13b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of	No	Source of costs and dates not reported. Costs reported in US dollars.

		reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.		
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	N/A	No modelling conducted, economic evaluation of local data only.
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Partially	Cost assumptions include: all patients assumed 7 days in-hospital, 1 day in ITU, all with same operating cost. All sternal wound infections assumed 13 days hospital stay, and 10 days treatment (with 3 dressing changes) with VAC system.
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	No	Not applied.
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	No	No distributions provided, no sensitivity analysis conducted.
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	No	Per patient cost, and cost multiplied across 1100 patients, only. ICER not reported
Characterising uncertainty	20 a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact	No	ICER not reported.

		of methodological assumptions (such as discount rate, study perspective).		
	20b	*Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.		
Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost-effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	No	No subgroup analysis. However age differed significantly between groups, which could have been explored further.
Discussion				
Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Yes	In the triclosan group no wound infection or dehiscence was observed during hospital visit or follow-up. Authors report conventional group older, but cross clamp times longer in triclosan group.
Other				
Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	No	No funding statement provided. No acknowledgment section
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	No	No conflict section in paper.

Table F7. *Critical appraisal of Singh et al. (2014).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	*"An economic model: value of antimicrobial-coated sutures to society, hospitals, and third-party payers in preventing abdominal surgical site infections".* Comparator not defined in title but implied.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Yes	*"cost-effectiveness of antimicrobial sutures in abdominal incisions from the hospital, third-party payer, and societal perspectives"*, decision model in TreeAge, sensitivity analysis conducted.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	*"To identify the situations for which such sutures may be appropriate, we developed a decision analytic simulation model to determine the cost and health effects of triclosan-coated absorbable sutures, as compared to those of their uncoated counterparts, for prevention of incisional infections in abdominal surgeries".*
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	No	Base case not explicitly defined, no subgroups used.
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Yes	Model outline (Figure 1)
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Yes	Results reported separately for hospital, third-party payer and societal perspectives.
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	Triclosan coated and regular absorbable suture.
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Yes	Incisional SSI within 30 days, deep SSI within 30-90 days.
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	Yes	*"All costs were discounted to 2013 values using a 3% discount rate."*
Choice of health	10	Describe what outcomes were used as the	Yes	Superficial and deep SSI, death

outcomes		measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.		
Measurement of effectiveness	11a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	N/A	All simulation (1,000,000 models)
	11b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.		
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted
Estimating resources and costs	13a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
	13b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Yes	*"Each simulation run sent 1000 individuals undergoing abdominal surgery through the model 1000 times (1,000,000 total trials)."*
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	Yes	All costs referenced and reported in US dollars. No conversion of currency applied.
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	Yes	Model outline (Figure 1)

Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Yes	*"The amount of suture used for each surgery was assumed to be 4 times the incision length, as recommended by previous studies". "SSI treatment was dependent on the severity and type of SSI".*
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	Yes	*"Sensitivity analysis systematically varied the risk of developing an SSI (range, 5%-20%) to account for heterogeneity among different surgical techniques and the presence/absence of various presurgical antibiotic prophylaxis regimens. Additional analyses varied triclosan-coated suture cost (range, $5-$25/inch) and efficacy (range, 5%-50%). The wide range of efficacy values accounted for the debate over the true efficacy of the sutures".* Monte Carlo probabilistic sensitivity analysis conducted.
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	Yes	Model inputs and distributions reported (Table 1).
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	Partially	All costs reported as mean cost savings (not reported separately for each arm). ICER not reported.
Characterising uncertainty	20 a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).		
	20 b	*Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.	Yes	Reported for hospital, third-party payer and societal perspectives.

Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost- effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	N/A	No subgroups considered.
Discussion Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Yes	*"Our analyses show that even though triclosan-coated sutures are almost 40% more expensive than the traditional uncoated sutures ($9.93 vs $7.32/inch), the cost savings generated by preventing abdominal SSIs offset the extra suture costs even when SSI risk is 15% and efficacy in preventing SSIs is as low as 5%."* Authors highlight need for further work around SSI risk to *"stratify patients and consequently determine effective preventative strategies for various subgroups"*. They also acknowledge that no model *"can account for every possible SSI outcome"*, and that their model *"was conservative about the potential benefits of triclosan-coated sutures"*.
Other Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	Yes	*"Financial support: The study was supported by the National Institute of General Medical Sciences Models of Infectious Disease Agent Study and the Pennsylvania Department of Health. The funders had no role in the design and conduct of the study; the collection, management, analysis, and interpretation of the data; or the preparation, review, or approval of the manuscript".*
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	Yes	*"Potential conflicts of interest: All authors report no conflicts of interest relevant to this article".*

Table F8. *Critical appraisal of Stone et al. (2010).*

Section/item	#	Recommendation	Reported (Y/N)	Additional comments
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Partially	*"Healthcare Savings Associated with Reduced Infection Rates Using Antimicrobial Suture Wound Closure for Cerebrospinal Fluid Shunt Procedures".* Comparator not explicitly defined, but implied.
Abstract	2	Provide a structures summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses) and conclusions.	Yes	Hospital perspective, cerebrospinal fluid shunting procedures, total hospital costs. Note not a model therefore uncertainty analyses not included.
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Yes	*"Approximately 36,000 shunt procedures are performed yearly, of which 14,000 are for revision. Given the relatively high rate of revision due to malfunction or infection, CSF shunts represent a large financial burden on the healthcare system."*
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	Yes	Cerebrospinal fluid shunt procedures. No subgroups analysed.
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	N/A	Not modelled
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Yes	Hospital charges
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Yes	VICRYL Plus and VICRYL.
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	No	Not reported. Assumed to be limited to patient length of stay.
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	N/A	Not modelled
Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their	Yes	Shunt infection

		relevance for the type of analysis performed.		
Measurement of effectiveness	11a	*Single study-based estimates:* Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	N/A	Retrospective review of hospital billing records.
	11b	*Synthesis-based estimates:* Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.		
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	Patient questionnaires not attempted
Estimating resources and costs	13a	*Single study-based economic evaluation:* Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Yes	Hospital costs calculated for each arm. *"Hospital charge data was obtained on 82 of the 84 procedures (45 AMS and 37 placebo). Itemized charge data was not obtainable for all admissions, and some admissions were prolonged because of unrelated issues such as appendicitis, fundoplication, and myelomeningocele repair. We therefore calculated the shunt-related expenses using the following predefined formula, which was applied to all procedures before statistical analysis. If the admission was uncomplicated and the patient was admitted for the sole purpose of placing a shunt, the entire admission charge was used. If the patient's stay was prolonged for reasons unrelated to placement of the shunt, the total admission charge was divided by the number of days admitted and then multiplied by 3 days. The 3-day index was chosen based on the average length of stay for the uncomplicated cases and from clinical experience. It was necessary to use this method to create an adjusted charge in 28 (34.1%) of the initial shunt procedures, each of which involved a prolonged hospital stay unrelated to shunt placement."* A similar approach was used to calculate cost of infection.
	13b	*Model-based economic evaluation:* Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods		

		for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.		
Currency, price, date and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	No	*"The Women and Children's Hospital of Buffalo billing office provided data regarding all hospital charges occurring during the admission for each procedure performed."* Unit costs therefore not reported. All costs reported in US dollars, no exchange rate applied
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	N/A	Not modelled
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	N/A	Not modelled. Large number of assumptions regarding which costs were included/excluded.
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	N/A	Not modelled.
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	Yes	Itemised cost data described in Table 3. Distributions not included as the economics are added (not modelled). *"Three main variables were analyzed: charges due to initial shunt placement, charges due to an infection, and total hospital charges related to a typical shunt placement."*
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	Yes	Mean, median and range of charges for readmission for shunt infection, treatment and replacement of the shunt for all patients are described in text. Also reported for antimicrobial and placebo arms separately. ICER not reported.
Characterising uncertainty	20 a	*Single study-based economic evaluation:* Describe the effects of sampling uncertainty for the estimated incremental cost and	N/A	Not modelled

	20b	incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective). *Model-based economic evaluation:* Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.		
Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost- effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	N/A	No subgroup analysis conducted
Discussion				
Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	Yes	*"There are many additional indirect costs due to associated morbidity and lost productivity that are beyond the scope of this study. Our study does not include the costs of neurosurgical physicians or consultant fees."* *"The 2 major drawbacks of this study include the fact that it is a post hoc analysis and the methodology needed to allocate charge data to a specific procedure. The charge data were not collected in a prospective fashion and therefore our results are not as reliable. We were forced to develop an algorithm for allocating charge data because in about one third of the patients, the hospital admission charge data included either unrelated charges (i.e. fundoplication) or the patient was initially randomized at the end of a prolonged admission due to previous shunt malfunction."*
Other				
Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	No	Not reported
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal	Yes	*"C.J.R. has received speaker's honoraria from Ethicon/Johnson & Johnson, but not in direct support of*

		policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.		*the study reported in this paper. Ethicon is currently the only manufacturer of commercially available antimicrobial sutures. Codman, a subsidiary of Johnson & Johnson, currently manufactures the only commercially available antibiotic-impregnated shunt catheters.*

Additional modelling conducted by the EAC

The decision tree, used for all scenarios, is shown in Figure F1.

Replication of company base case

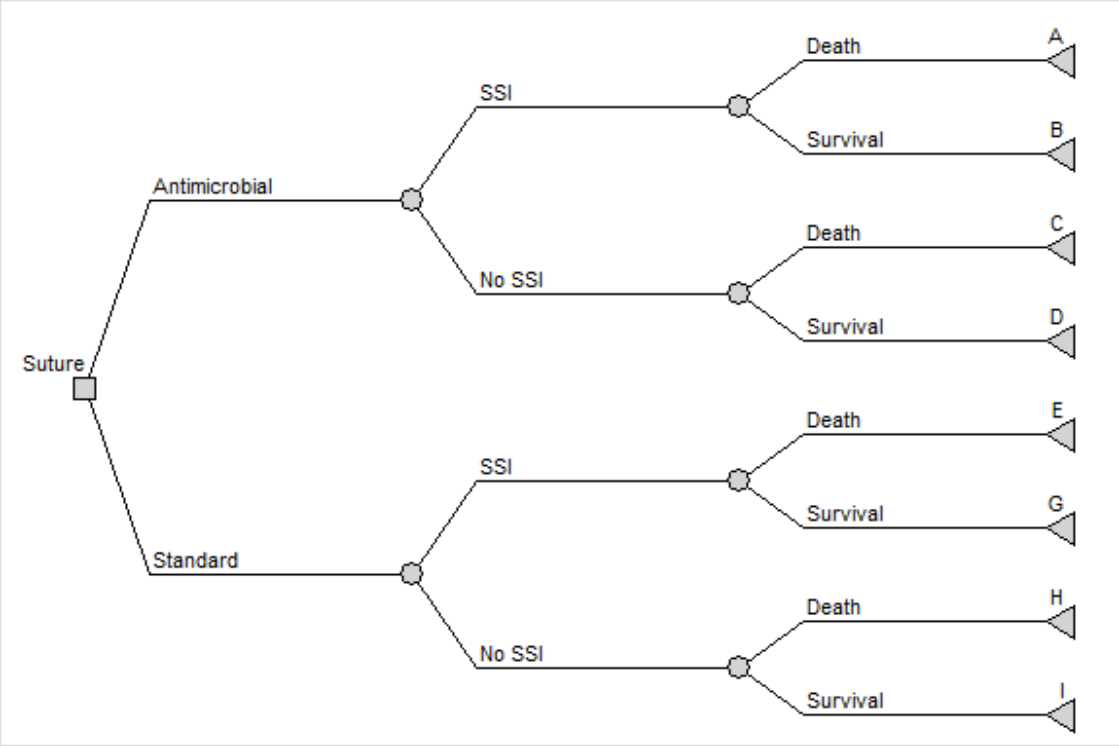


Figure F1. Decision tree used for all scenarios

The model

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F9).

Table F9: Model inputs for company's base case.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.344,0.054)	0.71	0.6379	0.7879
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures pack	GBP	Ga(96.036,0.043)	4.13	3.345	4.995
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures pack	GBP	Ga(96.036,0.034)	3.265	2.645	3.95

Results

Point estimate

Point estimates of the costs for each option are shown in Table F10.

Table F10. Point estimates for company's base case.

Suture	Cost
Antimicrobial	65.1
Standard	78.9

Univariate sensitivity

Tornado chart is shown in Figure F2.

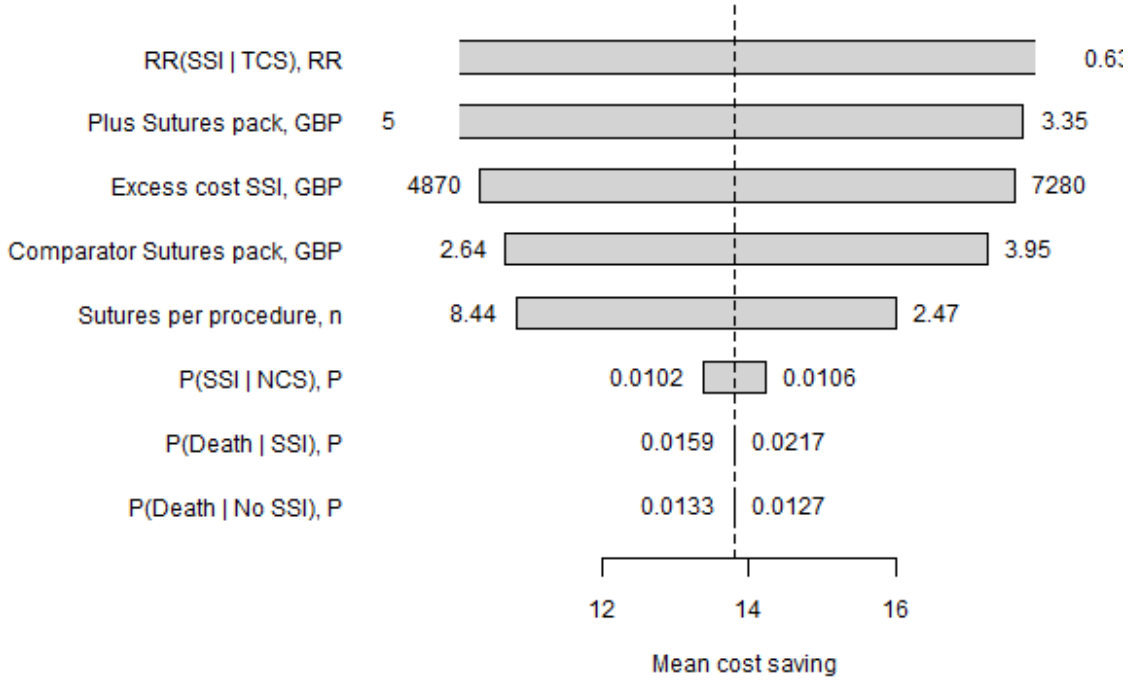


Figure F2. Tornado chart showing mean cost savings per procedure for company's base case

PSA

PSA results are shown in Figure F3.

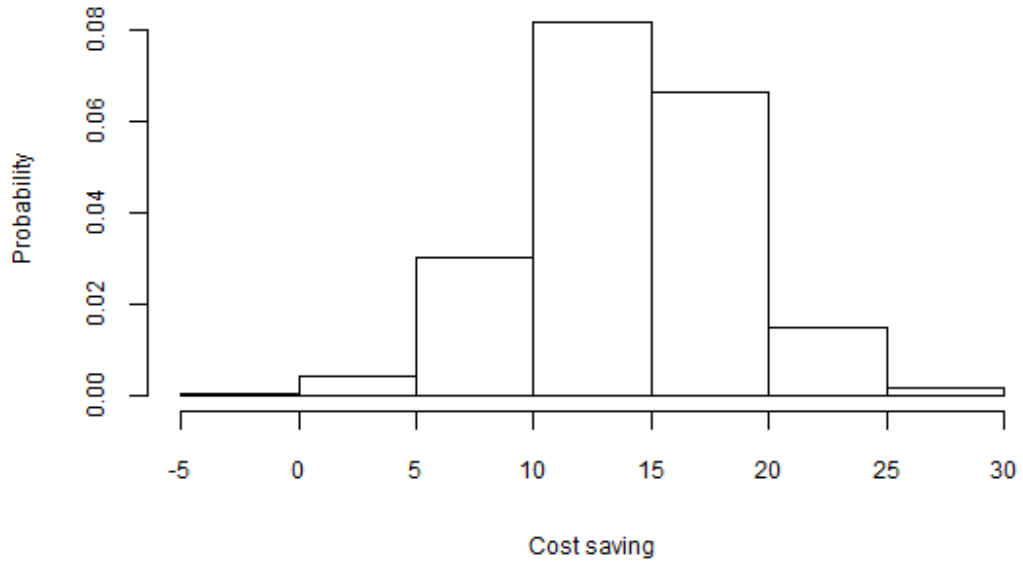


Figure F3. PSA results for company's base case.

Plus Sutures was cost saving in 99.8% of iterations, with a mean saving of 14.02 (95% CI: 5.12 to 22.88) GBP.

Threshold analysis on cost of SSI

The threshold SSI cost at which there is no cost saving is 1438.64 GBP.

Threshold analysis on baseline risk of SSI with comparator sutures

The threshold risk of SSI with comparator sutures at which there is no cost saving is 0.248%.

Threshold analysis on relative risk of SSI with Plus Sutures

The threshold relative risk of SSI with Plus Sutures at which there is no cost saving is 0.931.

Threshold analysis on number of sutures needed

The threshold number of sutures needed for surgery at which there is no cost saving is 21.

EAC base case

The EAC base case uses random effects relative risk from figure 7c from the meta-analysis submitted by the company in their clinical submission, which excludes studies of STRATAFIX Plus, and also uses the mean cost of Plus Sutures and comparator sutures from the published MIB.

The model

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F11).

Table F11: Model inputs for EAC base case.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.347,0.093)	0.71	0.5889	0.8486
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Results

Point estimate

Point estimates of the costs for each option are shown in Table F12.

Table F12. Point estimates for EAC base case.

Suture	Cost
Antimicrobial	65.71

Standard	79.33

Univariate sensitivity

Tornado chart is shown in Figure F4.

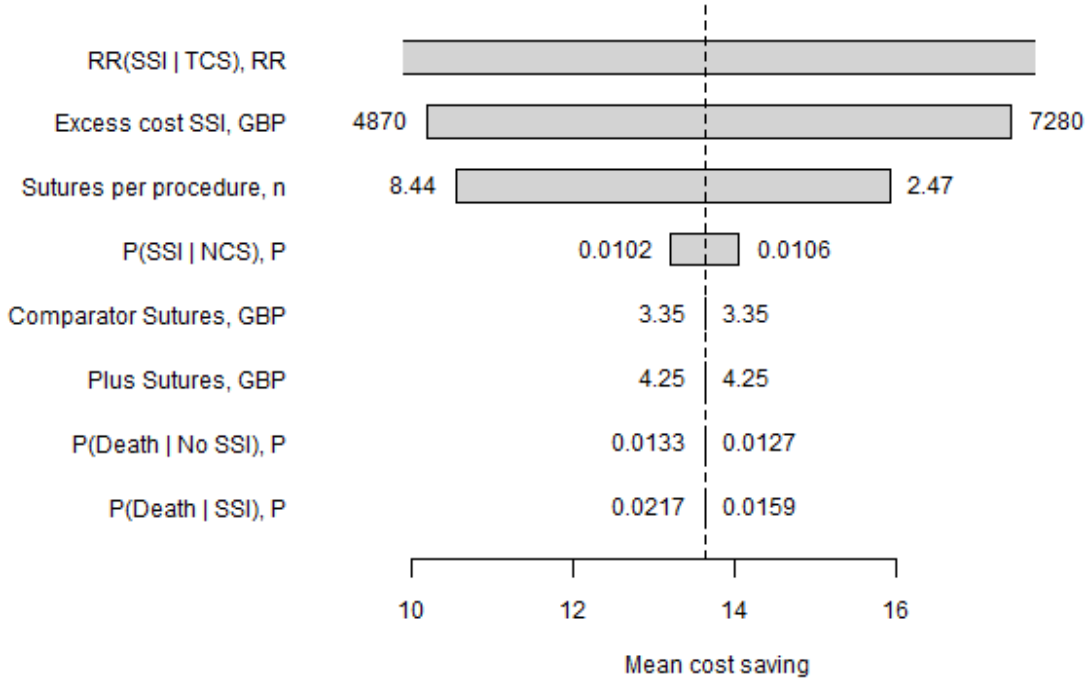


Figure F4. Tornado chart showing mean cost savings per procedure for EAC base case

PSA

PSA results are shown in Figure F5.

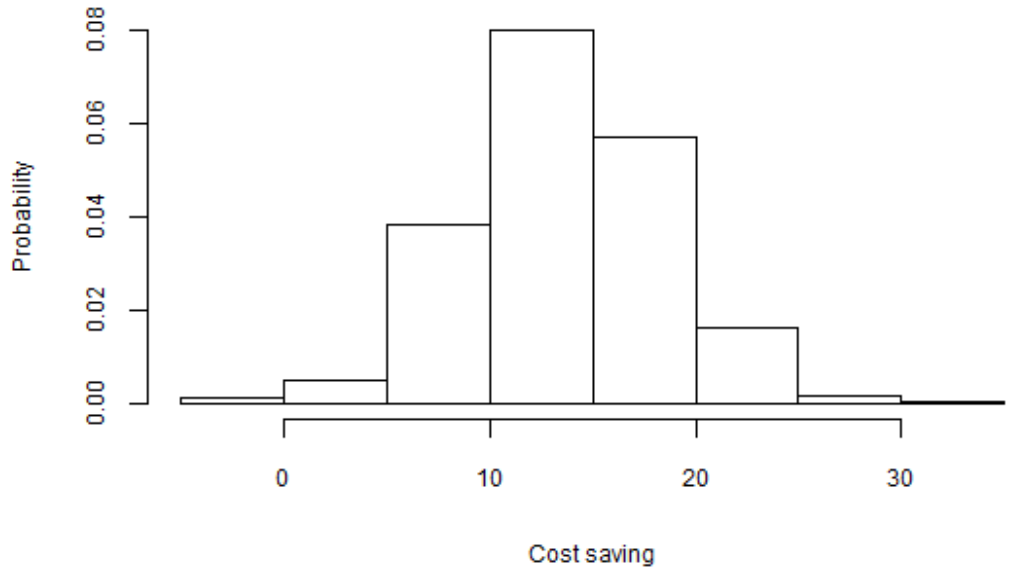


Figure F5. PSA results for EAC base case.

Plus Sutures was cost saving in 99.5% of iterations, with a mean saving of 13.6 (95% CI: 4.71 to 23.15) GBP.

Threshold analysis on cost of SSI

The threshold SSI cost at which there is no cost saving is 1497.39 GBP.

Threshold analysis on baseline risk of SSI with comparator sutures

The threshold risk of SSI with comparator sutures at which there is no cost saving is 0.259%.

Threshold analysis on relative risk of SSI with Plus Sutures

The threshold relative risk of SSI with Plus Sutures at which there is no cost saving is 0.928.

Threshold analysis on number of sutures needed

The threshold number of sutures needed for surgery at which there is no cost saving is 21.

EAC Scenario analysis

Adults

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F13).

Table F13: Model inputs for adult subgroup scenario.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.347,0.097)	0.71	0.5846	0.8543
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F14.

Table F14. Point estimates for adult subgroup scenario.

Suture	Cost
Antimicrobial	65.71
Standard	79.33

PSA results are shown in Figure F6.

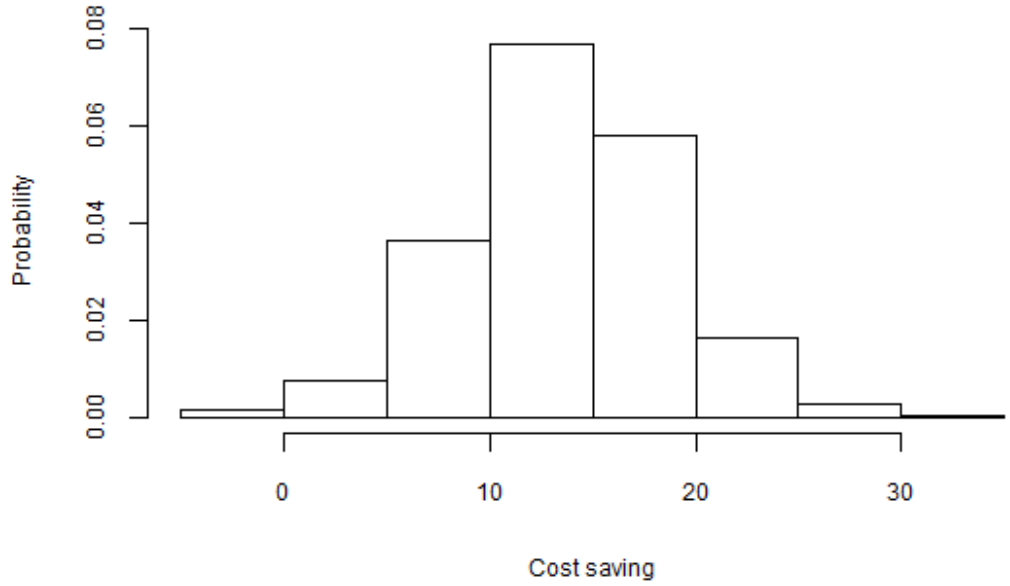


Figure F6. PSA results for adult subgroup scenario.

Plus Sutures was cost saving in 99.3% of iterations, with a mean saving of 13.67 (95% CI: 4.08 to 22.74) GBP.

Children

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F15).

Table F15: Model inputs for children subgroup scenario.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.689,0.265)	0.52	0.2986	0.8441
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F16.

Table F16. Point estimates for children subgroup scenario.

Suture	Cost
Antimicrobial	53.83
Standard	79.33

PSA results are shown in Figure F7.

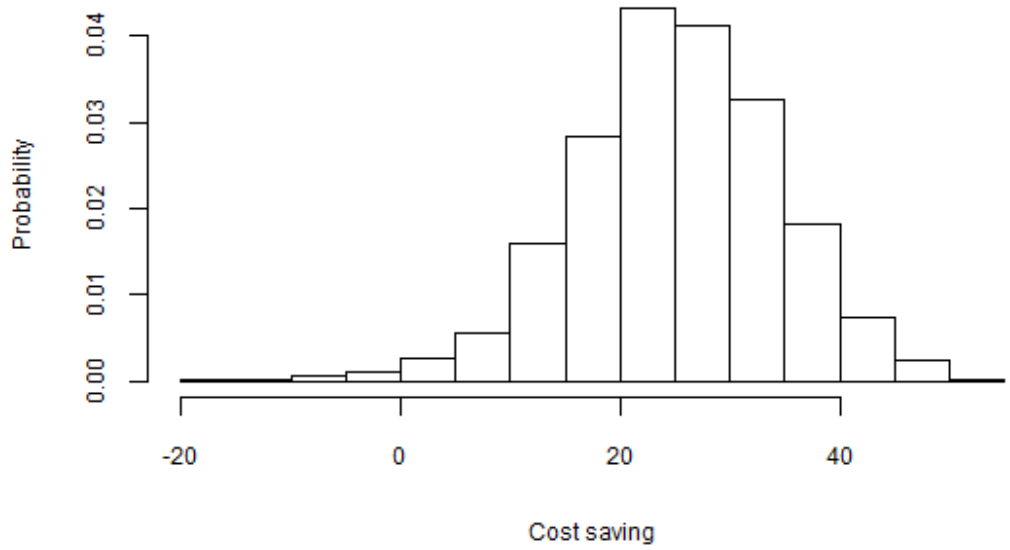


Figure F7. PSA results for children subgroup scenario.

Plus Sutures was cost saving in 98.9% of iterations, with a mean saving of 25.06 (95% CI: 5.54 to 42.56) GBP.

Clean wounds - weighted average baseline risk from PHE report

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F17).

Table F17: Model inputs for clean wound subgroup scenario, using weighted average from PHE report.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(5186,645042)	0.007976	0.007761	0.008193
RR(SSI | TCS)	RR	LN(-0.354,0.154)	0.71	0.5193	0.9481
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F18.

Table F18. Point estimates for clean wound subgroup scenario, using weighted average from PHE report.

Suture	Cost
Antimicrobial	55.38
Standard	64.78

PSA results are shown in Figure F8.

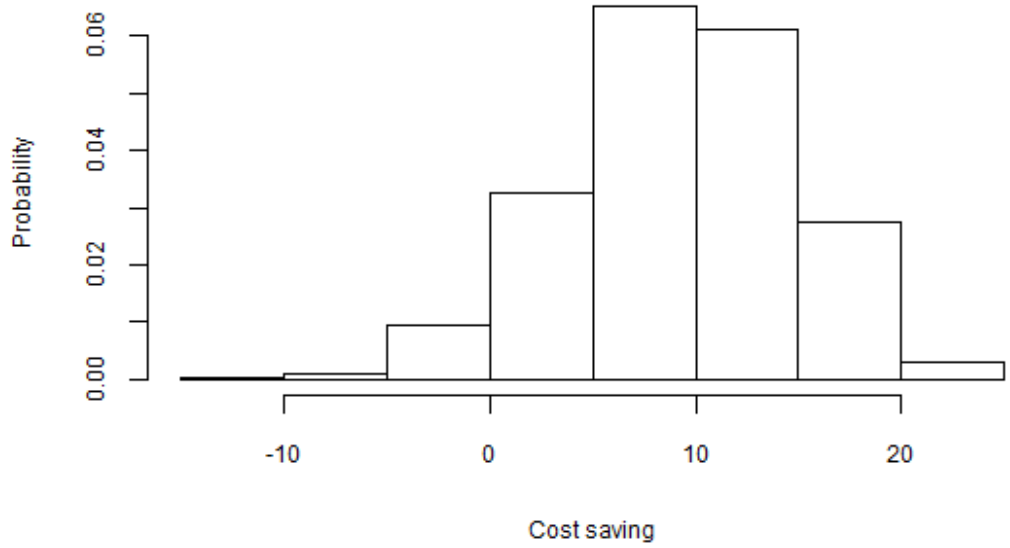


Figure F8. PSA results for clean wound subgroup scenario, using weighted average from PHE report.

Plus Sutures was cost saving in 94.6% of iterations, with a mean saving of 9.3 (95% CI: -2.24 to 19.26) GBP.

Non-clean wounds - weighted average baseline risk from PHE report

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F19).

Table F19: Model inputs for non-clean wound subgroup scenario, using weighted average from PHE report.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(1854,25261)	0.06838	0.0654	0.07141
RR(SSI | TCS)	RR	LN(-0.414,0.166)	0.67	0.4769	0.9155
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F20.

Table F20. Point estimates for non-clean wound subgroup scenario, using weighted average from PHE report.

Suture	Cost
Antimicrobial	296.9
Standard	428.1

PSA results are shown in Figure F9.

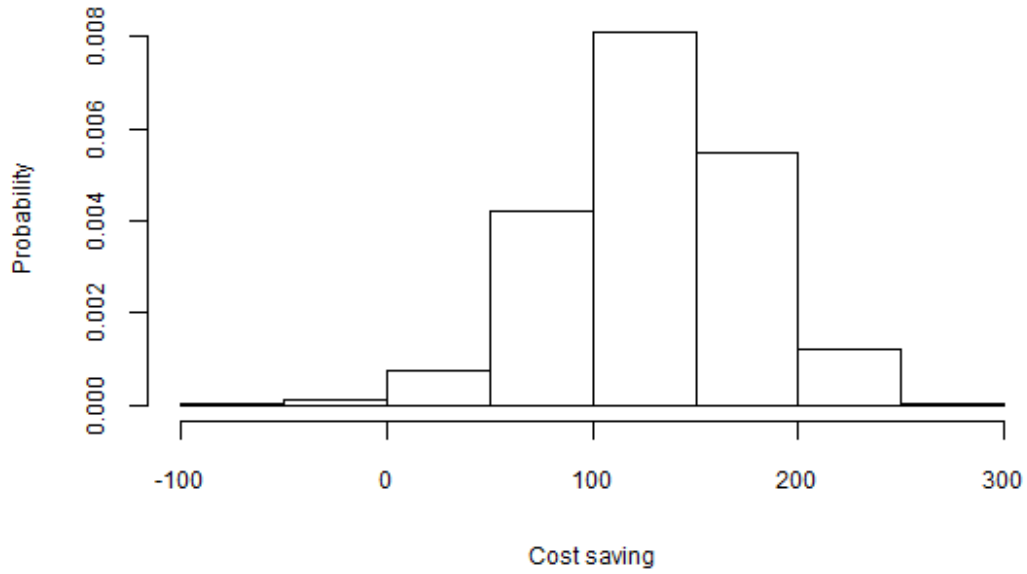


Figure F9. PSA results for non-clean wound subgroup scenario, using weighted average from PHE report.

Plus Sutures was cost saving in 99.2% of iterations, with a mean saving of 128.95 (95% CI: 33.86 to 216.92) GBP.

Relative risk from high quality studies only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F21).

Table F21: Model inputs for scenario using relative risk from meta-analysis of high quality studies only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.173,0.146)	0.85	0.6313	1.12
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F22.

Table F22. Point estimates for scenario using relative risk from meta-analysis of high quality studies only.

Suture	Cost
Antimicrobial	74.46
Standard	79.33

PSA results are shown in Figure F10.

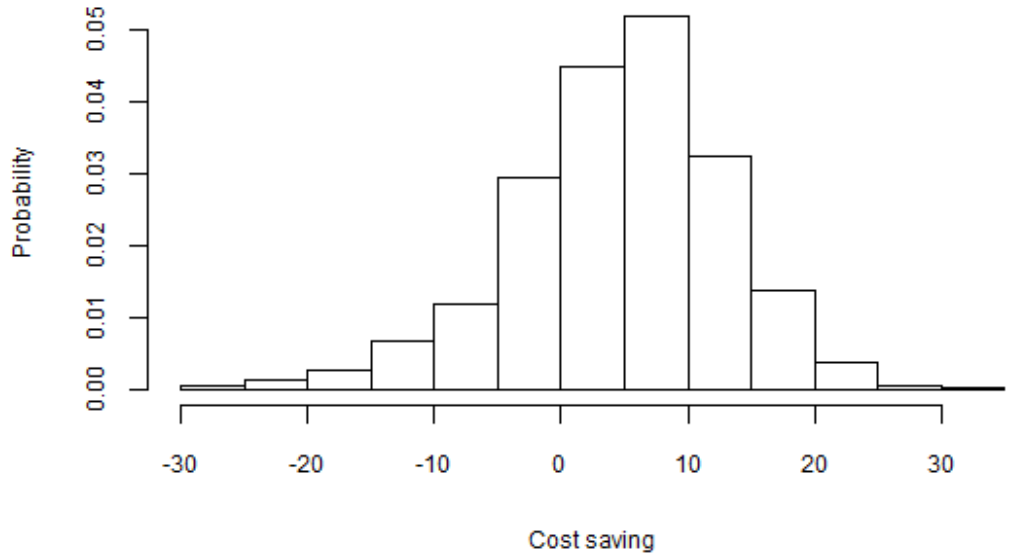


Figure F10. PSA results for scenario using relative risk from meta-analysis of high quality studies only.

Plus Sutures was cost saving in 73.8% of iterations, with a mean saving of 4.62 (95% CI: -13.92 to 19.34) GBP.

Relative risk from high/moderate quality studies only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F23).

Table F23: Model inputs for scenario using relative risk from meta-analysis of high and moderate quality studies only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.294,0.112)	0.75	0.5985	0.9281
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F24.

Table F24. Point estimates for scenario using relative risk from meta-analysis of high and moderate quality studies only.

Suture	Cost
Antimicrobial	68.21
Standard	79.33

PSA results are shown in Figure F11.

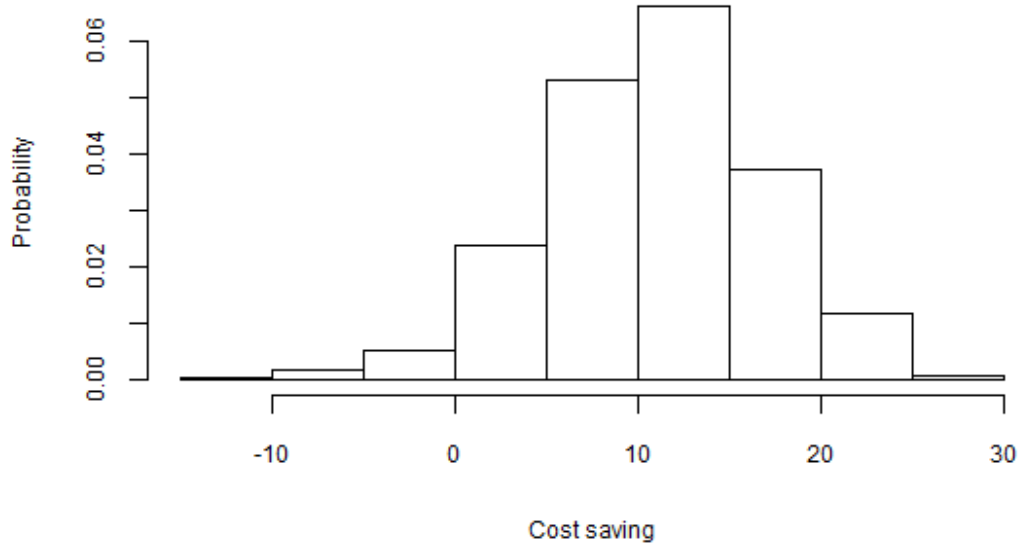


Figure F11. PSA results for scenario using relative risk from meta-analysis of high and moderate quality studies only.

Plus Sutures was cost saving in 96.5% of iterations, with a mean saving of 10.96 (95% CI: -0.83 to 21.89) GBP.

Relative risk from low quality studies only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F25).

Table F25: Model inputs for scenario using relative risk from meta-analysis of low quality studies only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.357,0.171)	0.71	0.5002	0.9786
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F26.

Table F26. Point estimates for scenario using relative risk from meta-analysis of low quality studies only.

Suture	Cost
Antimicrobial	65.71
Standard	79.33

PSA results are shown in Figure F12.

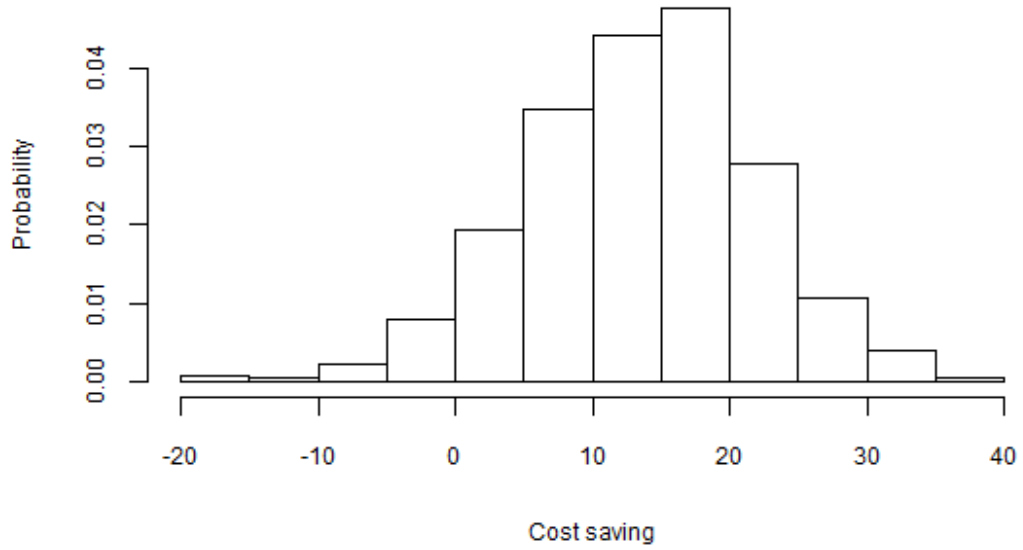


Figure F12. PSA results for scenario using relative risk from meta-analysis of low quality studies only.

Plus Sutures was cost saving in 94.3% of iterations, with a mean saving of 13.49 (95% CI: -3.23 to 29.07) GBP.

Relative risk from studies with n>1000 only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F27).

Table F27: Model inputs for scenario using relative risk from meta-analysis of studies with n>1000 only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.271,0.308)	0.8	0.417	1.396
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F28.

Table F28. Point estimates for scenario using relative risk from meta-analysis of studies with n>1000 only.

Suture	Cost
Antimicrobial	71.34
Standard	79.33

PSA results are shown in Figure F13.

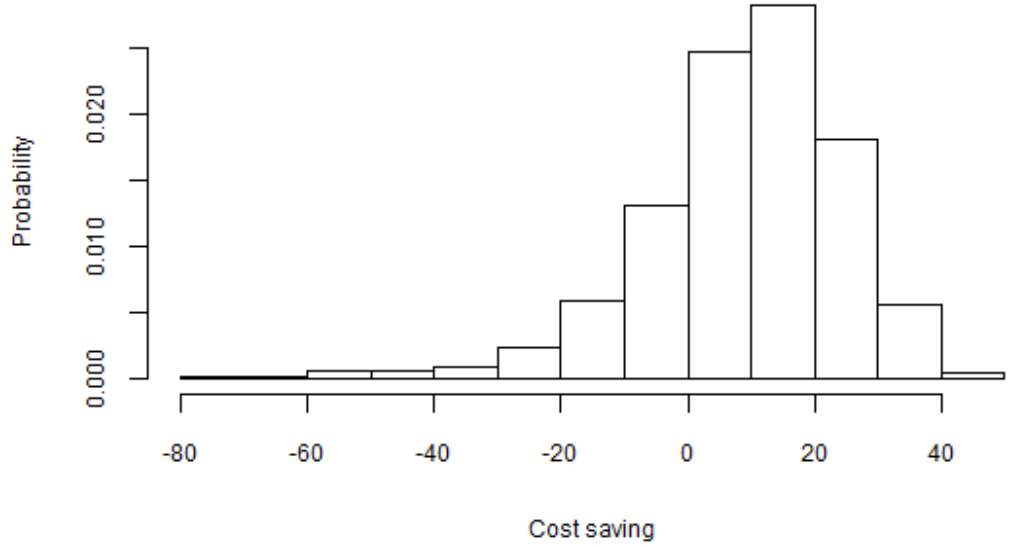


Figure F13. PSA results for scenario using relative risk from meta-analysis of studies with n>1000 only.

Plus Sutures was cost saving in 76.8% of iterations, with a mean saving of 9.1 (95% CI: -27.11 to 33.86) GBP.

Relative risk from studies with n<=1000 only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F29).

Table F29: Model inputs for scenario using relative risk from meta-analysis of studies with n<=1000 only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.377,0.107)	0.69	0.5564	0.846
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F30.

Table F30. Point estimates for scenario using relative risk from meta-analysis of studies with n<=1000 only.

Suture	Cost
Antimicrobial	64.46
Standard	79.33

PSA results are shown in Figure F14.

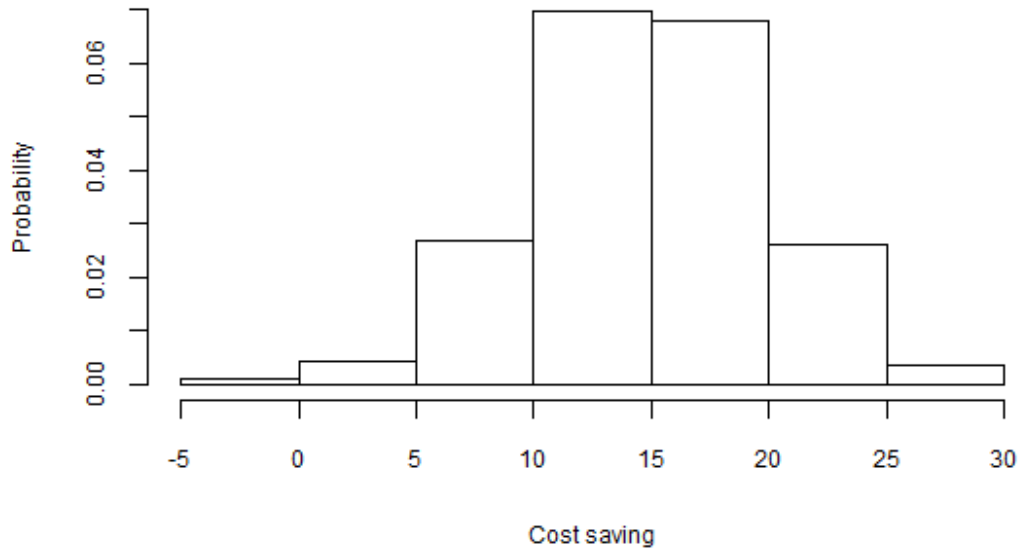


Figure F14. PSA results for scenario using relative risk from meta-analysis of studies with n<=1000 only.

Plus Sutures was cost saving in 99.4% of iterations, with a mean saving of 14.74 (95% CI: 4.93 to 24.3) GBP.

Relative risk from studies with n>500 only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F31).

Table F31: Model inputs for scenario using relative risk from meta-analysis of studies with n>500 only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.352,0.139)	0.71	0.535	0.9241
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F32.

Table F32. Point estimates for scenario using relative risk from meta-analysis of studies with n>500 only.

Suture	Cost
Antimicrobial	65.71
Standard	79.33

PSA results are shown in Figure F15.

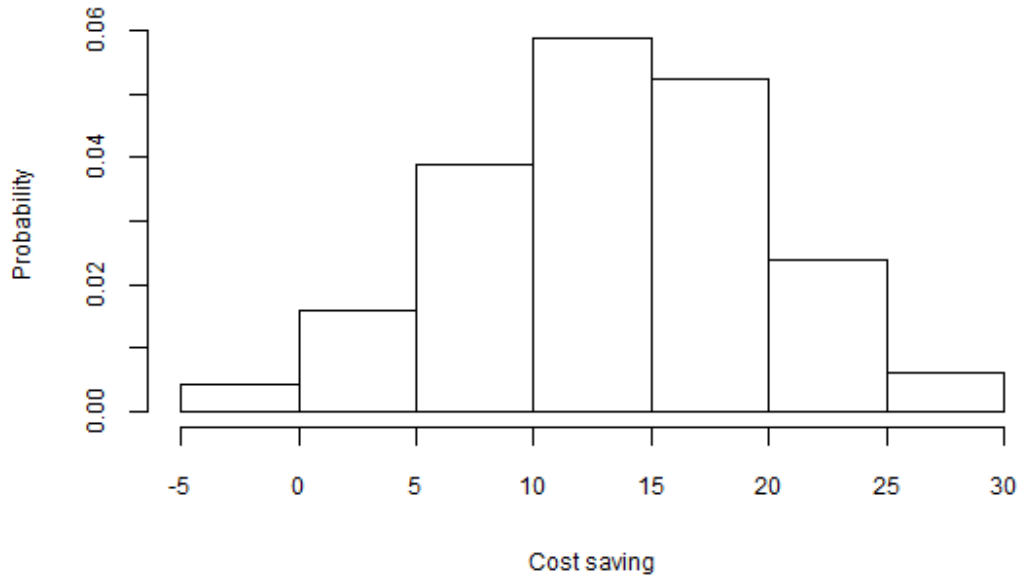


Figure F15. PSA results for scenario using relative risk from meta-analysis of studies with n>500 only.

Plus Sutures was cost saving in 97.9% of iterations, with a mean saving of 13.27 (95% CI: 0.39 to 25.74) GBP.

Relative risk from studies with n<=500 only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F33).

Table F33: Model inputs for scenario using relative risk from meta-analysis of studies with n<=500 only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.352,0.136)	0.71	0.539	0.9182
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F34.

Table F34. Point estimates for scenario using relative risk from meta-analysis of studies with n<=500 only.

Suture	Cost
Antimicrobial	65.71
Standard	79.33

PSA results are shown in Figure F16.

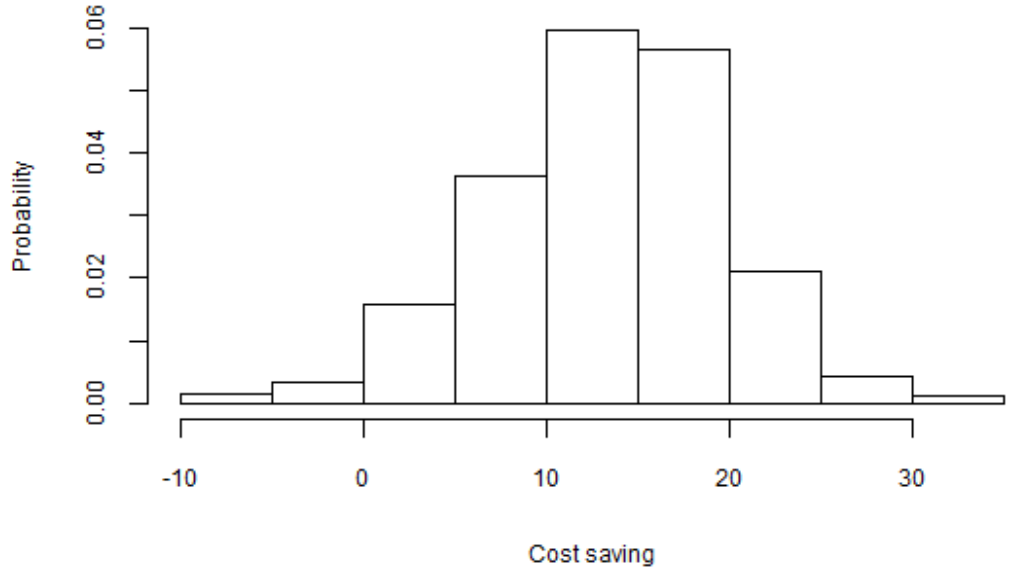


Figure F16. PSA results for scenario using relative risk from meta-analysis of studies with n<=500 only.

Plus Sutures was cost saving in 97.5% of iterations, with a mean saving of 13.3 (95% CI: 0.05 to 25.58) GBP.

Relative risk from UK studies only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F35).

Table F35: Model inputs for scenario using relative risk from meta-analysis of UK studies only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.637,0.961)	0.84	0.08039	3.483
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F36.

Table F36. Point estimates for scenario using relative risk from meta-analysis of UK studies only.

Suture	Cost
Antimicrobial	73.84
Standard	79.33

PSA results are shown in Figure F17.

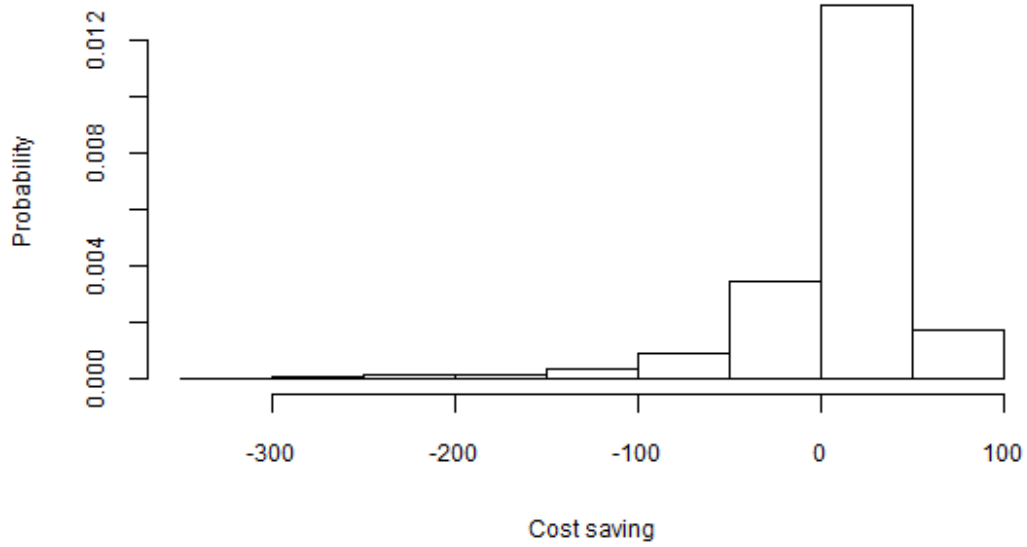


Figure F17. PSA results for scenario using relative risk from meta-analysis of UK studies only.

Plus Sutures was cost saving in 74.8% of iterations, with a mean saving of 10.86 (95% CI: -124.67 to 56.83) GBP.

Relative risk from non-UK studies only

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F37).

Table F37: Model inputs for scenario using relative risk from meta-analysis of non-UK studies only.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(7040,670303)	0.01039	0.01015	0.01064
RR(SSI | TCS)	RR	LN(-0.361,0.098)	0.7	0.5747	0.8444
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F38.

Table F38. Point estimates for scenario using relative risk from meta-analysis of non-UK studies only.

Suture	Cost
Antimicrobial	65.08
Standard	79.33

PSA results are shown in Figure F18.

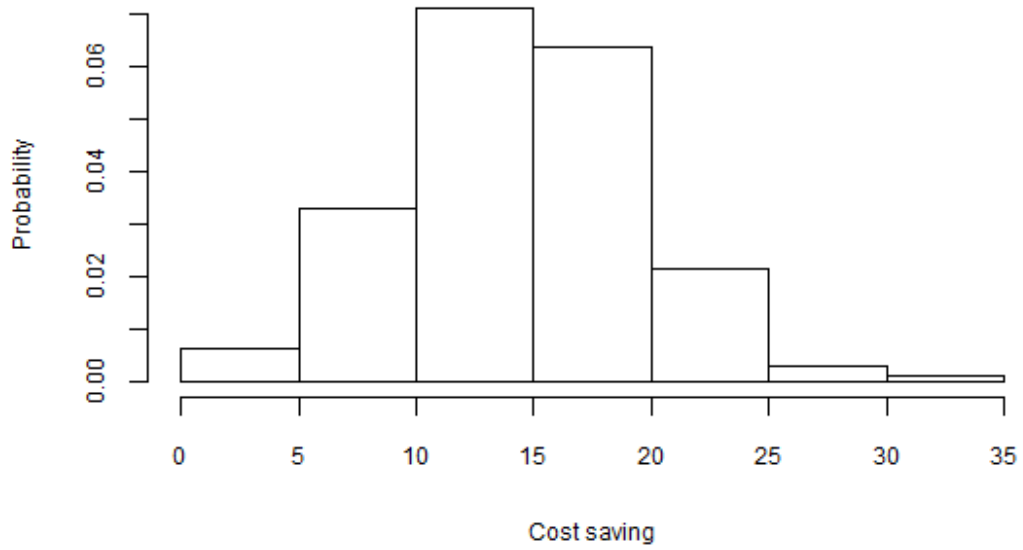


Figure F18. PSA results for scenario using relative risk from meta-analysis of non-UK studies only.

Plus Sutures was cost saving in 100% of iterations, with a mean saving of 14.32 (95% CI: 4.59 to 24.21) GBP.

Clean wounds - extreme baseline risk of SSI, knee replacement (from PHE report)

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F39).

Table F39: Model inputs for clean wound subgroup scenario, using extremes from PHE report.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(1022,220583)	0.004612	0.004334	0.004898
RR(SSI | TCS)	RR	LN(-0.354,0.154)	0.71	0.5193	0.9481
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F40.

Table F40. Point estimates for clean wound subgroup scenario, using extremes from PHE report.

Suture	Cost
Antimicrobial	41.01
Standard	44.54

PSA results are shown in Figure F19.

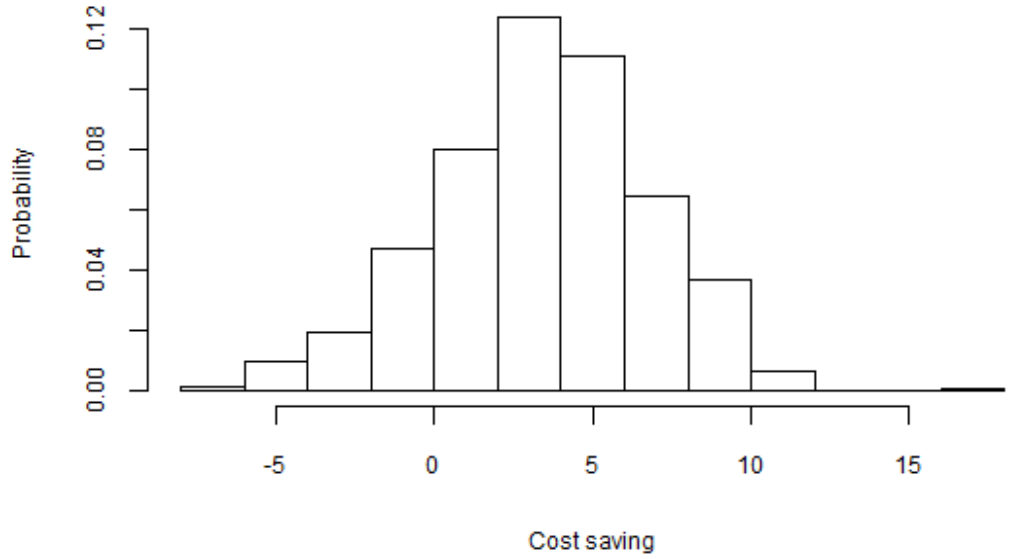


Figure F19. PSA results for clean wound subgroup scenario, using extremes from PHE report.

Plus Sutures was cost saving in 84.7% of iterations, with a mean saving of 3.45 (95% CI: -3.82 to 9.35) GBP.

Non-clean wounds - extreme baseline risk of SSI, bile duct, liver or pancreatic (from PHE report)

The uncertainties in the estimates of the variables were described by distributions with hyperparameters (Table F41).

Table F41: Model inputs for non-clean wound subgroup scenario, using extremes from PHE report.

Description	Units	Distribution	Mean	Q2.5	Q97.5
P(Death | SSI)	P	Be(157,8225)	0.01873	0.01594	0.02174
Excess cost SSI	GBP	Ga(95.909,62.726)	6016	4872	7278
P(SSI | NCS)	P	Be(146,1460)	0.09091	0.07734	0.1054
RR(SSI | TCS)	RR	LN(-0.414,0.166)	0.67	0.4769	0.9155
P(Death | No SSI)	P	Be(8507,645854)	0.013	0.01273	0.01328
Plus Sutures	GBP	Const(4.25)	4.25	4.25	4.25
Sutures per procedure	n	Ga(10.67,0.47)	5.015	2.472	8.442
Comparator Sutures	GBP	Const(3.35)	3.35	3.35	3.35

Point estimates of the costs for each option are shown in Table F42.

Table F42. Point estimates for non-clean wound subgroup scenario, using extremes from PHE report.

Suture	Cost
Antimicrobial	387.7
Standard	563.7

PSA results are shown in Figure F20.

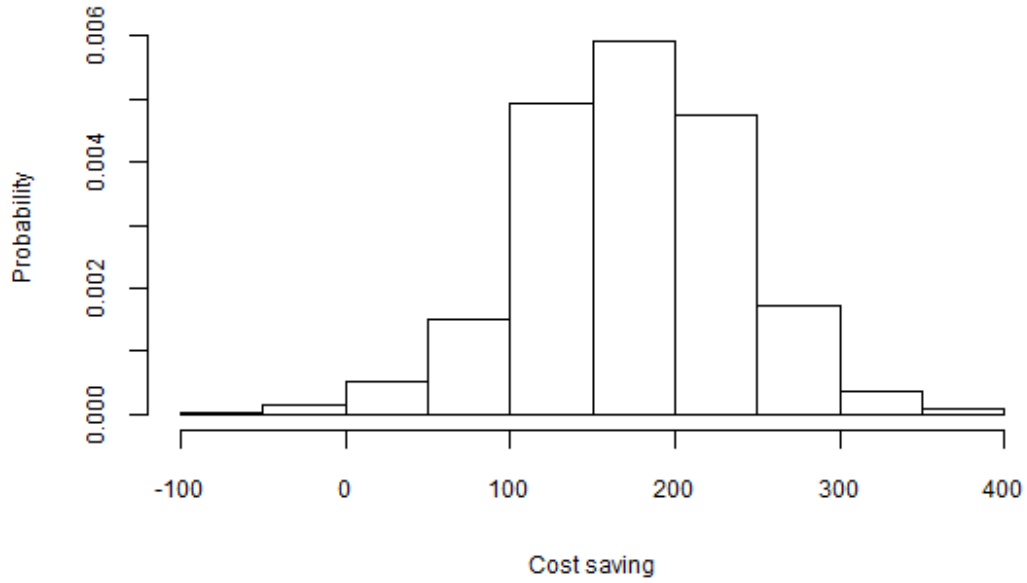


Figure F20. PSA results for non-clean wound subgroup scenario, using extremes from PHE report.

Plus Sutures was cost saving in 99% of iterations, with a mean saving of 173.22 (95% CI: 38.81 to 298.4) GBP.

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Medical technology guidance

Assessment report overview

Plus Sutures for preventing surgical site infection

This assessment report overview has been prepared by the Medical Technologies Evaluation Programme team to highlight the significant findings of the External Assessment Centre (EAC) report. It includes **brief** descriptions of the key features of the evidence base and the cost analysis, any additional analysis carried out, and additional information, uncertainties and key issues the Committee may wish to discuss. It should be read along with the company submission of evidence and with the EAC assessment report. The overview forms part of the information received by the Medical Technologies Advisory Committee when it develops its recommendations on the technology.

Key issues for consideration by the Committee are described in section 6, following the brief summaries of the clinical and cost evidence.

This report contains information that has been supplied in confidence and will be redacted before publication. This information is highlighted in [redacted]. This overview also contains:

- Appendix A: Sources of evidence
- Appendix B: Comments from professional bodies
- Appendix E: Scope decision problem

1 The technology

Plus Sutures (Ethicon, Johnson & Johnson Medical Ltd) are a range of synthetic, absorbable sutures that are either impregnated with or coated with medical grade triclosan, depending on the suture type. Triclosan is a broad-spectrum antibacterial agent effective on most common organisms associated with surgical site infection (SSI). Plus Sutures are intended for wound closure in people after a surgical procedure and are designed to prevent bacterial colonisation of the suture for 7 days or more. Absorbable sutures are absorbed by tissue over a matter of days and don't need removing. The company claims Plus Sutures can reduce the incidence of SSI and result in fewer readmissions because of an SSI.

Three sutures were considered within scope, each has different physical properties and absorption rates which affects which tissue types it is better suited to:

- Coated VICRYL Plus Antibacterial (polyglactin 910) Suture is a multifilament (multiple braided threads) with an absorption rate of between 57 and 70 days making it best suited for general soft tissue approximation and ligation (bringing together or tying of tissue edges).

- MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture is a monofilament sutures (solid and smooth thread) with an absorption rate of between 91 and 119 days making it best suited for general soft tissue approximation and ligation. This suture is also available in a barbed design for knotless suturing.

- PDS Plus Antibacterial (polydioxanone) Suture is a monofilament suture (solid and smooth thread) with an absorption rate of between 182 and 238 days. This suture can be used for general soft tissue approximation, including use in paediatric cardiovascular surgery, and other surgery types that require up to 6 weeks wound support. This suture is also available in a barbed design for knotless suturing.

PDS Plus and MONOCRYL Plus contain no more than 2,360 micrograms/m triclosan. VICRYL Plus has a coating of copolymer, calcium stearate as well as up to 472 micrograms/m triclosan. The absorption rates and handling properties are the same as non-triclosan sutures.

2 Proposed use of the technology

2.1 Disease or condition

Surgical site infection is a type of healthcare-acquired infection in which a wound infection develops as a complication of an invasive surgical procedure. NICE's guideline on preventing and treating surgical site infection states that at least 5% of patients undergoing a surgical procedure develop a surgical site infection that is usually caused by contamination of an incision with microorganisms from the patient's own body at the time of surgery.

A surgical site infection surveillance programme conducted by Public Health England (PHE) reported cumulative SSI incidence between April 2015 and March 2020. The risk of SSI varies between surgery types with contaminated or clean-contaminated surgery procedures associated in particular with an increased risk of SSI. PHE reported the highest SSI incidence to be in bile duct, liver or pancreatic surgery (9.1%) and large bowel surgery (8.3%). The lowest SSI incidence was reported in hip and knee replacement surgery (0.5%). A table presenting SSI risk for all surgical types included in the analysis can be found in the surveillance of surgical site infection infections in NHS hospitals in England, April 2019 to March 2020 annual report. These data are based on the surveillance data of 133 contributing NHS trusts and may not be an accurate reflection the national incidence of SSI.

2.2 Patient group

Plus Sutures are used for wound closure in people that have had a surgical procedure and need wound closure with an absorbable suture. The scope of this evaluation includes adults and children that need wound closure after a surgical procedure when absorbable sutures are an appropriate option.

2.3 Current management

The NICE guideline on preventing and treating surgical site infection recommends a range of preoperative, intraoperative and postoperative measures to prevent SSI. Preoperative measures include:

- Preoperative bathing with soap, preferably within a day of the planned surgical procedure and an antiseptic preparation immediately before the procedure.
- Nasal decolonisation, since Staphylococcus aureus is a likely potential cause of SSI.
- A preventative course of antibiotics (unless the surgery is considered clean, non-prosthetic and/or uncomplicated).

To close the wound, the guideline recommends considering antimicrobial triclosan-coated sutures. The wound is dressed with an appropriate dressing and changed using aseptic non-touch technique. Sterile saline is used to irrigate the wound up to 48 hours after surgery.

If SSI is suspected, an antibiotic is given that covers the likely organisms causing infection in line with NICE's guideline on antimicrobial stewardship: systems and processes for effective antimicrobial medicine use.

2.4 Proposed management with new technology

Plus Sutures would replace the use of non-triclosan absorbable sutures for wound closure in people that have had a surgical procedure. The adoption of Plus Sutures would not alter the current care pathway and no training is required. The technology is already used extensively within the NHS.

3 Company claimed benefits and the decision problem

These are described in the scope here (link to Appendix E). Table 1 described the company's proposed changes to the decision problem:

Table 1 Proposed changes to the decision problem

Decision problem	Variation proposed by company	EAC view of the variation
Intervention	"The STRATAFIX™ barbed design for knotless suturing has been included within the clinical and economic evidence in this submission". Rationale: "Plus technology is inclusive of the STRATAFIX range, and is described within the main section of the NICE scope. Meta-analysis is presented both with and without STRATAFIX"	STRATAFIX technology was not included in the decision problem of the final scope (NICE, 2021b). The EAC has excluded STRATAFIX and all studies that primarily reported on this barbed suture. This approach was considered to be appropriate with the clinical experts (EAC external correspondence log, 2021).

4 The evidence

4.1 Summary of evidence of clinical benefit

The EAC appraised the company's systematic review and reported that a clear and rigorous search strategy had been developed and were satisfied that no relevant studies had been omitted. The EAC, in agreement with the NICE team, carried out an additional literature search focussing on adverse events. Full details of the searches carried out are reported in section 4.1 of the assessment report.

The company submitted 31 fully published peer reviewed studies. All studies were randomised controlled trials (RCT). The EAC included 28 of the RCTs in the assessment, 3 studies were not included as they included the STRATAFIX suture design which was outside the scope of the evaluation. The EAC included two additional studies (Chen et al., 2011 and Sala-Perez et al., 2016) identified through the search for adverse events. Additionally, one study included by the company has been reported in 2 publications. The EAC have

included both publications independently because the publications reported on different surgical incisions (Thimour-Bergström et al., 2013; Steingrimsson et al., 2015). In total, 31 studies were included in the assessment.

Table 2 Summary of studies included in the assessment

Studies included in the assessment	
Publication and study design	31 studies have been included in the assessment • 28 parallel RCTs have been included by both the company and the EAC (Arslan et al., 2018; Baracs et al., 2011; Diener et al., 2014; Ford et al., 2005; Galal and El-Hindawy, 2011; Ichida et al., 2018; Isik et al., 2012; Justinger et al., 2013; Karip et al., 2016; Lin et al., 2018; Mattavelli et al., 2015; Mingmalairak et al., 2009; Nakamura et al., 2013; Olmez et al., 2019; Rasić et al., 2011; Renko et al., 2017; Rozzelle et al., 2008; Ruiz-Tovar et al., 2020; Santos et al., 2019; Seim et al., 2012; Soomro et al., 2017; Sprowson et al; 2018Sukeik et al., 2019; Tabrizi et al., 2019; Thimour-Bergström et al., 2013; Turtiainen et al., 2012; Williams et al., 2011; Zhang et al., 2011) • 1 study listed above (Thimour-Bergström et al., 2013) has been reported in 2 publications. The EAC has included both publications independently and have therefore included an additional RCT. (Steingrimsson et al., 2015). • 2 additional RCTs were included in the assessment by the EAC after the searches for adverse events (Chen et al., 2011 and Sala-Perez et al., 2016)
Studies excluded from the assessment	
Publication and study design	3 studies (RCTs) were excluded by the EAC • The studies did not meet the scope of the evaluation as they reported on the use of STRATAFIX Plus sutures (Ruiz-Tovar et al., 2020, Sundaram et al., 2020a, Sundaram et al., 2020b)
EAC's adverse events focused search	
Publication and study design	In addition to 18 RCTs that were included in the assessment, the EAC identified 17 additional studies that recorded adverse events. • 1 RCT (Sala-Perez *et al*., 2016) • 1 randomised pilot ((Deliart et al., 2009) • 8 cohort studies with historical controls (Justinger et al., 2009; Justinger et al., 2009; Justinger et al., 2012; Justinger et al., 2011; Laas et al., 2012; Nakamura et al., 2016; Nakamura et al., 2020; Okada et al., 2014; Ueno et al., 2015) • 2 prospective single-armed studies (Jung et al., 2014; Yokoyama et al., 2017)

	• 3 retrospective cohort studies (Jenaw et al., 2019; Ruiz-Tovar et al., 2018; Zhang et al., 2018) • 1 case series (Holzheimer, 2005) • 1 case report (Ismail and Nixon, 2020)

The evidence base for Plus Sutures is extensive, of relatively high quality and is generalisable to the UK NHS. The assessment included 31 RCTs that included over 14,000 patients. Only one of the outcomes listed in the scope, SSI incidence, was reported consistently enough in the literature to draw conclusions from. The evidence supports that the use of Plus Sutures is associated with a causative reduction in the incidence of SSI. The EAC used the GRADE methodology for appraising the quality of evidence for each outcome and states that the quality of evidence for SSI incidence was high. None of the other outcomes listed in the scope had sufficiently robust empirical evidence to show Plus Sutures were statistically superior to standard sutures. However, it is plausible that these could be inferred or extrapolated from the proven reduction in incidence of SSI. All study results are reported at an individual study level in the company submission table (table 5) and at an outcome level (table 4a and 4e in the company submission and section 5.3 of the assessment report).

To assess device related adverse events the EAC reviewed the RCTs included in the assessment and also performed a dedicated literature review to assess the nature of adverse events following the use of Plus Sutures. Studies that reported adverse events included 18 of the RCTs that were included in the assessment and an additional 17 randomised and non-randomised studies (table 1). The findings show that there is no discernible safety signal from the use of Plus Sutures.

The company performed 6 de novo meta-analyses to establish the overall pooled effect size associated with Plus sutures on the incidence of SSIs. The primary outcome was the relative risk of developing a surgical site infection

between Plus Sutures and control groups. The six separate meta-analyses, defined a priori, were performed using:

- All studies of Plus Sutures that provided sufficient data (base case, N = 28)
- A subset of studies in adults (N = 25)
- A subset of studies in children (N = 2)
- A subset of studies in those with clean wounds (N = 15)
- A subset of studies in those with non-clean wounds (N = 12)
- All studies of Plus Sutures including Stratafix Plus that provided sufficient data, as a sensitivity analysis (N = 31).

The results of the meta-analyses report that Plus Sutures is associated with a reduction in risk of SSI of nearly 30% in the base case and all results were considered statistically significant. The results are summarised in table 3 (forest plots are reported in figures 7c to 7h in the company submission).

Table 3 Summary of company meta-analysis results

Subgroup analysed	Analysis used*	I^2 value†	Relative risk	Lower 95% CI	Upper 95% CI
Base case (N = 28)	Random	40%	0.71	0.59	0.85
	Fixed		0.72	0.64	0.80
Adults (N = 25)	Random	33%	0.74	0.62	0.88
	Fixed		0.73	0.65	0.82
Children (N = 2)	Fixed**	40%	0.52	0.32	0.87
Clean (N = 15)	Random	3%	0.71	0.53	0.96
	Fixed		0.75	0.62	0.90
Non-clean (N = 12)	Random	32%	0.67	0.48	0.92
	Fixed		0.66	0.54	0.80

* Fixed or random effects analysis. Taking a conservative approach, the use of random effect analysis is most appropriate (Nikolakopoulou et al., 2014).
** Fixed effects analysis used where there are too few studies for random effects analysis
† I^2 value is a measure of inter-study heterogeneity. It can be interpreted as follows: 0% to 40%, might not be important; 30% to 60%,may represent moderate heterogeneity; 50% to 90%, may represent substantial heterogeneity; 75% to 100%: considerable heterogeneity (Higgins et al., 2019).

The company meta-analyses are of a high quality and at a low risk of bias. The methodology and results are transparent and clearly reported. The sub-groups were defined a prori and are in line with the scope, studies were identified using a systematic review, and a clear rationale for the inclusion and exclusion of studies was reported. Assessment of heterogeneity and detection of outlying studies were also performed. The company reports that "overall there was a lack of heterogeneity across all studies". However, due to heterogeneity in the surgical procedure, study populations and baseline SSI risk, the EAC believed the studies were not similar enough for fixed effects analysis and the analysis should primarily be reported using random effects. The EAC notes that this variation has minimal effect on the results.

The EAC validated the meta-analyses by replicating the analysis and performed additional analyses. The additional analyses included stratifying the analysis by, study quality size and location. The results of the additional analyses reported that in all scenarios Plus Sutures reduced the risk of SSI, however, the magnitude of the effect appeared to be related to study quality and sample size. When only high-quality studies were included in the analysis the difference is not statistically significant, however, this should be interpreted with caution as the smaller sample sizes and varied event rates will affect the precision and impact of the analysis. The results of the additional analyses are summarised in table 4 and are reported in full in section 7.2 of the assessment report.

Table 4 EAC's additional meta-analyses: summary of results by quality, size and location

Subgroup analysed		Analysis used*	I^2 value†	Relative risk	Lower 95% CI	Upper 95% CI
Quality	High (N = 8)	Random	36%	0.85	0.64	1.13
		Fixed		0.86	0.74	1.01
	High/moderate (N = 15)	Random	39%	0.75	0.61	0.94
		Fixed		0.77	0.68	0.88
	Low (N = 13)	Random	17%	0.72	0.55	0.94
		Fixed		0.66	0.55	0.80
Samp	>1,000 (N = 4)	Random	58%	0.80	0.44	1.43
		Fixed		0.83	0.68	1.01

	≤1,000 (N = 24)	Random	33%	0.69	0.56	0.85
		Fixed		0.67	0.59	0.77
	>500 (N = 8)	Random	58%	0.71	0.54	0.93
		Fixed		0.70	0.61	0.81
	≤500 (N = 20)	Random	32%	0.61	0.54	0.92
		Fixed		0.74	0.63	0.87
Location	UK (N = 3)	Random	1%	0.84	0.17	4.23
		Fixed		0.76	0.50	1.17
	Non-UK	Random	35%	0.65	0.56	0.77
		Fixed		0.67	0.61	0.75

* Fixed or random effects analysis. Taking a conservative approach, the use of random effect analysis is most appropriate (Nikolakopoulou et al., 2014).
† I^2 value is a measure of inter-study heterogeneity. It can be interpreted as follows: 0% to 40%, might not be important; 30% to 60%,may represent moderate heterogeneity; 50% to 90%, may represent substantial heterogeneity; 75% to 100%: considerable heterogeneity (Higgins et al., 2019).

4.2 Summary of economic evidence

The company identified 8 studies that were relevant to the economic submission. The EAC assessed the literature search and concluded it was satisfactory and agreed that the 8 studies (Leaper et al. 2017; Ceresoli et al., 2020; Mahajan et al., 2020; Leaper et al., 2020; Nakamura et al., 2013; Fleck et al., 2007; Singh et al., 2014; Stone et al., 2010) were relevant for the evaluation. The company cited that all studies reported that the introduction of Plus Sutures resulted in cost savings, however, none of the parameters in the company's de novo model were informed by the economic literature. The studies were critically appraised by the EAC and a summary of the studies is reported in section 9.1.2 of the assessment report.

De novo analysis

The company submitted a simple decision tree (see figure 1) which models a population of adults and children that need wound closure after a surgical procedure. The model assesses the cost of wound closure plus the cost of treatment for people that develop an SSI. People enter the model following surgical wound closure with either plus sutures or non-triclosan coated sutures and subsequently go on to develop, or not to develop, an SSI. An additional branch of the decision tree models patients with and without SSI that go on to die or remain alive. The mortality branch of the analysis was used by the company to calculate a cost per death avoided using cost-effectiveness methodology. The time horizon modelled is 1 year, this aligns with published economic evaluations of Plus Sutures.

The company model makes the following assumptions:

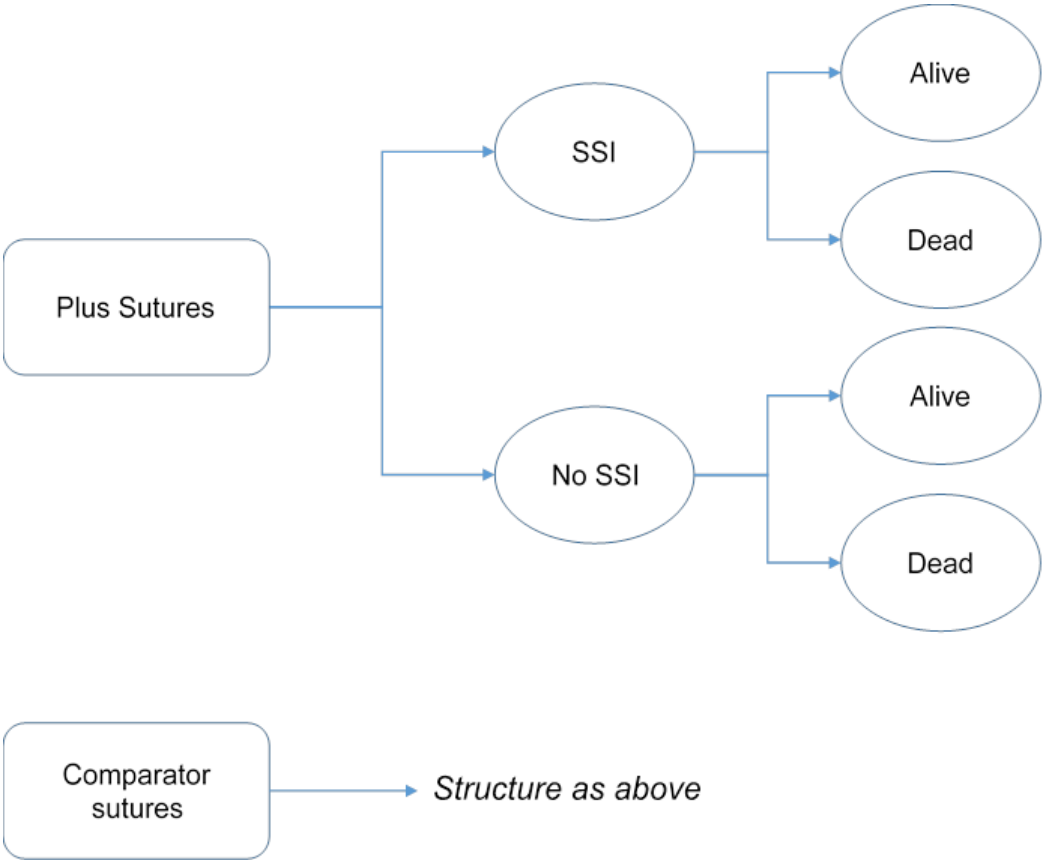
- Risk of SSI relates only to those detected and treated during the initial inpatient episode or on readmission.
- The average SSI episode cost does not include the cost of treating SSIs in the community.
- The risk of infection with Plus Sutures is calculated by applying the relative risk of SSI associated with the use of Plus Sutures reported in

the meta-analysis to a baseline risk of SSI. The baseline risk of SSI is based UK data.

- Adverse events were not included in the model.

The EAC considered the model structure to be appropriate, except for the mortality branch of the decision tree which complicates the model and is outside the scope of the evaluation. The EAC deemed the time horizon to be sufficient to capture the incidence and treatment of SSI and it accepted all the model assumptions.

Figure 1 Structure of the economic model



Model parameters

The company's approach to modelling the impact of Plus Sutures on SSI including applying a relative risk of SSI offered by using Plus Sutures to a baseline risk of SSI (for standard sutures). The clinical parameters included in the economic modelling were:

- Baseline risk of SSI: The baseline risk of SSI used in the model was 1.04%. To estimate this parameter the company used data published in the Surveillance of surgical site infections in NHS hospitals in England (Public Health England, 2020). The EAC accepted this source but agrees with the company that due to limitations of the SSI surveillance service the data are likely to underestimate the incidence SSI.
- Sub-group risk of SSI: The company assumed the risk of SSI in adult and children populations were the same as the baseline risk (1.04%). Wounds categorized as clean were assumed to have a risk of 0.8%, whereas non-clean wounds were assumed to have a risk of SSI of 6.8%. The EAC accepted these parameters.
- Relative risk associated with Plus Sutures: The base case relative risk value of 0.71 was derived from the de novo meta-analysis. The EAC agreed with this approach but favoured the results of the random effects over the fixed effects analysis.
- Mortality associated with SSI: This parameter was deemed out of scope by the EAC. Omission of this parameter had no impact on the results of the model.

Table 5 Clinical parameters

	Parameter	EAC value	Company value	Source	EAC rationale
Risk of SSI	Base case	same	1.04%	PHE SSISS Weighted mean of all surgical categories.	Estimate biased by over-representation of orthopaedic procedures. Likely to be conservative.
	Adult	same	1.04%	Same as base case	Data was not specific to age. Likely to be conservative.
	Children	same	1.04%		
	Clean	same	0.8%	PHE SSISS Weighted mean of clean wounds.	The EAC agreed with the approach taken to estimate baseline incidence of SSI in clean and non-clean

	Non-clean	same	6.8%	PHE SSISS Weighted mean of clean-contaminated wounds.	surgical procedures. Categorisation of wounds undertaken using data from Troughton et al. (2018).
Relative risk	Base case	same	0.71	Results from the de novo meta-analysis	EAC estimate was based on meta-analysis of all studies, excluding STRATAFIX (N=28); the company included STRATAFIX studies (N= 30). Random effects model data used rather than fixed effect.
	Adult	0.71	0.73		EAC used random effects data rather than fixed effect, except in children subgroup which had too few studies to perform random effects analysis (N=2).
	Children	same	0.52		
	Clean	0.71	0.75		
	Non-clean	0.67	0.66		
Abbreviations: PHE, Public Health England; SSISS, Surgical site infection surveillance service					

Costs and resource use

The cost parameters included in the model were:

- The cost of Plus Sutures (and the comparator): The company provided an estimate of the cost based weighted average of sales, this included Plus Sutures with the STRATAFIX design. The EAC reported that the company's estimation of the cost was not sufficiently transparent or reproducible. It also considered that STRATAFIX were out of scope. The EAC amended the cost of the technology by calculating a mean based on the cost published in the MedTech innovation briefing for Plus Sutures (MIB204).
- 5 sutures were used per surgical procedure: The EAC considered that the number of sutures used per procedure would depend on a number

of factors, however, the company included sensitivity analyses that ranged from 3 to 9. Clinical experts agreed that the values were plausible.

- The estimated cost of SSI: The company based their estimated cost of SSI on a UK study that reported the clinical and financial outcomes associated with SSI (Jenks et al. 2014). The EAC accepted this source and made no changes to this parameter.

The cost parameters used in the company's model and changes made by the EAC are described in table .6.

Table 6 Cost parameters

Parameter	EAC value	Company value	Source	EAC rationale
Plus Sutures cost	£4.25	£4.13	Company estimate based on weighted average of sales volumes	EAC costs based on the arithmetic mean of MONOCRYL Plus, PDS II Plus and VICRYL Plus sutures, and equivalent non-triclosan sutures, published in MIB204 (NICE, 2020).. As there was insufficient distributional data from this source, fixed costs were used for probabilistic sensitivity analyses. ..
Comparator cost	£3.35	£3.28		
SSI cost - All	Same	£6,016	Data from (Jenks et al., 2014), adjusted for inflation (PSSRU, 2021) . Distribution derived from 95% CI.	The EAC considered this estimate to be appropriate. It has been used and accepted by other assessments at NICE.
SSI cost - Clean	£6,016	£7,543	Data from (Jenks et al., 2014), adjusted for	The EAC noted that the cost associated

SSI cost Non-clean	£6,016	£6,227	inflation (PSSRU, 2021). Classification by Troughton et al. (2018), with proportion of surgery types weights by SSISS data, and validated by clinical experts	with clean and non-clean wounds were both higher than the overall average cost of SSI, which was counterintuitive. Clean wounds were also more costly to treat than unclean wounds; the EAC was satisfied with the rationale for this provided by the company, however, for the EAC used the base case cost of SSI.
Abbreviations: PHE, Public Health England; SSISS, Surgical site infection surveillance service				

Results

As there were so few changes to the model parameters the EAC and company's results were similar. In the EAC's base cases analysis Plus Sutures was found to be cost saving by a mean of £13.62 per patient; compared with £13.88 per patient reported by the company.

Table 7 and 8 show the base case and sub group analysis results, respectively.

Table 7 Base case deterministic results of de novo model reported by company and EAC

	Company estimate*			EAC estimate**		
	Plus Sutures	Comparator sutures	Difference (Plus Sutures minus Comparator)†	Plus Sutures	Comparator sutures*	Difference (Plus Sutures minus Comparator)†
Device cost (Mean cost per patient)	£20.65	£16.40	£4.25	£21.31	£16.80	£4.51
Cost of SSI treatment (Mean cost per patient)	£44.39	£62.53	-£18.13	£44.38	£62.51	-£18.13
Total cost per patient	£65.04	£78.93	-£13.88	£65.69	£79.31	-£13.62
Total (per 1,000 patients)	£65,045	£78,928	-£13,883	£65,690	£79,310	-£13,620

* Taken from Table 9 of company's Economic Submission.
** Using random effects analysis of RR for all included studies (excluding studies reporting on STRATAFIX). Cost of technology and comparator were taken from MIB204 (which did not incorporate STRATAFIX). All other parameters were the same as those used by the company.
† Negative values indicate a cost saving.

Table 8 Deterministic scenario (subgroup) analyses of de novo model reported by company and EAC (per patient)

Subgroup	Company estimate*			EAC estimate**		
	Plus Sutures	Comparator sutures	Difference (Plus Sutures minus Comparator)†	Plus Sutures	Comparator sutures*	Difference (Plus Sutures minus Comparator)†
Adults	£66.30	£78.93	-£12.63	£65.71	£79.33	-£13.62
Children	£53.16	£78.93	-£25.76	£53.83	£79.33	-£25.50
Clean	£65.77	£76.56	-£10.79	£55.38	£64.78	-£9.40
Non-clean	£301.65	£442.16	-£140.51	£296.90	£428.10	-£131.20

* Data reported in “miscellaneous” section of the company’s Economic Submission.
** Using random effects analysis of RR for all included studies. For the clean and non-clean wounds subgroup analysis, the EAC used the fixed base case cost of SSI for both groups. All other parameters were the same as those used by the company.
† Negative values indicate a cost saving.

Sensitivity analyses

The company performed extensive sensitivity analyses, including deterministic and probabilistic sensitivity analyses (DSA and PSA) on all base case input parameters. The upper and lower bounds and distributions used for each parameter are reported in able 9.3 in the assessment report.

The results of the one-way DSA showed that the model was most sensitive to changes in the incidence of SSI, however the model remained cost saving even when the lowest plausible SSI incidence was used (0.5%). Two-way DSAs were used to explore the combined impact of SSI incidence and relative risk, and SSI incidence and cost of SSI. The results were cost saving in all cases. This was further supported by threshold analyses that reported the following breakeven point, that were deemed by the company and the EAC, to be unlikely or implausible:

- Cost of SSI: £1,410
- Incidence of SSI: 0.24%
- Relative risk: 0.93
- Number of sutures used: 21

Results of the PSA, reported for the base case only, showed that Plus Sutures were cost saving in 99.8% of iterations (1,000 iterations performed). The EAC used these data to calculate the 95% credibility intervals (Crl) of the base case data. The summary result was Plus Sutures was associated with cost savings of £13.96 (95% Crl £4.97 to £22.22) per patient.

Additional sensitivity analyses performed by the EAC

The EAC performed additional sensitivity analyses to:

- Explore the uncertainty in the cost savings associated with each sub-group; adults, children, clean and non-clean.
- Explore the impact of different relative risk values reported in the EAC's meta-analysis as a result of stratifying studies by quality, sample size and location.

Plus Sutures were cost-saving in all sub-groups investigated. The most uncertainty was in the clean sub-group (£9.30; 95% CrI -£2.24 to £19.26; 94.6% probability cost saving). The meta-analysis showed that the size of the effect of using Plus Sutures (lowering the risk of SSI) appears diminished when studies of a high quality, or large sample size, were included in the analysis. The sensitivity analyses show that using Plus Sutures remains cost saving when the relative risk from the higher quality studies and studies with larger samples sizes were adopted but there was more uncertainty in the results. The results of these analyses are reported in table 9.60 in the EAC assessment report (page112). However, the EAC note that these results should be interpreted with caution as the exclusion of RCT data lower the precision of estimates.

5 Ongoing research

The company summarized five studies which have completed recruitment but not yet published results. The company also summarized 15 ongoing studies. None are recruiting within the UK so results may not be generalizable to the NHS.

[redacted]

6 Issues for consideration by the Committee

Clinical evidence

The EAC considered the evidence on Plus Sutures to be extensive and of a relatively high quality. It concluded that the company's claimed reduction in SSI incidence was proven by empirical evidence and showed this benefit of Plus Sutures was similar across sub-groups. However, other claimed benefits were not proven by empirical evidence but were deemed plausible by the EAC. The committee needs to consider if the clinical evidence is sufficient to support the adoption of Plus Sutures in all subgroups.

The EAC deemed that the barbed suture designed, STRATAFIX, was outside of the scope of the evaluation. The committee need to consider whether the STRATAFIX design should be included in the guidance.

The EAC reported that there were no safety concerns with the use of the antibacterial agents triclosan within Plus Sutures. Are the committee satisfied that the widespread use of Plus Sutures is safe?

Cost evidence

The EAC made only minor changes to the company model and concluded that Plus Sutures were highly likely to reduce costs to the NHS in most settings. Savings were greater when Plus Sutures were used in procedures resulting in non-clean wounds, and there was some uncertainty in the cost benefits in clean procedures. The EAC concluded that, overall, Plus Sutures were highly likely to reduce costs to the NHS of England in most settings. The committee need to consider whether there is enough certainty in the results of the analysis to recommend the technology across all groups.

7 Authors

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Kimberley Carter; HTA adviser

NICE Medical Technologies Evaluation Programme

May 2021

Appendix A: Sources of evidence considered in the preparation of the overview

A Details of assessment report:

- Willits, I., Keltie, K., et al. Plus Sutures for preventing surgical site infection, April 2021

B Submissions from the following sponsors:

- Ethicon, Johnson & Johnson Medical Ltd

C Related NICE guidance

- Surgical site infections: prevention and treatment. NICE clinical guideline 125 (2019). Available from www.nice.org.uk/guidance/CG125

D References

Please see EAC assessment report for full list of references

Appendix B: Comments from professional bodies

Expert advice was sought from experts who have been nominated or ratified by their Specialist Society, Royal College or Professional Body. The advice received is their individual opinion and does not represent the view of the society.

Giles Bond-Smith

Consultant Surgeon, Clinical Lead for Emergency General Surgery, Clinical Lead for SSI Reduction, Oxford University Hospitals NHS Foundation Trust

Lillian Chiwera

Infection control surveillance team leader, Guy's & St Thomas' NHS Foundation Trust

Andrew Miller

Consultant Colorectal Surgeon, University Hospitals of Leicester NHS TRUST

Shafi Mussa

Consultant Congenital Cardiac Surgeon, University Hospitals Bristol and Weston NHS FT

Anne Pullyblank

Consultant Surgeon/Medical Director, North Bristol NHS Trust/West of England Academic Health Science Network

Mike Reed

Consultant Orthopaedic Surgeon, Northumbria Healthcare

Melissa Rochon

Quality and Safety lead for Surveillance, Royal Brompton and Harefield Hospitals, part of Guy's and St Thomas' NHS FT

Justin Wormald

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Please see the clinical expert statements included in the pack for full details

Appendix C: decision problem from scope

Population	Adults and children that need wound closure after a surgical procedure and in whom absorbable sutures are an appropriate option
Intervention	• PDS Plus Antibacterial (polydioxanone) Suture • MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture • Coated VICRYL Plus Antibacterial (polyglactin 910) Suture
Comparator(s)	Sutures that do not contain an antibacterial agent
Outcomes	The outcome measures to consider include: • Incidence of SSI • Type of SSI • length of post-operative stay in hospital relating to SSI • readmission related to SSI • antibiotics use for SSI (including prescription, duration and dose) • Severity of SSI using validated scoring systems such as ASEPSIS (additional treatment, serous discharge, erythema, purulent exudate, separation of tissues, isolation of bacteria, stay duration as an inpatient) wound score. • incidence of wound dehiscence (wound opening) • patient reported pain or discomfort • device-related adverse events.
Cost analysis	Costs will be considered from an NHS and personal social services perspective. The time horizon for the cost analysis will be long enough to reflect differences in costs and consequences between the technologies being compared. Sensitivity analysis will be undertaken to address uncertainties in the model parameters, which will include scenarios in which different numbers and combinations of devices are needed.
Subgroups to be considered	• Adults • Children • Clean wound procedures • Non-clean wound types
Special considerations, including those related to equality	This technology should not be used in people with known allergies to triclosan. All absorbable sutures, including Plus Sutures, may not be appropriate for older people; age is a protected characteristic under the 2010 Equalities Act. The company's product information manual advises that the use of all absorbable sutures, including Plus Sutures, may also not be appropriate for people who are, malnourished, debilitated or people with conditions that may prevent wound healing. In some cases, these people may be classed as disabled; disability is a protected characteristic under the 2010 Equalities Act.

Special considerations, specifically related to equality	Are there any people with a protected characteristic for whom this device has a particularly disadvantageous impact or for whom this device will have a disproportionate impact on daily living, compared with people without that protected characteristic?	No
	Are there any changes that need to be considered in the scope to eliminate unlawful discrimination and to promote equality?	No
	Is there anything specific that needs to be done now to ensure the Medical Technologies Advisory Committee will have relevant information to consider equality issues when developing guidance?	No
Any other special considerations	Not applicable	

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Medical technology guidance scope

Plus Sutures for preventing surgical site infection

1 Technology

1.1 Description of the technology

Plus Sutures (Ethicon, Johnson & Johnson Medical Ltd) are a range of synthetic, absorbable sutures that are either impregnated with or coated with medical grade triclosan, depending on the suture type. Triclosan is a broad-spectrum antibacterial agent effective on most common organisms associated with surgical site infection (SSI). Plus Sutures are intended for wound closure in people after a surgical procedure and are designed to prevent bacterial colonisation of the suture for 7 days or more. Absorbable sutures are absorbed by tissue over a matter of days and don't need removing. The company claims Plus Sutures can reduce the incidence of SSI and result in fewer readmissions because of an SSI.

Plus sutures are available in 3 variations of suture polymers and are available in a range of sizes and designs. Each of the 3 varieties has different physical properties and absorption rates which affects which tissue types it is better suited to:

- Coated VICRYL Plus Antibacterial (polyglactin 910) Suture is a multifilament (multiple braided threads) with an absorption rate of between 57 and 70 days making it best suited for general soft tissue approximation and ligation (bringing together or tying of tissue edges).

- MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture is a monofilament sutures (solid and smooth thread) with an absorption rate of between 91 and 119 days making it best suited for general soft tissue approximation and ligation. This suture is also available in a barbed design for knotless suturing.

- PDS Plus Antibacterial (polydioxanone) Suture is a monofilament suture (solid and smooth thread) with an absorption rate of between 182 and 238 days. This suture can be used for general soft tissue approximation, including use in paediatric cardiovascular surgery, and other surgery types that require up to 6 weeks wound support. This suture is also available in a barbed design for knotless suturing.

PDS Plus and MONOCRYL Plus contain no more than 2,360 micrograms/m triclosan. VICRYL Plus has a coating of copolymer, calcium stearate as well as up to 472 micrograms/m triclosan. The absorption rates and handling properties are the same as non-triclosan sutures.

1.2 Relevant indication

Plus Sutures are used for wound closure in people that have had a surgical procedure and need wound closure with an absorbable suture.

Surgical site infection is a type of healthcare-acquired infection in which a wound infection develops as a complication of an invasive surgical procedure. NICE's guideline on preventing and treating surgical site infection states that at least 5% of patients undergoing a surgical procedure develop a surgical site infection that is usually caused by contamination of an incision with microorganisms from the patient's own body at the time of surgery.

A surgical site infection surveillance programme conducted by Public Health England (PHE) reported cumulative SSI incidence between April 2015 and March 2020. The risk of SSI varies between surgery types with contaminated or clean-contaminated surgery procedures associated in particular with an increased risk of SSI. The PHE reported the highest SSI incidence to be in bile duct, liver or pancreatic surgery (9.1%) and large bowel surgery (8.3%).

The lowest SSI incidence was reported in hip and knee replacement surgery (0.5%). A table presenting SSI risk for all surgical types included in the analysis can be found in the surveillance of surgical site infection infections in NHS hospitals in England, April 2019 to March 2020 annual report. These data are based on the surveillance data of 133 contributing NHS trusts and may not be an accurate reflection the national incidence of SSI.

1.3 Current management

The NICE guideline on preventing and treating surgical site infection recommends a range of preoperative, intraoperative and postoperative measures to prevent SSI. Preoperative measures include:

- Preoperative bathing with soap, preferably within a day of the planned surgical procedure and an antiseptic preparation immediately before the procedure.
- Nasal decolonisation, since Staphylococcus aureus is a likely potential cause of SSI.
- A preventative course of antibiotics (unless the surgery is considered clean, non-prosthetic and/or uncomplicated).

To close the wound, the guideline recommends considering antimicrobial triclosan-coated sutures. The wound is dressed with an appropriate dressing and changed using aseptic non-touch technique. Sterile saline is used to irrigate the wound up to 48 hours after surgery.

If SSI is suspected, an antibiotic is given that covers the likely organisms causing infection in line with NICE's guideline on antimicrobial stewardship: systems and processes for effective antimicrobial medicine use.

1.4 Regulatory status

- Coated VICRYL Plus Antibacterial (polyglactin 910) Suture received a CE mark in September 2004 as a class III device for wound closure. Its latest review of the CE mark was in September 2020.

- MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture received a CE mark in May 2007 as a class III device for wound closure. Its latest review of the CE mark was in January 2020. The barbed designed version received CE mark in October 2016.

- PDS Plus Antibacterial (polydioxanone) Suture received a CE mark in March 2009 as a class III device for wound closure. Its latest review of the CE mark was in January 2020. The barbed designed version received CE mark in September 2016.

1.5 Claimed benefits

The benefits to patients claimed by the company are:

- Reduced risk of SSI, independent of the type of surgery
- Reduced SSI associated length of stay
- Reduced antibiotics prescribed

The benefits to the healthcare system claimed by the company are:

- Cost savings as a result of reduced treatment of SSIs
- Reduced bed days associated with reduced treatment of SSIs

2 Decision problem

Population	Adults and children that need wound closure after a surgical procedure and in whom absorbable sutures are an appropriate option
Intervention	• PDS Plus Antibacterial (polydioxanone) Suture • MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture • Coated VICRYL Plus Antibacterial (polyglactin 910) Suture
Comparator(s)	Sutures that do not contain an antibacterial agent
Outcomes	The outcome measures to consider include: • Incidence of SSI • Type of SSI • length of post-operative stay in hospital relating to SSI • readmission related to SSI • antibiotics use for SSI (including prescription, duration and dose)

	• Severity of SSI using validated scoring systems such as ASEPSIS (additional treatment, serous discharge, erythema, purulent exudate, separation of tissues, isolation of bacteria, stay duration as an inpatient) wound score. • incidence of wound dehiscence (wound opening) • patient reported pain or discomfort • device-related adverse events.	
Cost analysis	Costs will be considered from an NHS and personal social services perspective. The time horizon for the cost analysis will be long enough to reflect differences in costs and consequences between the technologies being compared. Sensitivity analysis will be undertaken to address uncertainties in the model parameters, which will include scenarios in which different numbers and combinations of devices are needed.	
Subgroups to be considered	• Adults • Children • Clean wound procedures • Non-clean wound types	
Special considerations, including those related to equality	This technology should not be used in people with known allergies to triclosan. All absorbable sutures, including Plus Sutures, may not be appropriate for older people; age is a protected characteristic under the 2010 Equalities Act. The company's product information manual advises that the use of all absorbable sutures, including Plus Sutures, may also not be appropriate for people who are, malnourished, debilitated or people with conditions that may prevent wound healing. In some cases, these people may be classed as disabled; disability is a protected characteristic under the 2010 Equalities Act.	
Special considerations, specifically related to equality	Are there any people with a protected characteristic for whom this device has a particularly disadvantageous impact or for whom this device will have a disproportionate impact on daily living, compared with people without that protected characteristic?	No
	Are there any changes that need to be considered in the scope to eliminate unlawful discrimination and to promote equality?	No
	Is there anything specific that needs to be done now to ensure the Medical Technologies Advisory Committee will have relevant information to consider equality issues when developing guidance?	No
Any other special considerations	Not applicable	

3 Related NICE guidance

Published

- Surgical site infection: prevention and treatment (2019) NICE guideline NG125.
- Prevention and control of healthcare associated infections (2019) NICE Pathway

In development

NICE is developing the following guidance:

- Leukomed Sorbact for preventing surgical site infection. NICE medical technology guidance. Publication expected February 2021.

4 External organisations

4.1 Professional

The following organisations have been asked to comment on the draft scope:

- Association for Clinical Microbiologists
- Association for Perioperative Practice
- Association of Breast Surgery
- Association of Clinical Biochemists - Microbiology Section
- Association of Surgeons of Great Britain and Ireland
- Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland
- British Association for Surgery of the Knee
- British Association of Aesthetic Plastic Surgeons
- British Association of Paediatric Surgeons
- British Association of Plastic Reconstructive and Aesthetic Surgeons
- British Obesity Surgery Society
- British Orthopaedic Association
- Healthcare Infection Society
- Infection Prevention Society
- Royal College of Nursing

- Royal College of Surgeons
- Society for Cardiothoracic Surgery of GB and Ireland
- Society for General Microbiology
- The Association for Perioperative Practice
- The Vascular Society of Great Britain & Ireland
- The Welsh Wound Innovation Centre

NICE National Institute for Health and Care Excellence

Adoption report: MT507
Plus Sutures for preventing surgical site infection

Summary

Adoption levers identified by contributors

- Easy to use, with no (or minimal) training required.
- They feel and handle the same as standard sutures.
- Could improve patient outcomes due to reduced risk of surgical site infections (SSIs).
- Could reduce NHS costs associated with treating SSIs.

Adoption barriers identified by contributors

- Cost.
- The procurement process.
- Patient selection to optimise benefits.

1 Introduction

The adoption team has collated information from 7 healthcare professionals working within NHS organisations. 4 of these have experience of using Plus Sutures, though 1 of the 4 only used Plus Sutures in their private practice.

It has been developed for the medical technologies advisory committee (MTAC) to provide context from current practice and an insight into the potential levers and barriers to adoption. It does not represent the opinion of NICE or MTAC

This adoption report includes some of the adoption considerations for the routine NHS use of the technology.

2 Contributors

The adoption team spoke to the individuals in the table listed below.

Job title	Plus Suture user
Consultant Colorectal Surgeon	No
Consultant Colorectal & General Surgeon, RCS Surgical Tutor	Yes
Specialist registrar in plastic and reconstructive surgery	Yes
Specialist registrar in plastic and reconstructive surgery	No
Infection Control Surveillance Team Leader	Yes
Consultant Orthopaedic Surgeon	Yes - in private practice only.
Consultant Oncoplastic Breast Surgeon	No

3 Current practice in clinical area

People having surgical intervention are at risk of surgical site infection (SSI). Contributors reported that in line with NICE guidance on preventing surgical site infections standard procedures include preoperative bathing with soap, preferably within a day of the planned procedure; antibiotic prophylaxis (if assessed as needed); surgical site preparation with an antiseptic immediately before the procedure and usual good practice in relation to aseptic techniques. Wound closure decisions involve whether to consider using, antimicrobial triclosan-coated sutures (if available in the trust) and whether sutures or staples should be used. An appropriate wound dressing is used and changed using an aseptic non-touch technique. Sterile saline is used to cleanse the wound up to 48 hours after surgery. If SSI is suspected, an antibiotic is given that covers the likely organisms causing infection.

4 Use of Plus Sutures in practice

Contributors reported varying practice and opinions on the use of Plus Sutures with some using routinely for all procedures and others applying selection criteria.

All contributors reported that during a procedure they would generally decide at the time of suturing which suture would be appropriate from those they had available.

5 Reported benefits

The potential benefits of adopting Plus Sutures as reported to the adoption team by the healthcare professionals using the technology are:

- Could improve patient outcomes due to reduced risk of SSIs.
- Could reduce NHS costs associated with treating SSIs.

All contributors reported that use of antimicrobial triclosan-coated sutures was only of benefit alongside all other targeted interventions to reduce SSIs.

6 Insights from the NHS

Patient selection

Some contributors felt that, if proven to reduce SSIs and available, Plus Sutures should be used routinely for all patients, in all specialities and procedures, unless contraindicated.

Others thought that Plus Sutures would not need to be used routinely; but for people at high risk of an SSI, or when the procedure itself was high risk e.g.:

- an emergency or trauma procedure,
- on a contaminated area such as the gut or an abscess,
- an already infected area,
- invasive rather than keyhole surgery.

Most contributors reported that guidance on use is not required as they would make a clinical judgment on each individual procedure. One contributor considered that patient or procedure selection criteria would be beneficial.

Clinician confidence

There were varying views of acceptance or confidence in the technology amongst contributors. Most felt that if evidence showed Plus Sutures reduced SSI risk, and

therefore SSI rates, they would use them in practice if available in their trust. Some expressed strong views on the benefits of use and would specifically request them to be procured within their trust if recommended by NICE. Others suggested that there are other more important and effective targeted interventions to reduce SSI rates if this was identified as an issue in their department or trust such as improving staff adherence to hand washing and other aseptic principles recommended in the NICE guidance.

Procurement and resource impact

Contributors identified procurement as being key to the adoption of Plus Sutures. The cost of purchasing the sutures was highlighted as a barrier, as they are more expensive than the non-antimicrobial equivalent.

Contributors reported that the procurement process varies across trusts. Two contributors (including the private practice) explained that Plus Sutures had been procured at an organisation-wide level and were available across all surgical specialities. Another contributor reported that they were only available to one surgical speciality and were planning to present a business case to procure them at a trust wide level.

Those that did not use Plus Sutures reported that the department responsible for purchasing sutures (which differed amongst contributors) would not necessarily see the cost benefit of their use and this may be why they have not been purchased.

Most contributors felt that NICE guidance in this area would be beneficial as it may help with business cases and procurement decisions.

Training

Contributors who have used Plus Sutures reported that no training is required. The sutures look, feel, and handle the same as standard sutures.

Patient outcomes

Whilst contributors suggested that the use of Plus Sutures could potentially improve patient outcomes due to reduced risk of SSIs and consequently reduce the associated costs of treating infections, none had collected any data to support this.

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Medical technologies guidance

MT507 Plus Sutures for preventing surgical site infection
Company evidence submission

Part 1: Decision problem and clinical evidence

Company name	Ethicon, Johnson & Johnson Medical Ltd.
Submission date	Tuesday 2nd March 2021 (clinical evidence submission)
Regulatory documents attached	Current CE mark and IFU documents attached with this submission as follows: • VICRYL™ Plus: CE 73804, CE 589698, CE 591501, CE 555605. IFU LAB-0012862, 100061830. • MONOCRYL™ Plus: CE 518537, CE 589698. IFU LAB-0012863. • PDS™ Plus: CE 536533, CE 589698. IFU LAB-0012281. • STRATAFIX™ Spiral MONOCRYL™ Plus: CE 653647, CE 555605. IFU 100375782. • STRATAFIX™ Spiral PDS™ Plus: CE 630873, CE 555605. IFU 100379555. • STRATAFIX™ SYM PDS™ Plus: CE 630873, CE 555605. IFU 100025466.
Contains confidential information	Yes – both Academic & Commercial in Confidence information contained with this submission.

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1 Decision problem

	Scope issued by NICE	Variation from scope (if applicable)	Rationale for variation
Population	Adults and children that need wound closure after a surgical procedure and in whom absorbable sutures are an appropriate option	N/A	N/A
Intervention	PDS™ Plus Antibacterial (polydioxanone) Suture MONOCRYL™ Plus Antibacterial (poliglecaprone25) Suture Coated VICRYL™ Plus Antibacterial (polyglactin 910) Suture	The STRATAFIX™ barbed design for knotless suturing has been included within the clinical and economic evidence in this submission.	Plus technology is inclusive of the STRATAFIX range, and is described within the main section of the NICE scope. Meta-analysis is presented both with and without STRATAFIX
Comparator(s)	Sutures that do not contain an antibacterial agent	N/A	N/A
Outcomes	The outcome measures to consider include: • Incidence of surgical site infection (SSI) • Type of SSI • length of post-operative stay in hospital relating to SSI • readmission related to SSI • antibiotics use for SSI (including prescription, duration and dose) •Severity of SSI using validated scoring systems such as ASEPSIS (additional treatment, serous discharge, erythema, purulent exudate, separation of tissues, isolation of bacteria, stay duration as an inpatient) wound score. • type of SSI (deep / superficial) • incidence of wound dehiscence (wound opening) • patient reported pain or discomfort • device-related adverse events.	Type of SSI, incidence of wound dehiscence and patient reported pain were added to the scope at a later date following consultation. Because the data extraction was concluded at the point at which these outcomes were added, these outcomes were extracted seperatly (not presented) and have been summarised with a qualitative synthesis in Section 7.	See box at left
Cost analysis	Costs will be considered from an NHS and personal social services perspective. The time horizon for the cost analysis will be long enough to reflect differences in costs and consequences between the technologies being compared. Sensitivity analysis will be undertaken to address uncertainties in the model parameters, which will include scenarios in which different numbers and combinations of devices are needed.	N/A	N/A
Subgroups to be considered	• Adults • Children • Clean wound procedures • Non-clean wound types	N/A	N/A
Special considerations, including issues related to equality	This technology should not be used in people with known allergies to triclosan. All absorbable sutures, including Ethicon Plus Sutures, may not be appropriate for older people;	N/A	N/A

	Scope issued by NICE	Variation from scope (if applicable)	Rationale for variation
	age is a protected characteristic under the 2010 Equalities Act. The company's product information manual advises that the use of all absorbable sutures, including Ethicon Plus Sutures, may also not be appropriate for people who are, malnourished, debilitated or people with conditions that may prevent wound healing. In some cases, these people may be classed as disabled; disability is a protected characteristic under the 2010 Equalities Act.		

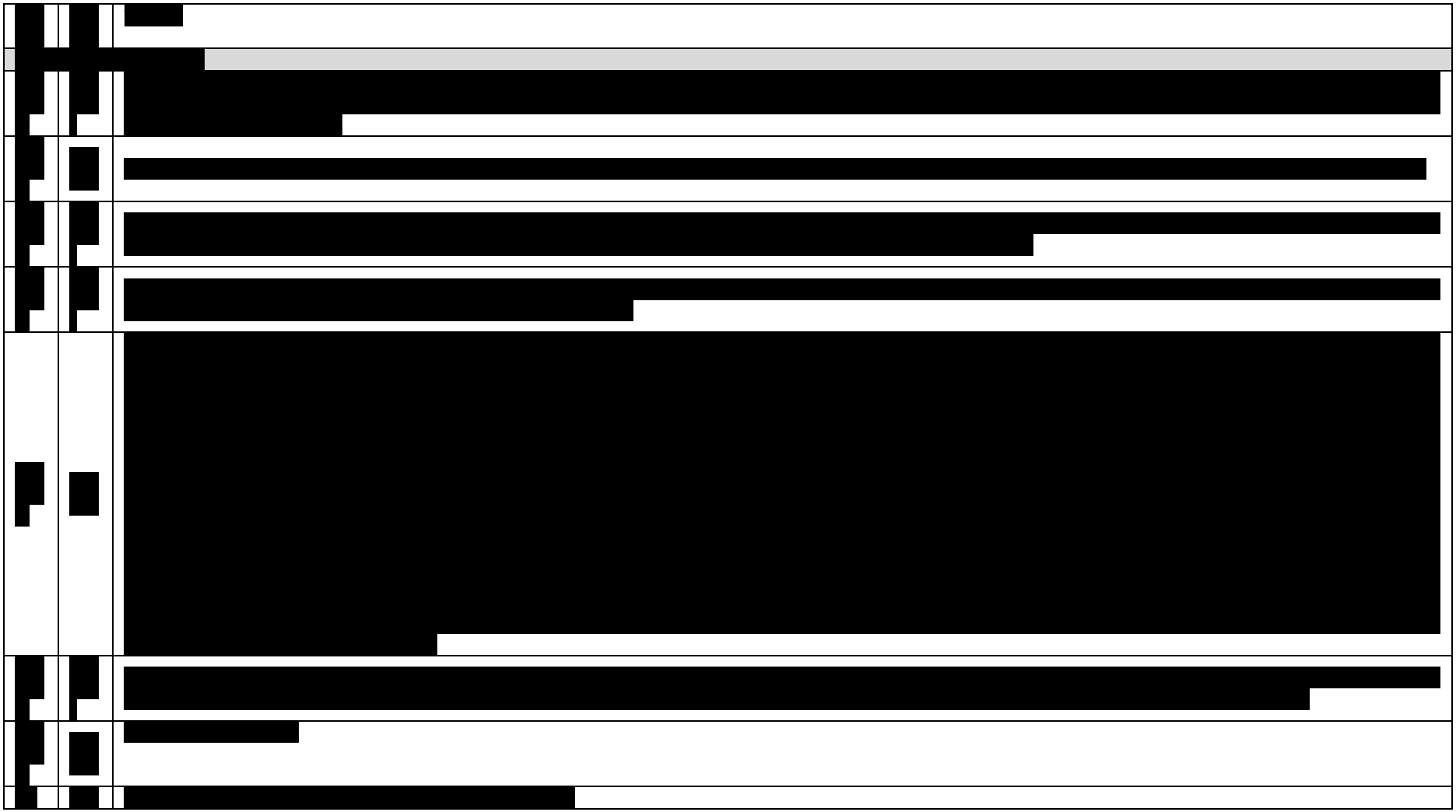
2 The technology

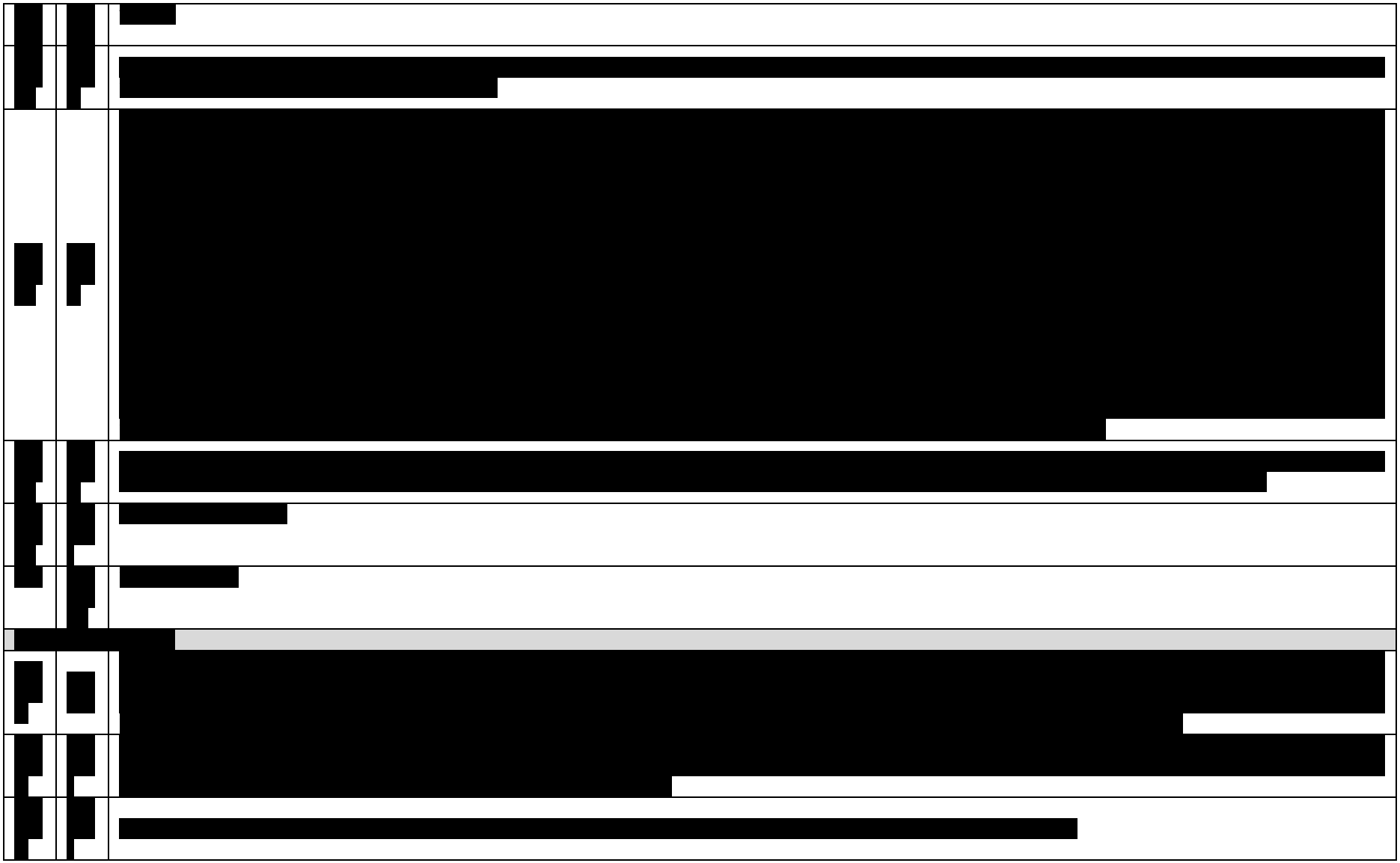
Give the brand name, approved name and details of any different versions of the same device (including future versions in development and due to launch). Please also provide links to (or send copies of) the instructions for use for each version of the device

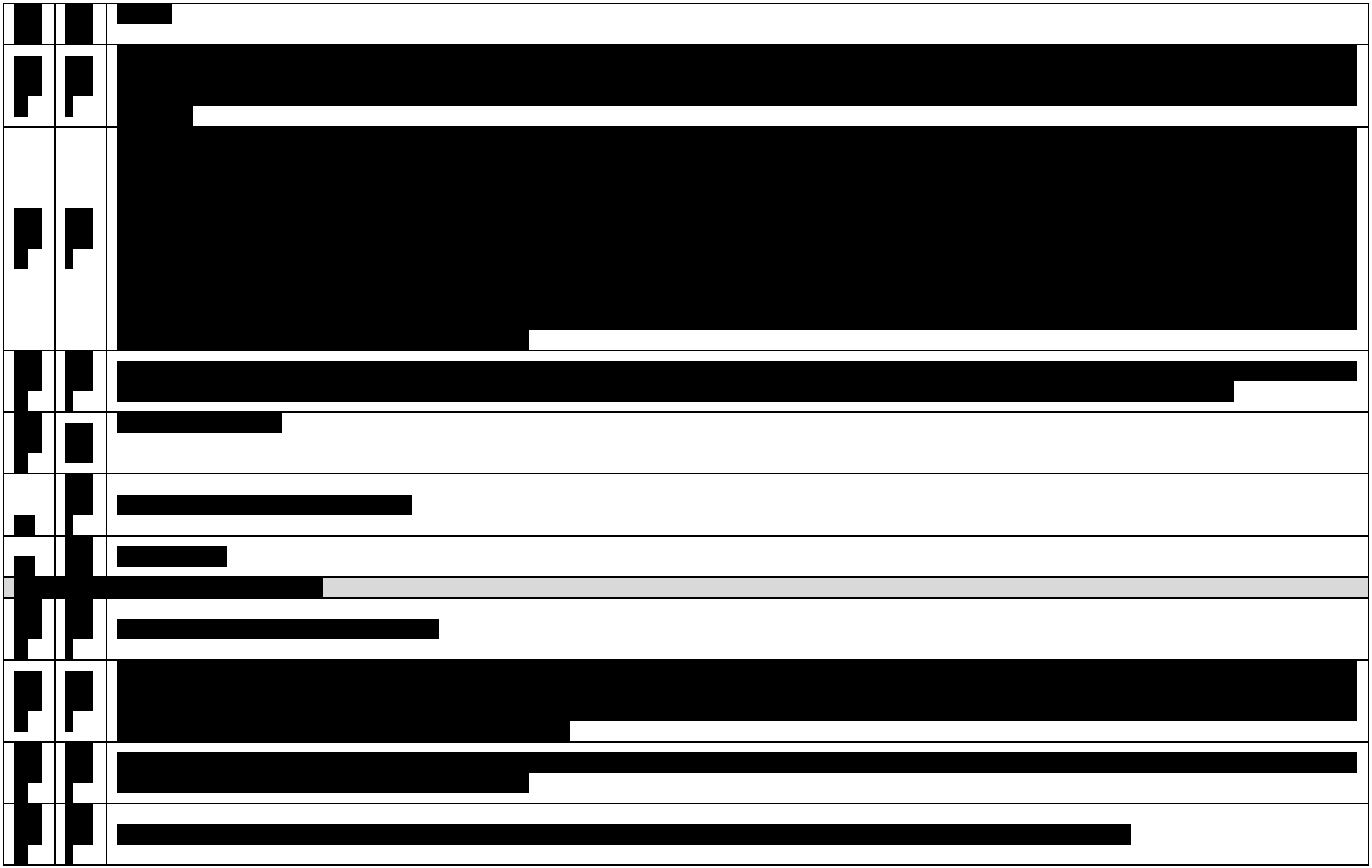
Brand name	Ethicon Plus Antibacterial Sutures (referred to throughout as “Plus Sutures”
Approved name	Ethicon Plus Antibacterial Sutures
CE mark class and date of authorisation	Coated VICRYL™ Plus Antibacterial (polyglactin 910) Suture received a CE mark in September 2004 as a class III device for wound closure. Its latest review of the CE mark was in September 2020. MONOCRYL™ Plus Antibacterial (poliglecaprone 25) Suture received a CE mark in May 2007 as a class III device for wound closure. Its latest review of the CE mark was in January 2020. The barbed designed version received CE mark in October 2016. PDS™ Plus Antibacterial (polydioxanone) Suture received a CE mark in March 2009 as a class III device for wound closure. Its latest review of the CE mark was in January 2020. The barbed designed version received CE mark in September 2016.

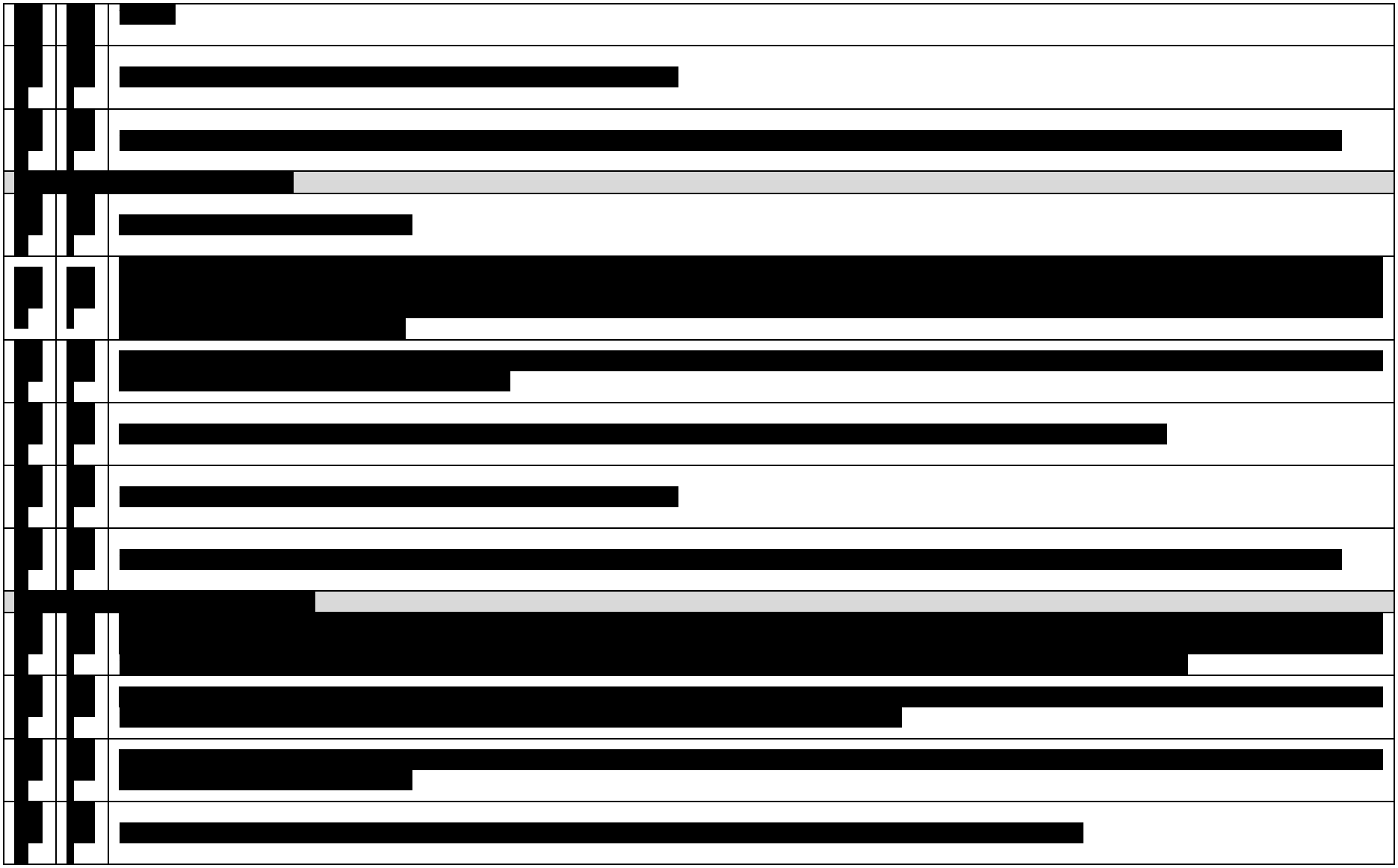
The IFU material and table of changes below is confidential and should not be published.

* ADAPTIV is a documentation system where Johnson & Johnson hold all technical documentation related to a product code.









What are the claimed benefits of using the technology for patients and the NHS?

Claimed benefit	Supporting evidence	Rationale
Patient benefits		
Reduced risk of SSI, independent of the type of surgery	SLR and meta-analysis conducted for this submission	All analyses indicated the reduction in SSI risk in the Plus Sutures arm were statistically significant. Results of the overall population meta-analysis incidence of SSI indicated that patients in the Plus Sutures group had a 28% reduction in the risk of developing an SSI compared to those in the control group. Results across subgroups were between 25% and 48% depending on subgroup reduction in incidence of SSI with the use of Plus Sutures.
Reduced SSI associated length of stay	SLR conducted for this submission Jenks (2014) (Jenks, Laurent et al, 2014) Badia (2017) (Badia, Casey et al, 2017)	Plus Sutures can reduce the risk of extended length of stay associated with SSI. SSIs are known to be associated with increased length of stay, additional cost, and hospital readmission. Plus Sutures have been shown in multiple meta-analyses to reduce the risk of SSIs by 28%. Reducing the risk of SSIs can therefore release additional beds.

Claimed benefit	Supporting evidence	Rationale
	De Jonge et al (2017) (De Jonge, Atema et al, 2017)	
Reduced antibiotics prescribed	SLR conducted for this submission	Limited evidence is available for antibiotic use. Available evidence suggests SSI is associated with an increase in antibiotic use (as per NICE recc 1.4.9 (National Institute for Health and Care Excellence, 2020)). With the reduction in SSI reported by use of Plus Sutures in the existing published literature and meta-analysis presented within this submission, it is therefore likely that antibiotic prescribing for the treatment of SSI should logically be reduced.
System benefits		
Cost savings as a result of reduced treatment of SSI	Leaper et al (2017) (Leaper, Edmiston et al, 2017) De novo cost model to be submitted in part 2	Plus Sutures can result in mean cost savings of £91.25 per surgical procedure. Savings associated with use of Plus Sutures as reported in the de novo cost consequence model will be presented in part 2 of this submission.
Reduced bed days associated with reduced treatment of SSI	SLR conducted for this submission Jenks (2014) (Jen	Limited evidence from the SLR is available reporting on length of hospital stay in patients who received Plus Sutures versus those that do not (due to limited reporting and limited SSI incidence in clinical studies). However, evidence is available concluding that SSI is associated with an increase in length of stay (Jenks, 2014). The published literature and meta-analysis reported in this submission demonstrate a statistically significant reduction in SSI associated with the use of Plus Sutures. It is therefore likely that by reducing SSI incidence will reduce bed days associated with reduced treatment of SSI.

Claimed benefit	Supporting evidence	Rationale
	ks, Laurent et al, 2014)	
Cost benefits		
Cost effective, and cost saving compared with standard care	Leaper et al (2017) (Leaper, Edmiston et al, 2017) De novo cost model to be submitted in part 2	Plus Sutures can result in mean cost savings of £91.25 per surgical procedure. Savings associated with use of Plus Sutures as reported in the de novo cost consequence model will be presented in part 2 of this submission.
Sustainability benefits		
Contributes to the reduction of antibiotic prescribing	SLR conducted for this submission	Limited evidence is available from the SLR on the relative risk for antibiotic use in patients receiving Plus Sutures versus those that do not. However, SSI incidence was significantly reduced and SSI is associated with an increase in antibiotic use (as per NICE recc 1.4.9 (National Institute for Health and Care Excellence, 2020)) hence antibiotic use should logically be reduced.
Reduces SSI associated bed days, readmissions and medical appointments	SLR conducted for this submission	By reducing SSIs, it is possible to reduce medical resource use including bed days, readmissions and medical appointments. While, limited evidence is available for length of hospital stay and readmission rates (due to limited reporting and limited SSI incidence in clinical studies), SSI incidence was significantly reduced and SSI is associated with an increase in length of stay (as per Jenks, 2014) hence bed days should logically be reduced.

Claimed benefit	Supporting evidence	Rationale
Environmental sustainability benefits as a result of reduced risk of SSI	De Jonge et al (2017) (De Jonge, Atema et al, 2017) Analysis by J&J	[redacted] Plus Sutures have been shown in meta-analyses to reduce the risk of SSI by 28% and so, the use of triclosan-coated sutures (Plus Sutures) can lead to potential environmental sustainability benefits.

Briefly describe the technology (no more than 1,000 words). Include details on how the technology works, any innovative features, and if the technology must be used alongside another treatment or technology.

Reducing the risk of SSI requires an evidence-based surgical care bundle approach that includes management of patient risk factors for infection, proper skin antisepsis, instrument sterilisation, environmental control within the operating theatre, and antibacterial devices (Berrios-Torres, Umscheid et al, 2017, World Health Organization, 2016). Despite antiseptic preparation of the skin before surgery to kill superficial bacteria, some bacteria remain below the visible surface of the epidermis, in the lining of hair follicles, sweat glands, and other areas (World Health Organization, 2018). Once a suture is introduced into a surgical incision, bacteria on the surface of the epidermis, disrupted while making a skin incision, migrate from the surface to the foreign body, which is the site of SSI initiation (Edmiston, Krepel et al, 2013, National Institute for Health and Care Excellence, 2008).

Bacteria can also adhere to and colonize the suture during its implantation. Subsequently, the colonizing bacteria can develop into a polymicrobial biofilm on the suture (Edmiston, Krepel et al, 2013). Biofilm on implanted sutures can increase over time as the colonizing bacteria secrete a sticky polymeric matrix, which is difficult to penetrate by macrophages or local or systemic antimicrobials, therefore the likelihood of SSI is increased (Barker, Khansa et al, 2017).

Plus Sutures, with a triclosan coating, were developed to address this known risk factor of SSI. Plus Sutures are now supported by evidence-based recommendations from several health authorities globally as part of the SSI prevention bundle (WHO, American College of Surgeons & Surgical Infection Society, CDC, NICE and KRINKO).

Plus Sutures are coated with medical-grade triclosan, IRGACARE® MP, a broad-spectrum antibacterial agent that actively inhibits the colonization of bacteria on the suture for 7 days or more, and is effective against the most common organisms associated with SSI (Staphylococcus aureus, Staphylococcus epidermidis, MRSA, MRSE, Escherichia coli & Klebsiella pneumoniae) (Ming, Rothenburger et al, 2007, Rothenburger, Spangler et al, 2002, Ming, Rothenburger et al, 2008).

Plus technology is available in a range of absorbable Ethicon suture polymers, sizes and designs, including braided, monofilament and barbed sutures, needled and non-needled options.

The three suture polymers have different physical and absorption properties, providing hospitals and healthcare professionals the choice of suture most suitable for their patient, procedure and tissue to be sutured (based on tissue healing time); the addition of triclosan does not impact intraoperative handling or absorption profile (Barbolt, 2002), therefore no additional specific training is required to use Plus Sutures.

As per the relevant IFUs (Johnson & Johnson, 2019, Johnson & Johnson, 2019, Johnson & Johnson, 2020, Johnson & Johnson, 2020, Johnson & Johnson, 2020, Johnson & Johnson, 2020):

- Coated VICRYL™ Plus antibacterial (polyglactin 910) suture is a synthetic absorbable multifilament suture (multiple braided threads) with an absorption rate of 56-70 days, it is intended for use in general soft tissue approximation and/or ligation.
- MONOCRYL™ Plus antibacterial (poliglecaprone 25) suture is a synthetic absorbable monofilament suture (solid and smooth thread) with an absorption rate of 91-119 days, it is intended for use in general soft tissue approximation and/or ligation.
- PDS™ Plus antibacterial (polydioxanone) suture is a synthetic absorbable monofilament suture (solid and smooth thread) with an absorption rate of 182-238 days, it is intended for use in general soft tissue approximation, including use in pediatric cardiovascular tissue, and where the combination of an absorbable suture with extended wound support (up to 6 weeks) is desirable.
- Coated VICRYL™ Plus suture has a coating of copolymer and calcium stearate and contains no more than 275 micrograms/m Triclosan. MONOCRYL™ Plus and PDS™ Plus Sutures contain no more than 2,360 micrograms/m Triclosan.
- The STRATAFIX™ knotless tissue device range consists of barbed suture material to allow tissue approximation without the need to tie surgical knots.

SSI represents 37% of all hospital acquired infections in surgical patients (Odom-Forren J, 2006, World Health Organization, 2009):

- Patients with an SSI are twice as likely to spend time in an intensive care unit.
- Patients with an SSI are five times more likely to be readmitted after discharge.
- Patients with an SSI are twice as likely to die.
- 40-60% of surgical site infections may be preventable

SSI can have a significant negative impact on patients, but also a financial and resource impact on NHS hospitals; the average cost of managing a single patient with an SSI has been reported previously by NICE at £3,122 (Jenks, Laurent et al, 2014, National Institute for Health and Care Excellence, 2020). SSI is common and known to be associated with increased length of stay, additional cost, and hospital readmission within UK (Jenks, Laurent et al, 2014, Leaper, van Goor et al, 2004). Reducing the occurrence of SSI by using Plus Sutures can release additional beds and allow for extra procedures to be performed, but also deliver better outcomes for patients.

Briefly describe the environmental impact of the technology and any sustainability considerations (no more than 1,000 words).

Environmental Sustainability benefits to NHS of SSI reductions

The Sustainable Care Pathways Guidance for surgical care pathways was developed through the Sustainable Healthcare Coalition, of which J&J is a member and NICE an advisory member (Coalition for Sustainable Pharmaceuticals and Medical Devices, 2015). This guidance enables users to understand the sustainability of new or existing models of care, and ultimately to improve the sustainability of health systems. Environmental impact is presented in the guidance document in terms of three main environmental metrics: greenhouse gas (GHG) emissions, fresh water use and waste generation.

[redacted]

For context, 22,629 tonnes of CO2e is equivalent to 80,817 return flights (roundtrip flight London-Rome: 0.28 tCO_2e (International Civil Aviation Organization, 2016)).

Use of Plus Sutures reduces SSI risk compared to non-coated sutures (De Jonge, Atema et al, 2017) leading to potential environmental benefits to English NHS .

Antimicrobial Resistance (AMR)

A recent European Public Health Alliance report (Vettore G, 2019) states that AMR jeopardises the achievement of Sustainable Development Goals and includes a focus on infection prevention and control to reduce the need for antibiotics and consequently decreasing risk of AMR.

Furthermore, reduced overall antibiotic use is an objective in the NHS Long term plan (NHS England, 2019) and UK Government 5 year action plan on AMR (HM Government, 2019). We believe through reducing risk of SSI and subsequent antibiotic prescribing, Plus Sutures has potential to deliver a direct positive contribution to environmental sustainability across the healthcare system.

Environmental Sustainability J&J (Johnson & Johnson, 2020)

As the world's largest healthcare company, we are committed to protecting our shared environment and natural resources, and have been setting public environmental goals for nearly 30 years.

In addition to enabling recycling of used surgical devices globally, J&J seeks ways to reduce its footprint in the manufacture and delivery of high-quality products, and to help health systems meet their environmental sustainability goals.

Becoming more energy and carbon-efficient are essential ways we can reduce our impact on the planet (Johnson & Johnson, 2020);

- 30% of our electricity is now produced or procured from renewable energy sources, on track for target of 100% by 2050.
- J&J certify manufacturing and R&D sites to ISO 14001 Environmental Management System Standard within three years of establishment or acquisition.
- We encourage suppliers to make sustainability improvements in their businesses through our globally-recognized Sustainable Procurement Program with focus areas including environmental, social and supply chain impact.
- Order optimization aims to reduce order complexity, costs, and frequency. Plus Sutures are predominantly manufactured in Germany thus consolidating orders can lead to reduced shipments and carbon emissions. In the UK and US, we have helped make a positive environmental impact on order efficiency by addressing changes with number and weight of orders, distance, and shipping method.
- Across Europe, including UK, we offer hospitals the Ethicon Suture Conversion Program, supporting the move to Plus Sutures, during which non-Plus Ethicon stock can be returned in exchange for invoice credit. No physical stock or investment in stock is wasted, and the transition period to Plus Sutures is reduced, allowing faster access for clinicians and patients.

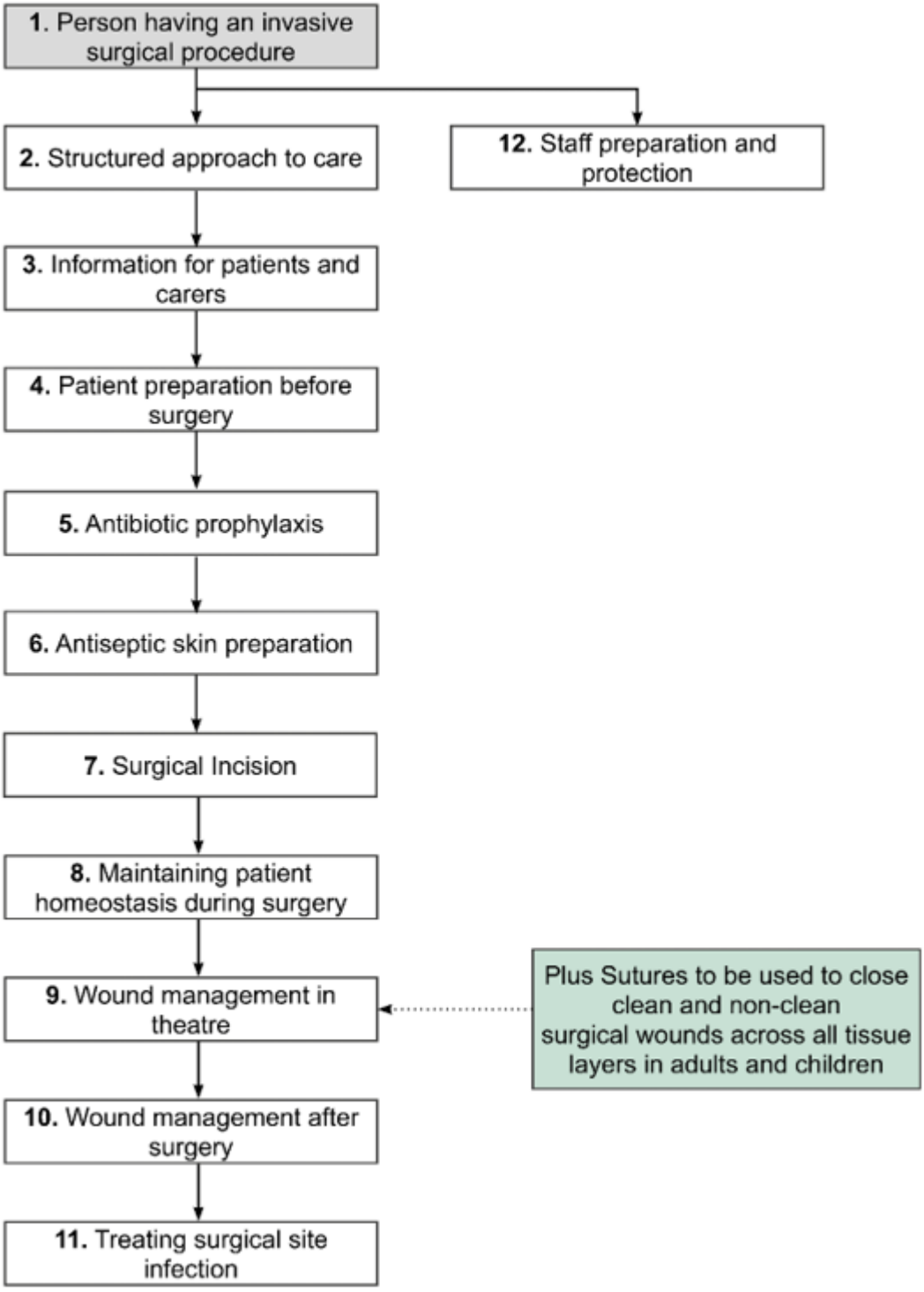
Triclosan

Ethicon's use of triclosan is regulated at each manufacturing site, conforming to all applicable standards for handling and disposal, therefore, would not be expected to have any measurable impact on the environment. The small quantity of triclosan on Plus Sutures is rapidly metabolized following implantation before being excreted in a neutralized form; therefore, it does not accumulate in the body and has minimal impact on environment (Rodricks, Swenberg et al, 2010). The US Environmental Protection Agency found antimicrobial uses of triclosan are unlikely to contribute significant quantities of triclosan into household wastewater and surface water (Office of Prevention Pesticides and Toxic Substances, 2008).

Education
J&J engage with HCPs to deliver education to understand environmental sustainability and stewardship fundamentals, relating to hospitals and theatres, including topics like healthcare waste and climate change. This online course is currently being implemented globally via the J&J Institute.

3 Clinical context

Describe the clinical care pathway(s) that includes the proposed use of the technology, ideally using a diagram or flowchart. Provide source(s) for any relevant pathways.



This pathway has been adapted from NICE Clinical Guidelines on SSI (National Institute for Health and Care Excellence, 2021).

Describe any training (for healthcare professionals and patients) and system changes that would be needed if the NHS were to adopt the technology.

No additional training is required for a healthcare professional (HCP) to use Plus Sutures, and system changes are minimal; Plus Sutures look, feel and behave just the same as traditional Ethicon sutures, and the addition of triclosan does not impact intraoperative handling or absorption profile (Barbolt, 2002). Plus Sutures are already used in secondary care by HCPs usually surgeons and have been available in the UK since 2004. We estimate that in the UK NHS,

[redacted]

Plus Suture product codes differ from their non-Plus alternatives and so conversion charts are provided to help HCPs select the correct alternative. Conversion charts and ordering advice is also given to supplies staff, who order the sutures. All end user confirmation is sought to confirm acceptance. Plus Suture boxes are clearly labelled to indicate the difference between non-Plus and Plus, along with labelling on individual suture sachets and IFU. HCPs may need to consider if a patient has a triclosan allergy. However, no additional training is required for a healthcare professional (HCP) to use Plus Sutures, and system changes are minimal; Plus Sutures look, feel and behave just the same as untreated Ethicon sutures. The only indicator that a HCP is using a Plus Sutures is the box labelling, packet labelling and IFU. Regardless of the absence of need for additional training, all end users' confirmation is sought to confirm acceptance.

Johnson & Johnson offer a range of Professional Education events that run throughout the year which support hospitals in a transition to Plus Sutures. These include courses designed to develop and enhance knowledge on SSI in terms of incidence, burden, risk factors and common guidelines for prevention. Furthermore, the programs include virtual break out rooms which serve as a platform for HCPs to engage with faculty experts (clinicians) in group discussions tackling the practical implementation of infection prevention guidelines, the possible challenges and how to overcome them.

For the patient there are no changes or additional training required, except for the consideration of a triclosan allergy.

NHS system changes to support adoption of Plus Sutures relate to the requirement for customers (NHS and private sector hospitals) to update their ordering systems/database. Product code and product description changes would be needed, and consideration may needed with regards to differing box sizes (Plus sutures versus non Plus Sutures) and to be reflected in box order quantities.

To demonstrate the relative ease of a hospital moving to Plus Sutures, Johnson and Johnson has been able to help hospitals within the UK make a successful switch remotely during the various national COVID lockdowns experienced in 2020 and 2021.

4 Published and unpublished clinical evidence

Methods for the identification and selection of studies

Details of the eligibility criteria for this review and analyses can be found in Section 1. Appendix A contains details of the resources searched and search strategies used. The review protocol was registered on the Open Science Foundation (OSF) database to ensure transparency (Open Science Foundation, 2021).

The eligibility criteria for the systematic review are as laid out below.

	Inclusion Criteria	**Exclusion Criteria**
Population	• Studies in adults and children in whom Plus Sutures (including Stratafix Plus) are an appropriate option • Studies assessing sutures for wound closure following an invasive surgical procedure Population subgroups of interest are as follows: • Adults • Children • Clean wound procedures • Non-clean wound procedures	• Participants with a known allergy to triclosan or contraindicated for the use of Plus Sutures • Studies assessing sutures for wound closure in settings other than invasive surgery
Intervention	Plus Sutures (Ethicon, Johnson & Johnson Medical Ltd): • PDS Plus Antibacterial (polydioxanone) Suture • MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture • Coated VICRYL Plus Antibacterial (polyglactin 910) Suture • STRATAFIX Symmetric PDS Plus Knotless Tissue Control Device • STRATAFIX Spiral PDS Plus Knotless Tissue Control Device • STRATAFIX Spiral MONOCRYL Plus Knotless Tissue Control Device Studies assessing "triclosan coated sutures" that do not refer to a brand name, will also be eligible	• Studies of any sutures other than the named eligible technologies • Studies of mixed eligible and ineligible interventions where results are not disaggregated according to suture variety or variant, i.e. studies where some patients in the intervention group receive one or more of the named Plus Sutures, and the remaining patients in the intervention group receive an ineligible intervention
Comparators	Standard of care, i.e.: • Sutures without any antibacterial coating	• Other sutures with an antibacterial coating, including other types of Plus Suture

Outcomes	• Incidence of SSI
	• Antibiotic use for SSI
	• Hospital stay related to SSI
	  ○ Length of post-operative stay in hospital relating to SSI
	  ○ Rate of readmission related to SSI
	• Severity of SSI, as reported by study authors, including ASEPSIS (additional treatment, serous discharge, erythema, purulent exudate, separation of tissues, isolation of bacteria, duration of stay as an inpatient) wound score
	• Device-related adverse events
	Outcomes added to the scope at a later date were not specified in the protocol but were summarised with a narrative synthesis from the
		Any other outcomes

	Inclusion Criteria	Exclusion Criteria
	studies included based on the criteria detailed in this table.	
Study design	• Randomised controlled trials (RCTs) of any design	Any studies other than RCTs, including intraindividual trials
Limits	• Full text documents or clinical trial records containing results for at least one outcome of interest to this review • Records of ongoing trials (to be listed for information rather than data extracted) • Otherwise relevant clinical trial records, detailing completed trials for which no results are available (to be listed in the section for relevant unpublished data rather than data extracted) • Only studies with a publication date of 2000 and onwards • English language publications	• Full text publications of studies with a publication date of 1999 or earlier • Clinical trials with a completion date of 1999 or earlier • Studies published in languages other than English

Results were downloaded into Endnote bibliographic software (Clarivate Analytics, 2018), deduplicated using several algorithms, and the duplicate references held in a separate EndNote database. A single researcher then assessed the search results according to their relevance in providing information on the clinical efficacy and safety of the intervention and comparator, and removed the obviously irrelevant records such as those about ineligible surgical interventions and studies in animals or in vitro.

Two reviewers independently assessed the titles and abstracts of remaining records for relevance against the eligibility criteria, with disagreements adjudicated by a third reviewer. Assessment of full texts was then conducted by two independent reviewers, again with a third reviewer adjudicating any disagreements.

One researcher extracted data from the eligible studies and a second researcher checked all the data points. The Cochrane Risk of Bias tool (Higgins, Altman et al, 2011) was used to assess each of the include studies, with one researcher completing the assessment and a second reviewer checking it.

Data were extracted as reported by study authors, with calculations performed only where the required data were not presented in the format required for the meta-analyses. Calculations were minimal and were based only on reported data.

As recommended by Cochrane guidance (Li T, 2020), timepoints at which data were to be extracted were specified prior to starting the review. One timepoint per study was extracted; if a paper reported data at more than one timepoint, CDC guidance (National Healthcare Safety Network, 2021) was used to select the most appropriate timepoint.

Identification of data for subgroups

Where reported, we recorded authors' descriptions of the status of the wounds assessed in each study. Where the authors did not explicitly report this information, the independent opinion of two clinicians was sought as to the likely wound status following the surgery detailed in each of the studies.

Complete the following information about the number of studies identified.

Please provide a detailed description of the search strategy used, and a detailed list of any excluded studies, in appendix A.

Number of studies identified in a systematic search.		1991*
Number of studies identified as being relevant to the decision problem.		52
Of the relevant studies identified:	Number of published studies (included in table 1).	31
	Number of abstracts (included in table 2).	0
	Number of ongoing studies (included in table 3).	21

*figure stated reports the total number of records retrieved by searches

List of relevant studies

In the following tables, give brief details of all studies identified as being relevant to the decision problem.

- Summarise details of published studies in table 1.
- Summarise details of abstracts in table 2.
- Summarise details of ongoing and unpublished studies in table 3.
- List the results of all studies (from tables 1, 2 and 3) in table 4.

For any unpublished studies, please provide a structured abstract in appendix A. If a structured abstract is not available, you must provide a statement from the authors to verify the data.

Any data that is submitted in confidence must be correctly highlighted. Please see section 1 of the user guide for how to highlight confidential information. Include any confidential information in appendix C.

Table 1a Summary of all relevant published studies

1a Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Study design** *Include details of single / double blind if reported*	**Inclusion criteria**	**Exclusion criteria**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Main outcomes** *Note primary and secondary outcomes*
(Arslan, Atasoy et al, 2018)	Arslan 2018, Turkey	Randomised trial Partially-blinded: the operating surgeon was not blinded as they recognised the sutures, whereas postoperative care and assessment of the surgical site were conducted by another surgeon, and was thus presumably blinded. Blinding of the patients was not reported	Patients ≥18 years old who underwent wide excision and primary closure for pilonidal disease	• Immunosuppression • Antibiotherapy and/or infection history within 1 week before surgery • Acute abscess • Recurrent pilodinal disease • Different procedures other than wide excision and primary closure • Use of drain • Postoperative antibiotics	Adult patients undergoing wide excision and primary closure for pilonidal disease Unspecified number of hospital surgical departments in Turkey **PDS Plus + Vicryl Plus**: analysed (treated patients) n=86 92 randomized; 6 protocol violations **Prolene + Vicryl**: analysed (treated patients) n=91 95 randomized; 4 protocol violations	Triclosan-coated sutures (PDS Plus + Vicryl Plus)	Uncoated sutures (Prolene + Vicryl)	Primary end-point: rate of SSI as defined by CDC guidelines (2017) Secondary end-points: wound dehiscence without infection and rate of seroma.
Primary: (Baracs, Huszar et al, 2011) Secondary: (University of Pecs, 2010)	Baracs 2011, Hungary Other identifiers: NCT01123616	Multicentre, randomised study NCT record states that masking was “double (Care Provider, Outcomes Assessor)”	Age between 18 and 80 years with benign or malignant colon or rectal disease undergoing an elective open surgical procedure involving an enterotomy	Patients with systemic disease influencing local surgical site healing (e.g., type I diabetes mellitus, Child-Pugh class B–C, liver cirrhosis, and chronic kidney disease necessitating dialysis) Patients receiving immunosuppressive treatment Patients with inflammatory bowel disease Patients needing acute operations with unprepared bowel Patients who refused to sign or withdrew the consent form Patients with intra-operative findings such as locally incurable tumour or sepsis (abscess, necrotic tumour), or	Adult patients up to 80 years of age undergoing an elective open surgical procedure involving an enterotomy Patients attending seven Hungarian surgical institutions (3 university clinics and 4 high-volume hospitals) **Total**: randomised 385 **PDS Plus:** randomised n = 188 **PDS II:** randomised n = 197 Patient withdrawals by arm NR 468 patients were suitable for randomisation, but 83 (18.1%) were excluded later. *(Inoperable tumor (45 cases; 54.2%), sepsis in the postoperative period (19 cases; 22.9%), breach of protocol (eight cases; 9.6%), patient request (two cases; 2.4%), and unsuccessful*	Triclosan-coated sutures (PDS Plus)	Uncoated sutures (PDS II)	Primary goals were to determine whether triclosan coated polydiaxanone is able to reduce the number of SSIs after colorectal surgery Secondary goals were to determine whether an SSI increases the length of the hospital stay, whether there are any additional costs, and the chances of late SSI after the patient has been discharged from the hospital

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
				with post-operative findings such as further surgical intervention through the site • Patients experiencing undesirable complications such as sterile surgical site dehiscence and suture breakage during the post-operative period	*bowel preparation (nine cases; 10.8%))*			
Primary: (Diener, Knebel et al, 2014) Secondary: (Diener, Knebel et al, 2014) (Heger, Voss et al, 2011) (Universitäts klinik Heidelberg, 2010) (Diener, Knebel et al, 2014) (Fujita, 2014)	Diener 2014, Germany Other identifiers: PROUD, DRKS00000390	Multicentre, randomised controlled group-sequential superiority trial Patients, surgeons, and the outcome assessors were masked to the suture material used	Adult patients (aged ≥18 years) who underwent elective midline abdominal laparotomy for any reason	Impaired mental state, language problems, and participation in another intervention trial that interfered with the intervention or outcome of this trial	Adult patients undergoing elective midline abdominal laparotomy 24 secondary and tertiary care centres in Germany **PDS Plus:** mITT = 587, PP = 451 607 allocated. 3 excluded, 108 terminated prematurely, 136 excluded from PP population **PDS II:** mITT = 598, PP = 462 617 allocated. 2 excluded, 118 terminated prematurely, 136 excluded from PP population	Triclosan-coated sutures (PDS Plus)	Uncoated sutures (PDS II)	Primary endpoint: the occurrence of superficial or deep surgical site infection (according to the CDControl and Prevention criteria) within 30 days of the operation Secondary endpoints: frequency of wound dehiscence (cutaneous and subcutaneous layer), frequency of burst abdomen (fascial dehiscence), postoperative length of stay in intensive care unit, postoperative length of stay in hospital, 30-day mortality, and quality of life (collected using the EQ-5D questionnaire)
(Ford, Jones et al, 2005)	Ford 2005, USA	Single-centre, open-label, RCT Reported to be open-label, but no specific details provided except for the blinded assessment of the primary endpoint (overall intraoperative	Children aged 1 to 18 years who were scheduled for clean or clean-contaminated surgical procedures	• Contaminated wound sites • Use of retention sutures • Inappropriate age • Evidence of malnutrition or debilitation • Comorbidities that may impair wound healing including AIDS	Paediatric patients scheduled for any general, clean or clean-contaminated surgical procedure NR explicitly but author affiliations suggest one hospital in the USA Total: 151 enrolled and randomised	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcome: the surgeon's assessment of the overall intraoperative handling of the triclosan-coated suture and traditional uncoated suture Secondary outcomes: • Specific intraoperative suture handling measures (ease of passage through tissue,

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
		handling characteristics)		• Incision sites prone to expand, stretch, distend, or require support • Ophthalmic, cardiovascular, or neurologic surgical sites • A need for more than one surgical procedure • Prior participation in this study Allergy to triclosan	**Vicryl Plus**: Observed cases: n=98 (baseline), n=76 (study end) 100* randomised; 2 withdrew prior to treatment; 22* withdrawals/lost to follow-up **Vicryl**: Observed cases: n=49 (baseline), n=38 (study end) 51* randomised; 2 withdrew prior to treatment; 11* withdrawals/lost to follow-up			first-throw knot holding, knot tie-down smoothness, knot security, surgical "hand," memory, and degree of fraying) • Wound healing assessments (healing progress, infection, edema, erythema, skin temperature, seroma, suture sinus, pain)
(Galal and El-Hindawy, 2011)	Galal 2011, Egypt	Multcentre, double-blind RCT Double-blind, with none of the research team (surgeon, nurse, microbiologist) or the patients being aware of the allocated treatment	All patients of any age, sex, and risk factors who were candidates for surgical intervention during the study period	• Patients with an established infection at the surgical site	Candidates for any surgical procedure during the study period Unspecified number of centres in Egypt This article only reported the results from one site, a university hospital **Vicryl Plus**: ITT n=230 230 enrolled; no withdrawals or loss to follow-up **Vicryl**: ITT n=220 220 enrolled; no withdrawals or loss to follow-up	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcomes: Not explicitly reported but focus was on SSI according to modified CDC criteria (1992) at 30 days (or 1 year in case of prosthetic surgery) Secondary outcomes: NR but study assessed postoperative stay, costs and health resources
Primary: (Ichida, Noda et al, 2018) (Department of Surgery Saitama Medical Center Jichi Medical University, 2014)	Ichida 2018, Japan Other identifiers: UMIN000013054	Single-centre, double-blind, randomised controlled group-sequential superiority trial Patients, surgeons, nurses in the surgical wards, and outcome assessors were all blinded to treatment allocation. The sutures were	Patients of any age undergoing gastroenterologic surgery	• Presence of a bacterial infection • Use of antibiotic therapy prior to operation • Presence of a contaminated abdominal cavity due to intestinal fistula or drainage tube • Known allergy to triclosan • Pregnancy From UMIN record:	Patients undergoing gastroenterologic surgery One medical university in Japan **Vicryl Plus**: mITT n=508 512 randomised; 4 did not receive intervention (2 operation cancelled, 2 administrative error); no loss to follow-up or withdrawals **Vicryl**: mITT n=505 511 randomised; 6 did not receive intervention (4 operation cancelled, 2	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary end point: incidence of superficial or deep SSIs according to the CDC criteria Secondary end points: NR

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
		identical in physical properties and were indistinguishable once removed from their packaging and any identification marks.		• Patients undergoing synchronous surgery • Patients excluded by personnel	administrative error); no loss to follow-up or withdrawals			
(Isik, Selimen et al, 2012)	Isik 2012, Turkey	Single-centre, doublie-blind RCT Reported to be double-blind. Patients were assigned the treatment during the operation, when the nurse delivered the suture materials to the operating room	Patients undergoing cardiac surgery at a private hospital	NR	Patients undergoing cardiac surgery One private hospital in Turkey **Vicryl Plus**:ITT n=170; evaluable patients n=170 (sternal site) and n=142 (leg site) 270 randomised; withdrawals/lost to follow-up NR **Vicryl:** ITT n=340; evaluable patients n=340 (sternal site) and n=260 (leg site) 340 patients randomised; withdrawals/lost to follow-up NR	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcome: incidence of sternal and leg wound infections, according to CDC criteria No secondary outcomes reported
Primary: (Justinger, Slotta et al, 2013) Secondary: (University Hospital, 2009)	Justinger 2013, Germany Other identifiers: NCT00998907	Single-centre, double-blind, randomised clinical pathway controlled trial Surgeons, patients, and wound monitors were all blinded to treatment allocation. The sutures were indistinguishable in terms of their physical properties	Patients scheduled to undergo a laparotomy From NCT record: • Age ≥18 years • Surgical pathologies accessed via midline or transverse abdominal incision Primary fascial closure	From NCT record: • Pregnancy • Age <18 years • Open abdominal treatment Known hypersensitivity against PDS/Triclosan	Adult patients undergoing elective laparotomy One hospital in Germany Overall: 1042 patients consented and included, of which 967 operated on per protocol, 111* patients excluded from analysis (12 patients with abdomen not closed, 18 early burst abdomen, 71 revisions, 10 deaths); 856 analysed **PDS Plus**: analysed (treatment completers) n=485 559 operated on per protocol; 485 of the randomised patients were evaluated	Triclosan-coated sutures (PDS Plus)	Uncoated sutures (PDS II)	Primary end point: the number of infections at the laparotomy incision during the hospital stay and 2-week follow-up post-discharge, with SSI defined according to CDC criteria Secondary end points: NR From NCT record: The number of incisional hernias at 6 months and after long-term follow-up (12 and 24 months)

1a Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Study design** *Include details of single / double blind if reported*	**Inclusion criteria**	**Exclusion criteria**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Main outcomes** *Note primary and secondary outcomes*
					PDS II: analysed (treatment completers) n=371 408 operated on per protocol; 371 of the randomised patients were evaluated			
(Karip, Celik et al, 2016)	Karip 2016, Turkey	Single-centre, double-blind RCT Reported to be double-blind. Patients were unaware of the treatments assigned and were not given any inforrmation about the nature of them. Blinding of the operating surgeon was not specified, but another surgeon conducted post-operative examinations unaware of treatment allocation	Patients with pilonidal sinus disease who were scheduled to undergo sinus excision followed by Karydakis flap repair	• Previous pilonidal abscess that required drainage • History of pilonidal surgery • Age<18 and >55 years • Antibiotic allergy • Acute renal or hepatic dysfunction • Prophylactic therapy for infective endocarditis • Surgical site skin lesions (severe inflammation or cellulitis) Immunosuppressive drug use	Adults aged 18 to 55 years who were scheduled for sinus excision followed by Karydakis flap repair for pilonidal sinus disease One training and research hospital in Turkey **Monocryl Plus:** ITT n=54 54 randomised and analysed; no apparent withdrawals/loss to follow up **Monocryl:** ITT n=52 52 randomised; and analysed; no apparent withdrawals/loss to follow up	Triclosan-coated sutures (Monocryl Plus)	Uncoated sutures (Monocryl)	In the revised and approved trial, the primary outcome was infection rates at 1 and 2 weeks after surgery Secondary outcomes: • Incision dehiscence 1 and 2 weeks after surgery Recurrence rates 1, 3 and 6 months after surgery
Primary: (Lin, Chang et al, 2018) Secondary: (Mel Shiuann-Sheng Lee, 2015)	Lin 2018, Taiwan Other identifiers: NCT02533492	Double-blind RCT Patients, clinical staff, operating surgeons, and the independent study nurse who collected perioperative and outcome data, were all blinded to the suture material allocated	• Men and women aged 55 to 85 years • Diagnosis of degenerative osteoarthritis of the knee • No prior surgery to the index knee From NCT record Varus/valgus deformity knee	• Inflammatory arthritis (rheumatoid arthritis, ankylosing spondylitis, infectious arthritis, systemic lupus erythematosus, and psoriatic arthritis) • History of cancer within 5 years before the initial study screening • Osteogenesis imperfecta • Paget's disease	Patients aged 55 to 85 years diagnosed with degenerative osteoarthritis of the knee who were scheduled for unilateral total knee arthroplasty One hospital in Taiwan **Vicryl Plus**: ITT n=51 No withdrawals or losses to follow-up; 51 randomised patients completed study **Vicryl**: ITT n=51 No withdrawals or losses to follow-up; 51 randomised patients completed study	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcome: incidence of SSI within 3 months of surgery. Secondary outcomes included: • Length of hospital stay • Pain level • Functional scores • Wound condition (wound drainage, extent of erythema, local heat, and skin surface temperature) • Inflammatory markers during hospitalisation and within 3 months postoperatively

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
				• Neurovascular disease of the lower extremities • Liver cirrhosis • Aspartate aminotransferase or alanine aminotransferase level ≥2x the maximum normal value at screening • Coagulopathy • Serum creatinine <35 ml/min at screening • Prior haemodialysis for renal failure • History of peripheral arterial occlusive disease or deep vein thrombosis • Preoperative INR >1.5 at screening, • An ASA physical classification score >3 An immunocompromised condition				From NCT record: Duration of antibiotic use
Primary: (Mattavelli, Rebora et al, 2015) Secondary: (University of Milano Bicocca, 2013)	Mattavelli 2015, Italy Other identifiers: NCT01869257	Multicentre, single-blind RCT Patients and outcome assessors were blinded to treatment allocation. Operating surgeons could identifiy the sutures from their packaging	Candidates for elective colorectal resection with a clean-contaminated field From NCT record: Age 18 to 85 years	• Age <18 years • Pregnancy • Emergency operations • Ongoing infections • ASA score ≥3 • Any organ insufficiency • Karnofsky performance status <70 • Intra-operative evidence of gross	Adults aged 18 to 85 years who were candidates for elective colorectal resection Four university referral hospitals in Italy **Vicryl Plus + PDS Plus:** analysed (treatment completers) n=140 150 randomised and received intervention;10 discontinued due to need for re-operation; 0 lost to follow-up	Triclosan-coated sutures (Vicryl Plus + PDS Plus)	Uncoated sutures (Vicryl + PDS II)	Primary outcome: the overall rate of incisional SSI (superficial and deep), defined according to CDC criteria (1999) within 30 days after hospital discharge Secondary outcomes: • Length of hospital stay Overall rate of incisional complications, including skin swelling and redness, hematomas, and seromas

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
				contamination of the surgical field • Denied written consent From NCT record: • Peritonitis • Hypersensitivity to triclosan The need for any patient to undergo re-operation for any reason during the post-operative course resulted in patient dropout from the trial with no replacement	**Vicry + PDS II**: analysed (treatment completers) n=141 150 randomised and received intervention; 9 discontinued due to need for re-operation; 0 lost to follow-up			
(Mingmalairak, Ungbhakorn et al, 2009)	Mingmalairak 2009, Thailand	Single-centre double-blind RCT The surgeons and attending doctor were blind to the type of suture	Patients aged 15-60 years-old, both sexes, with appendicitis diagnosed by intra-operative who operated with right lower quadrant incision. The study included both acute and ruptured appendix.	• Patients with diabetes • Patients who are immunocompromised • HIV • Currently taking and immunosuppressive drug • Malignancy • Missed diagnosis intra-operative • history of allergy to triclosan Pregnancy	Patients aged 15-60 years undergoing surgery for appendicitis (including emergency surgery) One university hospital in Thailand Study is a report of the first 100 patients recruited and treated **Vicryl Plus**: ITT n = 50 **Vicryl:ITT n = 50** No patients in either arm were excluded following randomisation or lost to follow up after surgery	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcome: To assess reduction of surgical site infection following appendectomy operations. Secondary outcome: To analyse the safety and physical properties of Vicryl plus
Primary: (Nakamura, Kashimura et al, 2013) Secondary: (Teine Keijinkai Hospital, 2010)	Nakamura 2013, Japan Other identifiers: UMIN00003322	Single-centre single-blind RCT Patients and the physicians who assessed the wound infections were blinded to the treatment assignment None of the surgeons	Patients of any age who were undergoing elective colorectal operations From UMIN record: Patients presenting with indication for operation	Absence of informed consent From UMIN record: Patients who need second look operation following treatment in the intensive care unit Appendicitis and upper gastrointestinal	Patients who were undergoing elective colorectal surgery One hospital in Japan **Vicryl Plus**: ITT n=206 206 randomised and received allocated intervention; 0 lost to follow-up, discontinued intervention, or excluded from analysis	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcome: number of wound infections, according to CDC guidelines (1999) Secondary outcome: additional cost of care for infected wound management From UMIN record: postoperative length of stay and their cost

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
		were blinded to the suture used.		perforation were noted under the heading 'Condition'	**Vicryl:** ITT n=204 204 randomised and received allocated intervention; 0 lost to follow-up, discontinued intervention, or excluded from analysis			
(Olmez, Berkesoglu et al, 2019)	Olmez 2019, Turkey	RCT; unclear whether double or single blind Patient follow-up and control tests were done by a blinded researcher	Patients who were 18 years old or older and underwent elective or urgent GI surgery for any reason	• Triclosan allergy • Need for re-laparotomy in the first week after surgery • Patients who were left with an open abdomen • Patients with an American Socieity of Anesthesiologists score IV Refusal of randomisation	Patients 18 years + undergoing any GI surgery Unclear whether single or multiple site, in Turkey Total: 890 enrolled **PDS Plus:** ITT n = 445 **PDS II:** ITT n = 445 All patients were analysed	Triclosan-coated sutures (PDS Plus)	Uncoated sutures (PDS II)	Primary and secondary outcomes not explicitly specified Study aimed to compare PDS and PDS Plus for incidence of SSI following GI surgery
(Rasic, Schwarz et al, 2011)	Rasic 2011, Croatia	Single-centre RCT Unclear whether patients and personnel were blinded to suture assignment Sealed and numbered opaque envelopes containing suture packets were prepared	Patients scheduled for elective surgery for colorectal cancer during a 12-month period	NR	Patients undergoing elective surgery for colorectal cancer between September 2008 and September 2009 One university hospital in Croatia **Vicryl Plus**: analysed NR 91 randomised; study discontinuations NR **Vicryl**: analysed NR 93 randomised; study discontinuations NR	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary and secondary outcomes not explicitly specified. Parameters recorded were: • Duration of operation • Duration of hospitalisation • Biochemical inflammatory markers • Wound complications: wound infection, dehiscence, haematoma or inflammatory reactions to the skin sutures (skin inflammation around the suture) • Postoperative hernias • Readmissions Reoperations
Primary: (Renko, Paalanne et al, 2017)	Renko 2017, Finland Other identifiers: NCT01220700	Single-centre, double-blind RCT With the exception of the two nurses	Children aged <18 years in the paediatric surgery and orthopaedics ward awaiting any	Patients coming from neonatal or paediatric intensive care units or the paediatric oncological ward	Children in the paediatric surgery and orthopaedics ward awaiting daytime elective or emergency surgery for any reason	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus, or PDS Plus)	Uncoated sutures (Vicryl, Monocryl, or PDS)	Primary outcome: the occurrence of a superficial or deep SSI, according to CDC criteria, within 30 days after the operation

1a Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Study design** *Include details of single / double blind if reported*	**Inclusion criteria**	**Exclusion criteria**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Main outcomes** *Note primary and secondary outcomes*
Secondary: (University of Oulu, 2010)		who masked the suture packages, the patients, their parents, and all study personnel were unaware of the treatment assignments	elective or emergency surgery scheduled for a daytime paediatric operation room and with anticipated use of absorbing sutures Written informed consent from parent or caregiver, or child (if aged 7-17 years and could read, write, and understand the trial protocol)	From TRR record: wound infection as a cause for surgery After 6 months, decision made to exclude: • Children having corrections of the foreskin; • Children undergoing procedures because of cleft lip or palate; Patients who were recruited before these decisions were made were excluded from the analyses	One university hospital in Finland **Triclosan-coated (Plus) sutures:** modified ITT n=778, PP n=636 Of 814 randomized, 802 had an operation; 166* excluded (1 death, 19 inclusion error, 4 lost to follow-up, 124 did not receive study suture material, 15 follow-up only up to 10 days, 3 other protocol violation) **Control (non-coated) sutures**: modified ITT n=779, PP n=651 Of 819 randomized, 813 had an operation; 162* excluded (27 inclusion error, 7 lost to follow-up, 107 did not receive study suture material; 18 follow-up only up to 10 days, 3 other protocol violation)			Secondary outcomes: NR
(Rozzelle, Leonardo et al, 2008)	Rozzelle 2008, USA	Single-centre double-blind RCT	Patients of all ages requiring CSF shunt implantation or revision surgery	Patients receiving ventricular access devices or ventriculo-subgaleal shunts, patients with active shunt infections, and immunocompromised patients were excluded	Patients of all ages requiring CSF shunt implantation or revision surgery One hospital in New York state, USA 84 shunt procedures were performed in 61 patients. Procedure types consisted of 40 implants and 44 revisions. Patients receiving new shunts following successful treatment of a shunt infection and patients undergoing revision more than 6 months after randomization were rerandomized	Vicryl Plus	Vicryl	Primary outcome: incidence of shunt infection within 6 months of CSF shunt placement surgery Secondary outcomes: Additional data were recorded prospectively pertaining to demographics, procedure type/time, and patient factors believed to influence infection risk

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
					N procedures analysed: **Vicryl Plus:** 46 **Vicryl:** 38			
Primary: (Ruiz-Tovar, Llavero et al, 2020) Secondary: (Hospital General Universitario Elche, 2018)	Ruiz-Tovar 2020, Spain Other identifiers: NCT03763279	Multicentre, randomised clinical trial Double-blind trial in terms of patients and outcome assessors (nurses and non-operating surgeon) masked to treatment assignment The surgeon knew the treatment assignment before initiating the surgery but was masked to treatment prior to that point All wounds were checked daily during hospital stay by an epidemiology nurse, blinded to group allocation and 30 days after operation Presence of evisceration was determined by a surgeon on the team, blinded to group allocation	Patients undergoing emergency surgery by laparotomy and midline approach, for community-acquired infection, peritoneal contamination secondary to perforation of the digestive tract, and ischemia of a segment of digestive tract requiring resection From NCT record: • Adults aged ≥18 years • Contaminated and dirty surgery • Included the following diagnosis: anastomotic leak of previous digestive surgery, colonic or bowel perforations, appendicitis, perforation of gastric or duodenal ulcer, intestinal ischemia	Patients with immune deficiencies or intake of immunodepressive drugs and nosocomial infection From NCT record: • Emergency surgery undergoing laparoscopic approach • Appendicitis operated by McBurney incision • Intestinal ischemia without requiring bowel resection	Adult patients undergoing emergency surgery by laparotomy and midline approach Spanish hospitals **Stratafix Symmetric**: PP =47 50 randomised; 0 lost to follow-up and study discontinuation; 3 excluded from analysis (2 re-operation, 1 mortality) **PDS Plus Loop:** PP = 45 50 randomized; 0 lost to follow-up and study discontinuation; 5 excluded from analysis (3 re-operation, 2 mortality) **PDS Loop**: PP = 47 50 randomised; 0 lost to follow-up and study discontinuation; 3 excluded from analysis (2 re-operation, 1 mortality) Patients with post-enrolment events, such as reoperation, deceased, or lost to follow-up during the first 30 days postoperatively, and patients planned for a second-look surgery were excluded from the final analysis	Triclosan-coated barbed suture (Stratafix Symmetric PDS Plus) Triclosan-coated non-barbed suture (PDS Plus Loop)	Uncoated sutures (PDS Loop)	Primary endpoints: rates of incisional SSI and evisceration during follow up period of 30 days (evaluated according to the CDC definitons of SSI) Secondary endpoints: postoperative pain and analytical acute phase reactants (48 hours after operation), and identification of micro-organisms present any incisional SSIs when present
(Ruiz-Tovar, Alonso et al, 2015)	Ruiz-Tovar, 2015, Spain	Multicentre, randomised clinical trial Those who made the diagnosis were not blinded to the	Inclusion criteria were intra-operative diagnosis of fecal peritonitis secondary to acute diverticulitis perforation, neoplastic tumor	Post-operative mortality	Patients undergoing abdominal wall closure after presenting with fecal peritonitis Two hospitals in Spain Total randomised: 110	Triclosan coated sutures (brand NR)	Uncoated sutures (brand NR)	Primary and secondary endpoints not explicitly reported but the aim of the study was to assess the effect of triclosan coated sutures on the incidence of SSI in dirty surgery

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
		treatment, but were blinded to the selection of the patient from the sequentially numbered container. Epidemiology nurse who evaluated the outcome of the surgical incision was the only person blinded to the allocated treatment	perforation, or colorectal anastomotic leak of previous elective colorectal resection.		9 patients died before an assessment of SSI could be made **Triclosan coated sutures:** n analysed = 50 **Uncoated sutures:** n analysed = 51			
(Santos, Santos et al, 2019)	Santos 2019, Brazil	Single-centre double-blind RCT Randomisation remained blinded to all participants in the surgical procedure, as well as to all those who were involved in its follow-up, except for the professionals responsible for randomisation and masking	Patients who underwent consecutively, prospectively, and exclusively on-pump and off-pump CABG, of both genders, and aged >30 years met the inclusion criteria for the study	• Patients undergoing CABG associated with other cardiac surgeries (valvar surgeries, ventricular aneurysms, acquired ventricular septal defects, congenital heart diseases) • Patients undergoing vascular surgeries other than CABG • Bilateral saphenectomized patients • Pregnant women • Patients under antibiotic therapy for previous infectious disease up to a month before • Immunosuppressed patients (acquired immune	Patients aged over 30 years undergoing saphenectomy during coronary artery bypass graft (CABG), with and without cardiopulmonary bypass (CPB) One teaching hospital in Brazil **Vicryl Plus**: Analysed (completers) n=251 289 allocated. 26 did not show up to at least two follow up appointments, and 12 died **Vicryl:** Analysed (completers) n=257 294 allocated. 26 did not show up to at least two follow up appointments, and 11 died	Triclosan-coated sutures (Vicryl plus)	Uncoated sutures (Vicryl)	Primary and secondary outcomes not explicitly specified The study measured the SSI rate (definition NR) wound pain,and wound hyperthermia

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
				deficiency syndrome, neoplasia, and or use of corticosteroids > 0.5 mg/kg/day) • Patients requiring simultaneous carotid artery surgery • Patients with severe peripheral vascular disease, history of venous disease of the deep system and superficial thrombophlebitis of the great saphenous vein Patients with psychiatric disorder				
(Seim, Tonnessen et al, 2012)	Seim 2012, Norway	Single-centre randomised trial All surgeons were aware of the suture material used. Blinding of the patients and outcomes assessors was not reported	Patients undergoing elective coronary artery bypass grafting	Patients with leg wounds, bilateral vein harvesting, harvesting of the short saphenous vein, varicose veins and those undergoing emergency coronary artery bypass grafting	Patients undergoing elective coronary artery bypass grafting One hospital in Norway **Vicryl Plus**: analysed (treatment completers) n=160 164 randomised; 4 lost to follow-up **Vicryl**: analysed (treatment completers) n=163 164 randomised; 1 lost to follow-up	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary and secondary outcomes not explicitly specified. The study examined the incidence of leg wound infections, and predictors of infection related to patient- and operative characteristics
(Soomro, Khurshaidi et al, 2017)	Soomro 2017, Pakistan	Single-centre randomised controlled trial The principal investigator was blinded to suture allocation Surgery "was performed by 3rd and 4th year	Patients undergoing minor clean surgery for benign breast pathologies (e.g., fibroadenoma), aged between 20 to 35 years	Inflammatory and malignant breast diseases; Known allergy or intolerance to triclosan; Known chronic immune deficiency (e.g., diabetes, prolonged steroid use, AIDS); Previous scar at operative site	Patients undergoing minor clean surgery for benign breast pathologies, aged 20-35 years One hospital in Karachi (Liaquat National Hospital) **Triclosan coated sutures:** ITT 189	Triclosan-coated sutures (brand NR)	Uncoated sutures (brand NR)	Primary and secondary outcomes not explicitly specified The purpose of the study was to compare the frequency of infection in simple polyglactin versus triclosan coated suture material in benign breast surgeries

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
		residents to avoid surgeon bias"			**Plain sutures:** ITT 189 Loss to follow up: NR			
Primary: (Sprowson, Jensen et al, 2018) Secondary: (Sprowson, Jensen et al, 2014)	Sprowson 2018, UK Other identifiers: ISRCTN17807356	Multi-centre, double-blind quasi-RCT The patients, research team, statistician, clinical staff and outcome assessors were all blinded to the treatment allocated. The participating surgeons were aware of the treatment allocation. "Associates" were also blinded, although it is unclear what their role was.	• Age >18 years, of either gender • Medically fit for an operation • Suitable for total hip arthroplasty or total knee arthroplasty, to be conducted by an orthopaedic consultant working at the Trust • Willing to give informed consent Negative MRSA swab prior to surgery	• Revision arthroplasty • Unable to consent • Unicondylar or patellofemoral knee replacement Patients under 18 years	Adults over 18 years undergoing elective, primary total hip arthroplasty or total knee arthroplasty Three hospitals in the UK **Vicryl Plus:** mITT n=1164 1223 randomised and received allocated intervention; 63 lost to follow-up, 2 deaths within 6 weeks **Vicryl:** mITT n=1273 1323 randomised and received allocated intervention; 58 lost to follow-up, 1 death within 6 weeks Paper states that ITT analysis was conducted but patients who died or were lost to follow-up do not appear to have been included in the analyses.	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcome: superficial SSI based on Health Protection Agency definitions (which originated from CDC 1992 criteria) at 30 days' post-operative follow-up Secondary outcomes: • Deep incisional infection at 30 days (no implant) or 12 months (implant in place) postoperatively • 30- and 90-day mortality • Length of hospital stay • Clostridium difficile infections • Complications recorded during the course of the trial • Critical care admission • Specific postoperative complications (deep vein thrombosis and pulmonary embolism at 60 days; stroke, transient ischaemic attack, gastrointestinal bleed, urinary retention, urinary tract infection, myocardial infarction, and pneumonia, all at 30 days) • Readmission From ISRCTN record: • Surgeon grade-consultant orthopaedic surgeon, Specialist trainee or core training doctor Cost analysis
Primary: (Sukeik,	Sukeik 2019, UK Other identifiers:	Single-centre. double-blind RCT	Adult patients (≥ 18 years old) who were undergoing primary	Unilateral primary total hip or knee	Adult patients undergoing primary total hip or knee arthroplasties	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary outcome: ASEPSIS wound scoring system to evaluate wound healing for

1a Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Study design** *Include details of single / double blind if reported*	**Inclusion criteria**	**Exclusion criteria**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Main outcomes** *Note primary and secondary outcomes*
George et al, 2019) Secondary: (University College London, 2013)	ISRCTN 21430045	Double-blind study where patients, surgeons and outcome assessors all blinded to treatment allocation. The sutures were indistinguishable after removal of the package labelling. Use of sealed envelopes for cases and controls with assignment of letters and codes.	total hip or knee arthroplasty under the care of one surgical team at the institute (Department of Trauma and Orthopaedics, University College London Hospital)	arthroplasty performed for trauma Revision procedure or a previous incision in the operative field History of tendency for keloid formation Allergy to triclosan or Vicryl Bleeding tendency (e.g., haemophilia and platelet disorders), or being on regular anticoagulation treatment (e.g., warfarin, treatment dose of low molecular weight heparin or conventional heparin) Underlying malignancy and immunocompromised status Dementia and mental illnesses preventing informed consent Children (age <18 years)	One university hospital in the UK **Vicryl Plus**: ITT n=81 81randomized; 6 did not attend 6-week follow-up **Vicryl:** ITT n=69 69 randomized; 5 did not attend 6-week follow-up Trial terminated early due to end of contract with Ethicon and hence the sutures were no longer available (planned inclusion of 420 participants; inclusion of 150)			the first 6 weeks post-operatively. Secondary outcomes: • Time for wound closure (minutes) • Length of operation (minutes) • Length of hospital stay in days • Pain assessment (VAS scores) at 1, 3 and 5 days post-operatively • Post-operative complications
Primary: (Sundaram K, Warren J et al, 2020a) Secondary: (The Cleveland Clinic, 2017)	Sundaram 2020a, USA Other identfiiers: NCT03285529	Single-centre, single-blind RCT Single-blind. A random envelope, which dictated the suture to be used, was drawn at the start of each arthroplasty Research personnel revealed the treatment assigned to the participating surgeon, but patients remained unaware.	All patients undergoing a primary total knee arthroplasty From NCT record: • Males and female aged 18 to 80 years at time of providing informed consent • Able to understand and voluntarily sign an informed consent form prior to any study-related	• Patients aged <18 or >80 years • BMI ≥45 kg/m^2 • Involvement in a concurrent interventional study From NCT record: • BMI ≥40 kg/m^2 • History of known bleeding disorder • History of medical co-morbidity that may result in poor wound healing (i.e. diabetes mellitus,	Adult patients aged 18 to 18 years who were undergoing a primary total knee arthroplasty for end-stage osteoarthritis One hospital in the USA **Stratafix Symmetric PDS Plus**: ITT n=30 30 randomised and received allocated intervention; no withdrawals or loss to follow-up **Vicryl**: ITT n=30 30 randomised and received allocated intervention; no withdrawals or loss to follow-up	Triclosan-coated barbed sutures (Stratafix Symmetric PDS Plus)	Uncoated sutures (Vicryl)	Primary and secondary outcomes were not explicitly reported. Study focused on duration of arthrotomy closure, the rate of suture utilisation, wound complications, readmission and reoperation From NCT record: Primary outcome was time to complete skin closure per protocol and operative time • Secondary outcome was the number of participants with wound complications (superficial wound infection, deep wound

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
		Independent research personnel conducted a blinded outcome assessment	assessments or procedures • Able to adhere to the study visit schedule and other protocol requirements • Fluent in local language (can speak and understand) • If female, is non-pregnant (negative pregnancy test results at baseline and randomisation visit) and non-lactating • End-stage osteoarthritis patients planning to undergo primary total knee arthroplasty BMI <40 kg/m2	peripheral vascular disease) • Imprisoned patients • Mentally unable to sign informed consent Uncontrolled illness that the investigator considers is likely to cause patient withdrawal from the trial or would otherwise interfere with interpreting the study results				infection, periprosthetic joint infection, wound hematoma, and wound dehiscence); costs
Primary: (Sundaram, Piuzzi et al, 2020b) Secondary: (The Cleveland Clinic, 2017)	Sundaram 2020b, USA Other identfiiers: NCT03285555	Single-centre, single-blind RCT Single-blind. Patients and outcome assessors were blinded to the treatment allocated. A random envelope, which dictated the suture to be used, was drawn at the start of each operation thus blinding the	• Patients undergoing primary total hip arthroplasty for osteoarthritis From NCT record: • Males and female aged between 18 to 80 years at time of providing informed consent • Able to understand and	• Patients aged <18 or >80 years • BMI ≥45 kg/m^2 • Involvement in a concurrent interventional study From NCT record: • BMI ≥40 kg/m^2 • History of known bleeding disorder • History of medical co-morbidity that may result in poor wound	Adult patients aged 18 to 18 years who were undergoing primary total hip arthroplasty for end-stage osteoarthritis One hospital in the USA **Stratafix Symmetric PDS Plus**: ITT n=30 30 randomised and received allocated intervention; no withdrawals or loss to follow-up **Vicryl**: ITT n=30 30 randomised and received allocated intervention; no	Triclosan-coated barbed sutures (Stratafix Symmetric PDS Plus)	Uncoated sutures (Vicryl)	Primary and secondary outcomes were not explicitly reported. Study focused on arthrotomy closure duration, wound complications, readmission and reoperation From NCT record: Primary outcome was time to complete skin closure per protocol and operative time Secondary outcome was the number of participants with wound complications (superficial wound infection, deep wound infection, periprosthetic joint infection,

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
		patients to the suture type used	voluntarily sign an informed consent form prior to any study-related assessments or procedures • Able to adhere to the study visit schedule and other protocol requirements • Fluent in local language (can speak and understand) • If female, is non-pregnant (negative pregnancy test results at baseline and randomisation visit) and non-lactating • End-stage osteoarthritis patients planning to undergo primary total hip arthroplasty BMI 40 kg/m^2	healing (i.e., diabetes mellitus, peripheral vascular disease) • Imprisoned patients • Mentally unable to sign informed consent • Uncontrolled illness that the investigator considers is likely to cause patient withdrawal from the trial or would otherwise interfere with interpreting the study results	withdrawals or loss to follow-up			wound hematoma, and wound dehiscence); costs
Primary: (Tabrizi, Mohajerani et al, 2019) Secondary: (Shiraz University of Medical Sciences, 2018)	Tabrizi 2019, Iran Other identifiers: NCT03659344	Single-blind, randomised clinical trial conducted across two sites in Iran Patients were blinded to the type of suture used	Patients undergoing dental surgery who received three implants in the posterior mandible	Patients were excluded if they had diabetes or were smokers, or had poor oral hygiene. Patients who needed hard and soft tissue augmentation were also excluded. If the patient required bone augmentation due to exposed threads during insertion, they	Patients undergoing dental surgery who received three implants in the posterior mandible One university hospital in Tehran and one private medical clinic in Isfahan **Vicryl Plus**: 160 **Vicryl:** 160	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	Primary and secondary outcomes not explicitly specified. The aim of this study was to compare the incidence of surgical site infection following the use of Vicryl and Vicryl Plus Sutures in dental implant surgeries.

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
				were excluded from the study	No loss to follow-up or withdrawals are reported			
Primary: (Thimour-Bergstrom, Roman-Emanuel et al, 2013) and (Steingrimsson, Thimour-Bergstrom et al, 2015) Secondary: (Turtiainen and Hakala, 2014) (Jeppsson, Thimour-Bergstrom et al, 2014) (Sahlgrenska University Hospital, 2010)	Thimour-Bergström 2013, Sweden Other identfiers: NCT01212315	Single-centre, double-blind RCT Surgeon, patients and outcome assessors were unaware of treatment assignment. Research nurses who were not involved in the patients' follow-up revealed the assigned treatment, and delivered the assigned package to the operation room, where sutures were removed from their packages, and placed in the operating room without any identification marks prior to the surgeon' arrival. Both the coated and non-coated sutures looked identical NCT record also states masking of care provider and investigator	Patients with scheduled coronary artery bypass graft (CABG), CABG + aortic valve replacement (AVR) or CABG + mitral valve repair or replacement at Sahlgrenska University Hospital with intended use of a saphenous vein graft From NCT record: age 18 to 85 years eligible for study	On-going sepsis or septicaemia, on-going bacterial infections or antibiotic treatment, participation in other clinical studies, other severe disease that might influence wound healing, emergency surgery, known allergy to triclosan,	Adult patients undergoing elective saphenous vein harvesting and sternotomy during cardiac surgery One university hospital in Sweden **Open vein harvesting:** **Vicryl Plus + Monocryl Plus:** analysed ('as-treated') n=184 Randomised 193; received allocated treatment 187; loss to follow-up 3 (1 death, 2 declined follow-up) **Vicryl + Monocryl**: analysed ('as-treated') n=190 Randomised 199; received allocated treatment 192; loss to follow-up 2 (1 death, 1 declined follow-up) **Sternotomy:** **Vicryl Plus + Monocryl Plus:** analysed ('as-treated') n=179 Randomised 193; received allocated treatment 191; loss to follow-up 12 (9 re-operations, 1 death, 2 not possible to reach) **Vicryl + Monocryl**: analysed ('as-treated') n=178 Randomised 200; received allocated treatment 195; loss to follow-up 17 (13 re-operations, deaths, 2 not possible to reach)	Triclosan-coated sutures (Vicryl Plus and Monocryl Plus)	Uncoated sutures (Vicryl and Monocryl)	**Open vein harvesting:** Primary endpoint: SSI in the vein-harvesting leg, according to CDC definition (1992), within 60 days after surgery Secondary endpoints: • Culture-proven SSI according to CDC definition, within 60 days after surgery • Antibiotic-treated SSI according to CDC definition within 60 days after surgery • ASEPSIS score at Days 30 and 60 postoperatively • Non-infectious leg-wound dehiscence within 60 days after surgery **Secondary analysis of sternotomy outcomes:** Primary endpoint: any sternal wound infection (either superficial or deep) as defined by the CDC within 60 days after the primary operation. Other outcomes measured: • Deep and superficial sternal wound infection according to the CDC's definition within 60 days after surgery • Antibiotic-treated sternal SSI • Culture-proven sternal SSI • ASEPSIS score at days 4, 30 and 60 postoperatively

1a Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Study design** *Include details of single / double blind if reported*	**Inclusion criteria**	**Exclusion criteria**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Main outcomes** *Note primary and secondary outcomes*
(Turtiainen, Saimanen et al, 2012)	Turtiainen 2012, Finland	Prospective, randomised, multicentre, double-blinded trial in five hospitals in Finland Only the nurses in the operating theatre knew to which group each patient had been randomised. Neither the vascular surgeons, the nurses in the surgical ward, nor the patients knew to which group a patient had been randomised.	The study group comprised adult patients who underwent non-emergency lower-limb arterial surgery.	The exclusion criterion was the patient's refusal to participate. Aortoiliac procedures were not included in the study	Three tertiary referral hospitals and two secondary referral hospitals in Finland **Vicryl Plus and Monocryl Plus:** 139 6 patients died but all were included in the final analysis. 0 lost to follow up. **Vicryl and Monocryl:** 137 4 patients died but all were included in the final analysis. 0 lost to follow up.	Triclosan-coated sutures (Vicryl Plus and Monocryl Plus)	Uncoated sutures (Vicryl and Monocryl)	Primary outcome: Occurrence of surgical wound infection No secondary outcomes reported
(Williams, Sweetland et al, 2011)	Williams 2011, UK	Single-centre double-blind RCT The surgeon, patient, and the assessor at follow-up were blinded to which type of suture had been used	Female patients older than 18 years undergoing skin closure after breast cancer surgery	• Inflammatory breast cancer or skin ulceration • Neo-adjuvant chemotherapy or radiotherapy • Surgery for benign or reconstructive reasons • Known immune deficiency or allergy to triclosan • Inability to give consent or suspicion that the patient was unlikely to comply with follow-up	Adult women undergoing skin closure after breast cancer surgery One hospital in UK **Vicryl Plus or Monocryl Plus:** n = 75; analysed n = 66 at 6 weeks' follow up 75 randomised; 9 withdrawn from study by 6 weeks. Patient request = 2; lost to follow up = 1; need for further surgery = 6 **Vicryl or Monocryl: ITT** n = 75; analysed n = 61 at 6 weeks' follow up 75 randomised; 14 withdrawn from study by 6 weeks. Patient request = 1; lost to follow up = 3; need for further surgery = 10	Triclosan-coated sutures (Vicyl Plus or Monocryl Plus)	Uncoated sutures (Vicryl or Monocryl)	Primary and secondary outcomes not explicitly specified The study measured the SSI rate, based on CDC definitions, as well as ASEPSIS and Southampton wound scores
Primary: (Zhang,	Zhang 2011, China	Post-market, multi-centre,	• Women aged ≥18 years	• Surgery for modified radical mastectomy with	Women aged ≥18 years undergoing modified radical mastectomy for breast cancer	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Chinese silk)	Primary outcome: Cosmetic outcome, by VAS scoring of

1a Data source *Endnote live link – to be added later*	Author, year and location (country)	Study design *Include details of single / double blind if reported*	Inclusion criteria	Exclusion criteria	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Main outcomes *Note primary and secondary outcomes*
Zhang et al, 2011) Secondary: (Ethicon Inc., 2008)	Other identifiers: NCT00768222	randomised, open-label pilot study Open-label. Treatment assignment was revealed to the patients and surgeon at the time of wound closure. Blinded assessment of primary outcome by a central assessor, and non-blinded assessment of secondary outcomes	• Scheduled for clean modified radical mastectomy • Signed hospital approved informed consent • Class I (Clean) surgical wound (CDC SSI Surgical Wound Classification)	immediate breast reconstruction, cosmetic breast operations reduction, expansion, insertion of a prosthesis, duct ectasia, or infective breast disease or implant • Class II, III, or IV surgical wounds (CDC SSI Surgical Wound Classification) • Inflammatory cancers or skin ulceration • Known allergy or intolerance to triclosan • Anticipated compromised wound healing or chronic immune deficiency (e.g., diabetes, prolonged steroid use, AIDS or substance abuse) • Serious heart and/or lung disease • Skin scar history or family history • Receipt of an experimental drug or use of an experimental medical device within 30 days prior to the planned start of treatment • Employees of the investigator or	6 hospitals in China **Vicryl Plus**: ITT n=51, PP n=46 51 randomised and received allocated intervention; 5 excluded from analysis (1 lost to follow-up, 1 discontinued intervention, 1 consent withdrawal, 2 protocol violations) **Chinese silk**: ITT n=50, PP n=43 51 randomised and received allocated intervention; 7 excluded from analysis (1 lost to follow-up, 0 discontinued intervention, 3consent withdrawals, 3 protocol violations)			blinded surgical site wound photographs at 30 days Secondary outcomes: • Photograph score of cosmetic outcome at day 12 • Modified Hollander Cosmetic Scale score at days 12 and 30, as assessed by non-blinded nvestigator • Incidence of SSIs, based on ASEPSIS wound scores and CDC criteria From NCT record: • Mean SSI score on modified ASEPSIS scale at days 3, 5, 7, 12, 30, 90

1a Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Study design** *Include details of single / double blind if reported*	**Inclusion criteria**	**Exclusion criteria**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Main outcomes** *Note primary and secondary outcomes*
				study centre with direct involvement in the proposed study or other studies under the direction of that investigator or study centre • In the investigator's opinion, unlikely to comply with or complete the 90-day follow up visit				

Table 1b Summary study characteristics

An asterisk (*) denotes a reviewer calculated value

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
(Arslan, Atasoy et al, 2018)	Arslan 2018, Turkey	Unspecified number of hospital surgical department	Triclosan-coated sutures (PDS Plus + Vicryl Plus) (Wound closure following cyst excision: 1/0 PDS Plus for retention, 3/0 Vicryl Plus for subcutaneous tissue, and 3/0 PDS Plus for skin closure)	Uncoated sutures (Prolene + Vicryl) (Wound closure following cyst excision: 1/0 Prolene for retention, 3/0 Vicryl for subcutaneous tissue, and 3/0 Prolene for skin closure)	Total: 177 **PDS Plus + Vicryl Plus**: 92 (86 analysed) **Prolene + Vicryl**: 95 (91 analysed)	Wide excision and primary closure for pilonidal disease	NR	CDC guidelines (2017)	30 days post-surgery
Primary: (Baracs, Huszar et al, 2011) Secondary: (University of Pecs, 2010)	Barac 2011, Hungary	7 Hungarian surgical centres (3 university clinics and 4 high-volume hospitals)	Triclosan-coated sutures (PDS Plus) (Abdominal fascia closure using triclosan-coated PDS Plus Sutures Optional separate peritoneal closure and subcutaneous 2-0 sutures, depending on surgeon preference)	Uncoated sutures (PDS II) (Abdominal fascia closure using uncoated PDS II sutures Optional separate peritoneal closure and subcutaneous 2-0 sutures, depending on surgeon preference)	Total: 385 **PDS Plus:** 188 **PDS II:** 197	Open colorectal surgery involving an enterotomy	NR but authors considered open and rectal procedures to be classified as clean-contaminated.	NR	One year
Primary: (Diener, Knebel et al, 2014) Secondary: (Diener, Knebel et al, 2014) (Heger, Voss et al, 2011) (Universitäts klinik Heidelberg, 2010)	Diener 2014, Germany	Surgical departments of 24 secondary and tertiary care centres	Triclosan-coated sutures (PDS Plus) (Abdominal fascia closure after midline laparotomy using triclosan-coated PDS Plus PDP9262T sutures (needle: CTX 48 mm 1/2 circle))	Uncoated sutures (PDS II) (Abdominal fascia closure using non-coated PDS II Z1950G sutures (needle: CTX 48 mm 1/2 circle))	Total: 1224 **PDS Plus:** 607 **PDS II:** 617	Abdominal laparotomy	**PDS Plus:** clean 144 (24.5%); clean-contaminated 430 (73.3%); contaminated 11 (1.9%); dirty 2 (0.3%) **PDS II:** clean 138 (23.1%); clean-contaminated 450 (75.3%); contaminated 9 (1.5%); dirty 1 (0.2%)	Modified version of CDC 1992 criteria	30 days post-surgery

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
(Diener, Knebel et al, 2014) (Fujita, 2014)									
(Ford, Jones et al, 2005)	Ford 2005, USA	NR explicitly but authors' affiliations suggest one hospital paediatric surgical department	Triclosan-coated sutures (Vicryl Plus) (No surgical details relating to skin/tissue closure)	Uncoated sutures (Vicryl) (No surgical details relating to skin/tissue closure)	Total: 151 **Vicryl Plus**: 100* **Vicryl**: 51*	General surgical procedures (no further details)	NR but study inclusion criteria stipulated clean or clean-contaminated surgical procedures	Other: observed redness >3–5mm from the wound margins, edema, purulent discharge, pain, and increased skin temperature were considered evidence of an infection; a confirmatory culture was not required	80 (±5) days post-surgery
(Galal and El-Hindawy, 2011)	Galal 2011, Egypt	Unspecified number of centres This article reported the results from one university hospital surgical department	Triclosan-coated sutures (Vicryl Plus) (Vicryl Plus sutures used in all steps, except for laparotomy closure and vascular structure)	Uncoated sutures (Vicryl) (Vicryl Plus sutures used in all steps, except for laparotomy closure and vascular structure)	Total: 450 **Vicryl Plus**: 230 **Vicryl**: 220	Any type of surgery **Vicryl Plus**: Vascular: 50 (21.7%*) Plastic surgery: 40 (17.4%) Gastrointestinal tract: 38 (16.5%*) Biopsy 32 (13.9%*) Hernia: 30 (13.0%*) Thyroidectomy: 9 (3.9%*) Mastectomy: 10 (4.3%*) Lipoma: 7 (3.0%*) General surgical procedures: 4 (1.7%*) Exploration: 3 (1.3%*) Amputation: 3 (1.3%*) Hand surgery: 1 (0.4%*)	Traditional wound classification **Vicryl Plus**: Clean: 117 (50.9%*) Clean-contaminated: 71 (30.9%*) Contaminated: 35 (15.2%*) Infected/dirty: 0 (0) **Vicryl**: Clean: 119 (54.1%*) Clean-contaminated: 72 (32.7%*) Contaminated: 36 (16.4%*) Infected/dirty: 0 (0)	Modified CDC (1992) criteria	30 days post-discharge (1 year for prosthetic surgery)

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
						Shoulder tumour: 1 (0.4%*) Knee tumour: 1 (0.4%*) Orchiectomy: 1 (0.4%*) **Vicryl**: Vascular: 36 (16.4%*) Plastic surgery: 42 (19.1%*) Gastrointestinal tract: 27 (12.3%*) Biopsy 32 (14.5%*) Hernia: 33 (15.0%*) Thyroidectomy: 21 (9.5%*) Mastectomy: 5 (2.3%*) Lipoma: 6 (2.7%*) General surgical procedures: 7 (3.2%*) Exploration: 6 (2.7%*) Amputation: 2 (0.9%*) Hand surgery: 3 (1.4%*) Shoulder tumour: 0 (0) Knee tumour: 0 (0) Orchiectomy: 0 (0)			
Primary: (Ichida, Noda et al, 2018) (Department of Surgery Saitama Medical Center Jichi Medical	Ichida 2018, Japan	One surgical department in a medical university	Triclosan-coated sutures (Vicryl Plus) (Closure of abdominal fascia and peritoneum using Vicryl Plus sutures)	Uncoated sutures (Vicryl) (Closure of abdominal fascia and peritoneum using Vicryl sutures)	Total: 1023 **Vicryl Plus**: 512 (analysed: 508) **Vicryl**: 511 (analysed: 505)	Gastroenterologic surgery Target organ for operation: **Vicryl Plus:** Upper GI: 149 (29.3%) Hepato-biliary-pancreatic: 84 (16.5%)	**Vicryl Plus**: Clean: 6 (1.2%) Clean-contaminated: 495 (97.4%) Contaminated/Dirty: 7 (1.4%) **Vicryl**: Clean: 3 (0.6%) Clean-contaminated: 495 (98.0%)	CDC criteria	Up to 30 days post-discharge

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
University, 2014)						Small bowel: 17 (3.4%) Colorectal: 247 (48.6%) Others: 11 (2.2%) **Vicryl:** Upper GI: 148 (29.3%) Hepato-biliary-pancreatic: 88 (17.4%) Small bowel: 13 (2.6%) Colorectal: 248 (49.1%) Others: 8 (1.6%)	Contaminated/Dirty: 7 (1.4%)		
(Isik, Selimen et al, 2012)	Isik 2012, Turkey	One cardiovascular surgical department in a private hospital	Triclosan-coated sutures (Vicryl Plus) (Closure of leg and sternal wound sites using Vicryl Plus sutures)	Uncoated sutures (Vicryl) (Closure of leg and sternal wound sites using Vicryl sutures)	Total: 510 **Vicryl Plus:** 170 **Vicryl**: 340	Various cardiac surgical procedures **Vicryl Plus:** CABG: 147 (86.5) Valve repair: 17(10) CABG + valve repair : 6 (3.5) Other: 0 (0) **Vicryl Plus:** CABG: 263 (77.4) Valve repair: 50 (14.7) CABG + valve repair: 25 (7.4) Other: 2 (0.6)	NR	CDC criteria	1 month post-surgery
Primary: (Justinger, Slotta et al, 2013) Secondary: (University Hospital, 2009)	Justinger 2013, Germany	One surgical department in a university hospital	Triclosan-coated sutures (PDS Plus) (Closure of abdominal fascia using 2-0 PDS Plus loop sutures)	Uncoated sutures (PDS II) Closure of abdominal fascia 2-0 PDS II loop sutures)	Total: Randomised NR (967 operated on per protocol) **PDS Plus**: NR (559 operated on per protocol) (analysed: 485) **PDS II**: NR (408 operated on per	Scheduled laparotomy with abdominal wound closure following a standard clinical pathway **PDS Plus**: Upper GI tract: 59 (12.2%) Hepatopancreatobiliary: 210 (43.4%)	**PDS Plus**: Clean: 286 (59%) Clean-contaminated: 162 (33.4%) Contaminated: 37 (7.6%) Septic: 0 (0) **PDS II**: Clean:245 (66%) Clean-contaminated: 97 (26.1%)	CDC criteria	2 weeks post-discharge

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
					protocol) (analysed: 371)	Small intestine: 19 (3.9%) Colorectal: 143 (29.5%) Vascular surgery: 26 (5.4%) Other: 27 (5.4%) **PDS II**: Upper GI tract: 41 (11.1%) Hepatopancreatobiliary: 173 (46.6%) Small intestine: 14 (3.8%) Colorectal: 100 (27.7%) Vascular surgery: 24 (6.5%) Other: 19 (5.1%)	Contaminated: 25 (6.7%) Septic: 4 (1.1)		
(Karip, Celik et al, 2016)	Karip 2016, Turkey	General surgery clinics at one training and research hospital	Triclosan-coated sutures (Monocryl Plus) (Incision closure using Monocryl Plus suture, ensuring that the suture line was not on the midline)	Uncoated sutures (Monocryl) (Incision closure using Monocryl suture, ensuring that the suture line was not on the midline)	Revised trial, total: 106 **Monocryl Plus:** 54 **Monocryl**: 52	Sinus excision followed by Karydakis flap repair	NR	Other: surgeon-assessed signs of infection (rash, fever, or purulent discharge) on physical examination	6 months
Primary: (Lin, Chang et al, 2018) Secondary: (Mel Shiuann-Sheng Lee, 2015)	Lin 2018, Taiwan	One hospital	Triclosan-coated sutures (Vicryl Plus) (3-layer closure using Vicryl Plus: arthrotomy, fascial layer, and subcutaneous wound)	Uncoated sutures (Vicryl) (3-layer closure using Vicryl: arthrotomy, fascial layer, and subcutaneous wound)	Total: 102 **Vicryl Plus**: 51 **Vicryl**: 51	Unilateral total knee arthroplasty using standard medial parapatellar technique	Clean: 102 (100%)	Other: Presence of SSI based on wound condition (surface temperature, digital photo, image analysis)	Within 3 months post-surgery
Primary: (Mattavelli, Rebora et al, 2015) Secondary: (University of Milano Bicocca, 2013)	Mattavelli 2015, Italy	Four university referral hospitals	Triclosan-coated sutures (Vicryl Plus + PDS Plus) (Separate layer technique: closure of peritoneum with Vicryl Plus suture, then closure of abdominal fascia	Uncoated sutures (Vicryl + PDS II) (Separate layer technique: closure of peritoneum with Vicryl suture, then closure of abdominal fascia with PDS suture; optional	Total: 300 **Vicryl Plus + PDS Plus:** 150 **Vicryl + PDS II:** 150	Elective colorectal resection **Vicryl Plus + PDS Plus,** n (%)**:** Right colectomy: 49 (35.0%) Transverse resection: 5 (3.6%)	NR but study inclusion criteria stipulated colorectal resection with a clean-contaminated field	CDC 1999 criteria	30 days post-discharge

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
			with PDS Plus suture; optional subcutaneous closure of subcutaneous tissue layer using 3/0 Vicryl Plus suture)	subcutaneous closure of subcutaneous tissue layer using 3/0 Vicryl suture)		Left colectomy: 55 (39.3%) Anterior resection of rectum: 29 (20.7%) Abdominal–perineal resection: 2 (1.4%) **Vicryl + PDS II,** n (%)**:** Right colectomy: 49 (34.7%) Transverse resection: 9 (6.4%) Left colectomy: 55 (39.0%) Anterior resection of rectum: 23 (16.3%) Abdominal–perineal resection: 5 (3.6%)			
(Mingmalairak, Ungbhakorn et al, 2009)	Mingmalairak 2009, Thailand	One univeraity hospital in Thailand	Vicryl Plus	Vicryl	100 (this paper is a report of the first 100 patients randomised and treated)	Appendicitis surgery: types of apenditictis are were follows: **Vicryl Plus; n(%)**: Acute 12 (24) Suppurative 28 (56) Gangrene 3 (6) Ruptured 7 (14) **Vicryl; n(%):** Acute 12 (24) Suppurative 24 (48) Gangrene 5 (10) Ruptured 9 (18)	Wound class NR but study reports “degree of contamination” **Vicryl Plus; n(%)**: Mild 43 (86) Moderate 4 (8) Severe 3 (6) **Vicryl; n(%):** Mild 40 (80) Moderate 6 (12) Severe 4 (8)	“As defined by a surgeon”; further details NR	Paper states 1 year post-surgery, but also states that the patients were studied between August 2006 and March 2007, which is 9 months
Primary: (Nakamura, Kashimura et al, 2013) Secondary: (Teine	Nakamura 2013, Japan	One surgical department in a hospital	Triclosan-coated sutures (Vicryl Plus) (Abdominal closure after laparotomy using Vicryl Plus suture)	Uncoated sutures (Vicryl) (Abdominal closure after laparotomy using Vicryl suture)	Overall: 410 **Vicryl Plus**: 206 **Vicryl:** 204	Elective colorectal surgery **Vicryl Plus**: Right colectomy: 61 (29.6%*)	**Vicryl Plus**: Clean: 0 (0) Clean-contaminated: 205 (99.5%*) Contaminated: 1 (0.5%*) Dirty: 0 (0)	CDC 1999 guidelines	30 days post-discharge

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
Keijinkai Hospital, 2010)						Transverse colectomy: 13 (6.3%*) Left colectomy: 11 (5.3%*) Sigmoidectomy: 49 (23.8%*) Low anterior resection: 41 (19.9%*) Abdominoperineal resection: 21 (10.2%*) Total colectomy: 1 (0.5%*) Simple colostomy: 9 (4.4%*) **Vicryl:** Right colectomy: 61 (29.9%*) Transverse colectomy: 11 (5.4%*) Left colectomy: 9 (4.4%*) Sigmoidectomy: 48 (29.6%*) Low anterior resection: 41 (23.5%*) Abdominoperineal resection: 23 (11.3%*) Total colectomy: 2 (1.0%*) Simple colostomy: 9 (4.4%*)	**Vicryl:** Clean: 0 (0) Clean-contaminated: 203 (99.5%*) Contaminated: 1 (0.5%*) Dirty: 0 (0)		
(Olmez, Berkesoglu et al, 2019)	Olmez 2019, Turkey	Sites NR; Turkey	PDS Plus	PDS II	Total: 900 **PDS Plus**:Enrolled n = 450. Analysed n = 445 (2 dropped from follow up, reason NR, 3 deaths) **PDS II**: Enrolled n = 450. Analysed n =	Target organ for operation n(%): **PDS Plus**: Small bowel 109 (24.4) Colorectum 97 (21.7) Stomach 41 (9.2) Liver 35 (7.8)	Calculated from Table 5 of publication **PDS Plus; n (%)**: Clean 18 (4.0) Clean-contaminated 396 (89.0) Contaminated 30 (6.7) Dirty 1 (0.2)	Unclear, although the authors reference NICE Guidance CG74 (2014)	30 days post-surgery

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
					445 (4 dropped from follow up, reason NR, 1 death)	Pancreas 41 (9.2) Gallbladder 36 (8.0) Spleen 18 (4.0) Other 48 (10.7) **PDS II:** Small bowel 57 (12.8) Colorectum 76 (17.0) Stomach 49 (11.1) Liver 31 (6.9) Pancreas 14 (3.1) Gallbladder 53 (11.9) Spleen 18 (4.1) Other 147 (33.1)	**PDS II; n(%):** Clean 66 (14.8) Clean-contaminated 255 (57.3) Contaminated 122 (27.4) Dirty 2 (0.4)		
(Rasic, Schwarz et al, 2011)	Rasic 2011, Croatia	One surgical department in a university hospital	Triclosan-coated sutures (Vicryl Plus (Wound closure with 0 Vicryl Plus sutures using a continuous single-layer mass technique (peritoneum, muscle and fascia) Skin was closed with polyamide: Ethicon 2-0)	Non Triclosan coated sutures (Vicryl) (Wound closure with 0 Vicryl sutures using a continuous single-layer mass technique (peritoneum, muscle and fascia) Skin was closed with polyamide 2-0)	Total: 184 **Vicryl Plus:** 91 **Vicryl:** 93	Elective colorectal carcinoma surgery through a midline incision	NR	NR	NR "Hospitalisation period" (p 440 of paper)
Primary: (Renko, Paalanne et al, 2017) Secondary: (University of Oulu, 2010)	Renko 2017, Finland	Paediatric surgery and orthopaedics ward in a university hospital (serving as tertiary paediatric hospital) Optional further follow up carried out at local health centre or private practice	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus, or PDS Plus) Surgeons could use other suture materials in addition to the study sutures during surgery if the study sutures were unsuitable for the procedure	Non-coated sutures (Vicryl, Monocryl, or PDS) Surgeons could use other suture materials in addition to the study sutures during surgery if the study sutures were unsuitable for the procedure	Total: 1633 **Triclosan-coated sutures:** 814 (778 included in the mITT analysis) **Non-coated sutures**: 819 (779 included in the mITT analysis)	NR Target organs for surgery were: nervous system, chest wall and lungs, abdominal wall (including hernias), intra-abdominal (including gallbladder, intestines, and spleen) urinary system and genitals,	**Triclosan-coated sutures** (n=778): Clean: 699 (99%); Clean-contaminated: 26 (3%); Contaminated: 0 (0); Dirty or infected: 0 (0); Missing data: 53 (7%) **Non-coated sutures** (n=779): Clean: 695 (89%); Clean-contaminated: 27 (3%); Contaminated: 1 (<1%); Dirty or infected: 0 (0);	CDC 1992 criteria	30 days post-surgery

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
						musculoskeletal system, skin or other subcutaneous tissue, other	Missing data: 56 (7%)		
(Rozzelle, Leonardo et al, 2008)	Rozzelle 2008, USA	One hospital in New York state, USA	Vicryl Plus	Vicryl	Patients receiving new shunts following successful treatment of a shunt infection and patients undergoing revision 6 months after randomisation were re-randomised. Total N operations: 84 No patients were lost to follow-up during the study period. **Vicryl plus:** Randomised operations: n = 46 **Vicryl:** Randomised operations: n =38	Implantation of cerebrospinal fluid (CSF) shunting device	NR	NR	This was intended to be 6 months post-surgery, but only results up to the second interim analysis (14 weeks) were presented
Primary: (Ruiz-Tovar, Llavero et al, 2020) Secondary: (Hospital General Universitario Elche, 2018)	Ruiz-Tovar 2020, Spain	Surgical departments of hospitals in Spain. Number NR but authors' affiliations suggest up to 4.	Two intervention arms Triclosan-coated barbed suture calibre 1, 48-mm sutures with cylindric needle (Stratafix Symmetric PDS Plus) Triclosan-coated non-barbed suture calibre 1, 48-mm sutures with cylindric needle (PDS Plus Loop)	Uncoated sutures (PDS Loop) (Abdominal fascia closure using uncoated PDS Loop sutures (standard calibre 1, 48-mm cylindric needle))	Total: 150 **Stratafix Symmetric Plus**: 50 **PDS Plus Loop**: 50 **PDS Loop:** 50	Emergency surgery by laparotomy and midline approach	NR but inclusion criteria specified contaminated and dirty surgery	CDC 1992 definition	30 days post-surgery
(Ruiz-Tovar, Alonso et al, 2015)	Ruiz-Torvar 2015, Spain	Two university hospitals in Spain	Triclosan coated polyglactin 910 antimicrobial loop	Uncoated polyglactin 910 antimicrobial loop	Total: 110	Abdominal closure following intraoperative	Dirty	CDC 1992 definition	60 days post-surgery

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
			suture size number 2 (brand NR)	suture size number 2 (brand NR)	**Triclosan coated sutures:** 55 **Uncoated sutures:** 55	diagnosis of faecal peritonitis secondary to acute diverticulitis perforation, neoplastic tumor perforation, or colorectal anastomotic leak of previous elective colorectal resection.; all patients underwent a Hartmann procedure			
(Santos, Santos et al, 2019)	Santos 2019, Brazil	One teaching hospital in Brazil	Vicryl Plus	Vicryl	Total: 583 **Vicryl Plus**: 289 **Vicryl:** 257	Saphenectomy during coronary artery bypass graft (CABG), with and without cardiopulmonary bypass: (CPB) **CPB:** **Vicryl Plus**: 238 (94.8) **Vicryl:** 241 (93.8)	NR	NR	30 days post-surgery
(Seim, Tonnessen et al, 2012)	Seim 2012, Norway	One cardiothoracic surgery department in a university hospital	Triclosan-coated sutures (Vicryl Plus) (Leg wound closed using Vicryl Plus)	Uncoated sutures (Vicryl) (Leg wound closed using Vicryl)	Total: 328 **Vicryl Plus**: 164 (160 analysed) **Vicryl**: 164 (163 analysed)	Coronary artery bypass graft surgery with saphenous vein harvesting	NR	Other: SSI diagnosis based on positive bacterial culture and clinical judgement	4 weeks post-surgery
(Soomro, Khurshaidi et al, 2017)	Soomro 2017, Pakistan	One breast unit at a national hospital	Triclosan-coated sutures (brand NR)	Uncoated sutures (brand NR)	**Total:** 378 **Triclosan coated sutures:**189 **Plain sutures:** 189	Minor clean breast surgeries in benign breast diseases	Clean	CDC guidelines (version NR)	30 days post-surgery
Primary: (Sprowson, Jensen et al, 2018) Secondary: (Sprowson,	Sprowson 2018, UK	Three acute teaching hospitals that were elective centres	Triclosan-coated sutures (Vicryl Plus) (Closure of deep fascia to subcutaneous layer, dependent on	Uncoated sutures (Vicryl) (Closure of deep fascia to subcutaneous layer, dependent on	Total: 2546 **Vicryl Plus:** 1223 **Vicryl:** 1323	Primary total hip or knee arthroplasty **Vicryl Plus:** Hip arthroplasty: 532 (45.7)	NR	Health Protection Agency defiinitions	12 months

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
Jensen et al, 2014)			surgeon preference, using Vicryl Plus suture)	surgeon preference, using Vicryl suture)		Knee arthroplasty: 632 (54.3) **Vicryl:** Hip arthroplasty: 590 (46.3) Knee arthroplasty: 683 (53.7)			
Primary: (Sukeik, George et al, 2019) Secondary: (University College London, 2013)	Sukeik 2019, UK	One Trauma and orthopaedic department in a university hospital	Triclosan-coated sutures (Vicryl Plus) to close the deep layers of the wound (1 interrupted Vicryl Plus for closure of medial parapatellar incisions (knee) and fascia lata (hip); and 2-0 Vicryl Plus for closure of subcutaneous tissues (hip and knee)) Skin clips used for the outside skin closure	Non-coated sutures (Vicryl) to close the deep layers of the wound (1 interrupted Vicryl for closure of medial parapatellar incisions (knee) and fascia lata (hip); and 2-0 Vicryl Plus for closure of subcutaneous tissues (hip and knee)) Skin clips used for the outside skin closure	Total: 150 **Vicryl Plus:** 81 **Vicryl:** 69	Unilateral knee arthroplasty: medial parapatellar approach (+ cement) Unilateral hip arthroplasty: posterior approach (uncemented prostheses)	NR	NR Superficial SSIs defined as those resolved with oral antibiotics only Deep SSIs defined as those not controlled with oral antibiotics or required washout/debridement or revision surgery.	6-weeks post-surgery
Primary: (Sundaram K, Warren J et al, 2020a) Secondary: (The Cleveland Clinic, 2017)	Sundaram 2020a, USA	One hospital	Triclosan-coated barbed sutures (Stratafix Symmetric PDS Plus) (3-layer closure: #1 Stratafix PDS Plus suture with symmetric barbs for closure of the capsule; then 2-0 Vicryl suture for closure of subcuticularous layer and finally 3-0 Monocryl suture for subcutaneous layer, followed by adhesive strips)	Uncoated sutures (Vicryl) (3-layer closure: #1 Vicryl suture for closure of arthrototomy (deep layer) ; then 2-0 Vicryl suture for closure of intermediate layer and finally 3-0 Monocryl suture for subcutaneous layer, followed by adhesive strips)	Total**:** 60 **Stratafix Symmetric PDS Plus:** 30 **Vicryl:** 30	Total knee arthroplasty using medial para-patella approach	NR	Other: definitions were adapted from consensus criteria from the Knee Society (2013)	90 days post-surgery

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
Primary: (Sundaram, Piuzzi et al, 2020b) Secondary: (The Cleveland Clinic, 2017)	Sundaram 2020b, USA	One orthopaedic surgery department in a hospital	Triclosan-coated barbed sutures (Stratafix Symmetric PDS Plus) (4-layer closure: unidirectional #1 Stratafix PDS Plus suture with symmetric barbs for closure of the arthrotomy; then 2-0 Vicryl suture for closure of subucatenous layer and 3-0 Monocryl suture for subcuticular layer, followed by adhesive strips)	Uncoated sutures (Vicryl) (4-layer closure: #1 Vicryl suture for closure of the arthrotomy (deep layer); then 2-0 Vicryl suture for closure of subucatenous layer and 3-0 Monocryl suture for subcuticular layer, followed by adhesive strips)	Total**:** 60 **Stratafix Symmetric PDS Plus:** 30 **Vicryl:** 30	Posterior approach total hip arthroplasty with repair of posterior capsule and short external rotator	NR	Other: definitions developed by the Hip Society (2016)	90 days post-surgery
Primary: (Tabrizi, Mohajerani et al, 2019) Secondary: (Shiraz University of Medical Sciences, 2018)	Tabrizi 2019, Iran	Two sites; one university hospital and one private medical clinic	Triclosan-coated sutures (Vicryl Plus)	Uncoated sutures (Vicryl)	**Total:** 320 **Vicryl Plus:** 160 **Vicryl:** 160	Dental implant surgery to place three dental implants in the posterior mandible	NR	Authors' definition: "local erythematous changes in the mucosa around the dental implant with a purulent discharge, or localized abscess formation at the surgical site, and/or increasing pain and swelling in the operated area"	28 days post-surgery
Primary: (Thimour-Bergstrom, Roman-Emanuel et al, 2013) and (Steingrimsson, Thimour-Bergstrom et al, 2015)	Thimour-Bergström 2013, Sweden	One surgical department in a university hospital	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus) (Saphenous vein skin closure: subcutaneously with 3.0 Vicryl Plus suture and intracutaneously with 4.0 Monocryl Plus suture)	Non-coated sutures (Vicryl, Monocryl) (Saphenous vein skin closure: subcutaneously with 3.0 Vicryl suture and intracutaneously with 4.0 Monocryl suture) (Fascia and subcutaneous tissue	Total: 392 ***Open vein harvesting:*** **Vicryl Plus + Monocryl Plus:** 193 (184 analysed) **Vicryl + Monocryl**: 199 (190 analysed) ***Sternotomy:***	CABG or CABG plus valve surgery using a saphenous vein graft and sternotomy	NR	CDC 1992 definition	60 days post-surgery

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
Secondary: (Turtiainen and Hakala, 2014) (Jeppsson, Thimour-Bergstrom et al, 2014) (Sahlgrenska University Hospital, 2010)			(Fascia and subcutaneous tissue closed using 2.0 Vicryl Plus suture and intracutaneously using 4.0 Monocryl Plus suture) The same kind of sutures was used to close the wound on both the sternum and the leg	closed using 2.0 Vicryl suture and intracutaneously using 4.0 Monocryl suture) The same kind of sutures was used to close the wound on both the sternum and the leg	**Vicryl Plus + Monocryl Plus:** 193 (179 analysed) **Vicryl + Monocryl**: 200 (178 analysed)				
(Turtiainen, Saimanen et al, 2012)	Turtiainen 2012, Finland	Three tertiary referral hospitals and two secondary referral hospitals in Finland	Triclosan-coated sutures (Vicryl Plus and Monocryl Plus)	Uncoated sutures (Vicryl and Monocryl)	**Total:** 276 **Vicryl Plus and Monocryl Plus**: 139 **Vicryl and Monocryl:** 137	Non-emergency lower-limb arterial surgery	NR	CDC guidelines (1992)	Unclear; All patients were followed up for at least one month post-surgery, but some patients were followed up for at least 125 days post-surgery for safety outcomes. Definition of SSI is "within 30 days post-surgery".
(Williams, Sweetland et al, 2011)	Williams 2011, UK	Two breast surgeons at the Cardiff and Vale NHS Trust (single centre)	Vicryl Plus and Monocryl Plus	Vicryl and Monocryl	Total: 150 **Vicryl Plus and Monocryl Plus**: 75 **Vicryl and Monocryl:** 75	Breast surgery **Vicryl Plus and Monocryl Plus**: Wide lump excision and sentinel node biopsy: 50 Axillary node clearance: 1 Mastectomy and sentinel node biopsy: 15 Wide lumb excision alone: 6 Mastectomy alone 1	**Vicryl Plus and Monocryl Plus**: Clean 75 (100%) **Vicryl and Monocryl:** Clean 75 (100%)	CDC 1999 guidelines	6 weeks post surgery

1b Data source *Endnote live link – to be added later*	**Author, year and location (country)**	**Trial setting** *Setting of surgery and number of sites*	**Details of intervention**	**Details of control**	**No. of participants randomised**	**Surgery type**	**Wound class** *Clean / clean-contaminated / contaminated / dirty*	**Definition of SSI** *CDC / other (if other, define)*	**Maximum duration of trial follow-up**
						Localised wire excision (therapeutic): 2 **Vicryl and Monocryl:** Wide lump excision and sentinel node biopsy: 49 Axillary node clearance: 2 Mastectomy and sentinel node biopsy: 12 Wide lumb excision alone: 10 Mastectomy alone 0 Localised wire excision (therapeutic): 2			
Primary: (Zhang, Zhang et al, 2011) Secondary: (Ethicon Inc., 2008)	Zhang 2011, China	6 Chinese first tier hospitals	Triclosan-coated sutures (Vicryl Plus) (Intradermal, subcuticular skin closure using Vicryl Plus sutures in accordance with unified standard of care)	Uncoated sutures (Chinese silk) (Simple interrupted transdermal skin closure using Chinese silk sutures in accordance with unified standard of care)	Total: 101 **Vicryl Plus:** 51 **Chinese Silk**: 50	Clean (Class I) modified radical mastectomy	Clean: All patients	CDC criteria and ASEPSIS wound scores	90 days

Table 1c Summary of population details

An asterisk (*) denotes a reviewer calculated value.

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
(Arslan, Atasoy et al, 2018)	Arslan 2018, Turkey	PDS Plus + Vicryl Plus	25.8 (6.5)	79 (91.9*)	Mean (SD) BMI, kg/m^2: 25.6 (2.6)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Hair removal	Yes Antibiotic prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** PSD Plus suture **Other:** NR	Elective: 86 (100)
		Prolene + Vicryl	25.5 (5.5)	76 (83.5*)	Mean (SD) BMI, kg/m^2: 26.2 (2.8)		Yes Antibiotic prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** Prolene suture **Other:** NR	Elective: 91 (100)
Primary: (Baracs, Huszar et al, 2011) Secondary: (University of Pecs, 2010)	Barac 2011, Hungary	PDS Plus	62.6 (SD NR)	110 (58.5*)	Type II diabetes mellitus: 27 Neoadjuvant therapy: 47 BMI (mean) 24.7	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Prophylactic antibiotic (a second-generation cephalosporin and metronidazole 30 minutes before incision) were used in every case	**Wound dressing:** Yes **Sterile saline wash:** NR **Method of skin closure:** Suture (Monocryl Plus) **Other:** Disposable drapes were used	All procedures were elective
		PDS II	63.5 (SD NR)	111 (56.3*)	Type II diabetes mellitus: 26 Neoadjuvant therapy: 40 BMI (mean) 25.5				
Primary: (Diener, Knebel et al, 2014) Secondary: (Diener,	Diener 2014, Germany	PDS Plus	64.7 (11.8)	361 (61.5)	N (%) Anaemia 167 (28.4) Diabetes mellitus 81 (13.8) Chronic obstructive pulmonary disease 38 (6.5) Chronic renal insufficiency 23 (3.9) Liver cirrhosis 8 (1.4)	**Bathing with soap:** NR **Nasal decolonisation:** NR	Yes (according to German national guidelines) Antibiotic prophylaxis: 578 (98.5)	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** Staples	All procedures were elective

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
Knebel et al, 2014) (Heger, Voss et al, 2011) (Universitätsklinik Heidelberg, 2010) (Diener, Knebel et al, 2014) (Fujita, 2014)					Malignant disease 407 (69.3) Current immunosuppressive therapy 11 (1.9) Chronic inflammatory disease 31 (5.3)	**Other:** Routine scrub and site preparation according to site centres		**Other:** Postoperative care was provided according to the principles and standards of the participating departments	
		PDS II	65.0 (12.1)	368 (61.5)	N (%) Anaemia 166 (27.8) Diabetes mellitus 96 (16.1) Chronic obstructive pulmonary disease 51 (8.5) Chronic renal insufficiency 20 (3.3) Liver cirrhosis 9 (1.5) Malignant disease 442 (73.9) Current immunosuppressive therapy 11 (1.8) Chronic inflammatory disease 27 (4.5)		Yes (according to German national guidelines) Antibiotic prophylaxis:586 (98.0)		
(Ford, Jones et al, 2005)	Ford 2005, USA	Vicryl Plus	NR (only overall across treatments : mean 9.8, range: 1-18 years)	NR (only overall across treatments: 52% male)	NR	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Local protocol for infection control	Yes IV antibiotics: 65* (65)	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** NR **Other:** Local protocol for infection control	Elective: 98 (100)
		Vicryl			NR		Yes IV antibiotics: 40* (82)		Elective: 49 (100)
(Galal and El-Hindawy, 2011)	Galal 2011, Egypt	Vicryl Plus	Mean NR Median NR Age groups covered the range 21-60 years	148 (64.3%*)	Hypertension: 50 (21.7%*) Diabetes: 32 (19.1%*) Risk factors for SSI (National Nosocomial Infections Surveillance risk factor):: 0: 149 (64.8%*) 1: 55 (23.9%*) 2: 26 (11.3%*)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Local protocol for infection control	No	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** Monocryl suture **Other:** Local protocol for infection control	Elective: 230 (100)
		Vicryl		127 (57.7%*)	Hypertension: 50 (22.7%*) Diabetes: 42 (19.1%*) Risk factors for SSI (National Nosocomial Infections Surveillance risk factor): 0: 133 (60.5%*) 1: 73 (33.2%*)		No		Elective: 220 (100

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
					2: 14 (6.4%*)				
Primary: (Ichida, Noda et al, 2018) (Department of Surgery Saitama Medical Center Jichi Medical University, 2014)	Ichida 2018, Japan	Vicryl Plus	67.0 (11.5)	304 (59.8)	Mean BMI (kg/m^2): 22.9 (3.9) Respiratory impairment: 116 (22.8%) Diabetes mellitus: 108 (21.3%) Renal impairment: 50 (9.8%) Hemodialysis: 7 (1.4%) Use of steroid /immunosuppressant: 17 (3.3%) Preoperative chemotherapy: 43 (8.5%) Malignant disease: 427 (84.1%) Anaemia: 159 (31.3%) Hypoalbuminemia: 125 (24.6%)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Perioperative care protocols as recommended in CDC guidelines	Yes Antibacterial prophylaxis: All patients	**Wound dressing:** sterile dressing for ≥48 hours **Sterile saline wash:** Wound irrigation with normal saline **Method of skin closure:** PDS Plus sutures **Other:** Wound management according to CDC guideline recommendations	Emergency: 4 (0.8)
		Vicryl	67.5 (11.6)	322 (63.8)	Mean BMI (kg/m^2): 22.8 (3.4) Respiratory impairment: 129 (25.5%) Diabetes mellitus: 126 (25.0%) Renal impairment: 60 (11.9%) Hemodialysis: 9 (1.8%) Use of steroid /immunosuppressant: 8 (1.6%) Preoperative chemotherapy: 36 (7.1%) Malignant disease: 435 (86.1%) Anaemia: 132 (26.1%) Hypoalbuminemia: 110 (21.8%)		Yes Antibacterial prophylaxis: All patients	**Wound dressing:** sterile dressing for ≥48 hours **Sterile saline wash:** Wound irrigation with normal saline **Method of skin closure:** PDS II sutures **Other:** Wound management according to CDC guideline recommendations	Emergency: 7 (1.4)
(Isik, Selimen et al, 2012)	Isik 2012, Turkey	Vicryl Plus	60.15 (10.77)	110 (64.7)	Diabetes: 57 (33.5) Body mass index: <25 kg/m^2: 45 (26.5) 25-30 kg/m^2: 84 (49.4) >30 kg/m^2: 41 (24.1)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	No	**Wound dressing:** NR **Sterile saline wash:** NR	Elective: 168 (98.8) Emergency: 2 (1.2)

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
					EuroSCORE risk factor: <5: 119 (70.0) >5: 51 (30.0)			**Method of skin closure:** NR	
		Vicryl	61.21 (10.25)	228 (67.1)	Diabetes: 120 (35.3) Body mass index: <25 kg/m^2: 98 (28.8) 25-30 kg/m^2: 158 (46.5) >30 kg/m^2: 84 (24.7) EuroSCORE risk factor: <5: 210 (61.8) >5: 130 (38.2)		No	**Other:** Discharge training on wound care, arranged and provided by an experienced nurse specialised in cardiac rehabilitation	Elective: 326 (95.9) Emergency:14 (4.1)
Primary: (Justinger, Slotta et al, 2013) Secondary: (University Hospital, 2009)	Justinger 2013, Germany	PDS Plus	63 (SED 13)	301 (62.1)	Data reported as n (%) BMI <18 7: 14 (2.9) 18–25: 221 (45.6) 26–30: 174 (35.9) >30 54: 76 (16.4) Inflammatory bowel disease:) 14 (2.9) Diabetes mellitus: 49 (10.1) Malignancy: 355 (73.2)	**Bathing with soap:** Regular shower without iodine within 24 hours before surgery **Nasal decolonisation:** NR **Other:** Abdominal hair removal following the preoperative shower	Yes Antibacterial prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NRo **Method of skin closure:** Staples **Other:** Skin disinfected with polyvidone iodine in alcohol following skin closure; sterile drape for ≥24 hours	Elective: 485 (100)
		PDS II	63 (SED 13	224 (60.4)	Data reported as n (%) BMI: <18 7: (1.9) 18–25: 181 (48.8) 26–30: 129 (34.8) >30 54: (15.8) Inflammatory bowel disease: 7 (1.9) Diabetes mellitus: 35 (9.4) Malignancy: 264 (71.4)		Yes Antibacterial prophylaxis: All patients		Elective: 371 (100)
(Karip, Celik et al, 2016)	Karip 2016, Turkey	Monocryl Plus	25.89 (6.07)	NR (only overall across treatments: 83 (78.3%) male)	Mean (SD) BMI, kg/m^2: 25.37 (2.53)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Yes in revised trial IV antibacterial prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** NR **Other:** Analgesics prescribed, but no antimicrobial therapy	Elective: 54 (100)
		Monocryl	25.73 (6.64)	NR (only overall across treatments: 83 (78.3%) male)	Mean (SD) BMI, kg/m^2: 25.25 (3.10)		Yes in revised trial IV antibacterial prophylaxis: All patients		Elective: 52 (100)
	Lin 2018, Taiwan	Vicryl Plus	71.3 (7.7)	15* (29.4*)	NR	**Bathing with soap:** NR	Yes	**Wound dressing:** NR	Elective 51 (100)

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
Primary: (Lin, Chang et al, 2018) Secondary: (Mel Shiuann-Sheng Lee, 2015)						**Nasal decolonisation:** NR **Other:** Standard clinical pathway	Systemic antibacterial prophylaxis: All patients	**Sterile saline wash:** NR **Method of skin closure:** Staples **Other:** Standard clinical pathway	
		Vicryl	70.0 (7.1)	11* (21.6*)	NR		Yes Systemic antibacterial prophylaxis: All patients		Elective 51 (100)
Primary: (Mattavelli, Rebora et al, 2015) Secondary: (University of Milano Bicocca, 2013)	Mattavelli 2015, Italy	Vicryl Plus + PDS Plus	Median 69 (IQR: 60-75)	81 (57.8)	BMI (kg/m^2): median 24.3 (IQR: 22.6-27.2) BMI categories, n (%): <19: 4 (2.8) 19–25: 77 (55.0) 26–30: 46 (32.8) >30: 13 (9.3) Weight loss >10%: 19 (13.6%) Diabetes mellitus: 21 (15.0%) Cancer: 124 (88.6%) Pre-operative radiochemotherapy: 17 (12.1%)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Hair removal either the evening before the operation or the morning of the operation	Yes Antibacterial prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** 3/0 Vicryl Plus suture **Other:** NR	Elective: 140 (100)
		Vicryl + PDS II	Median 69 (IQR: 60-76)	74 (52.4)	BMI (kg/m^2): median 24.8 (IQR: 22.3-27.1) BMI categories, n (%): <19: 10 (7.1) 19–25: 64 (45.4) 26–30: 55 (39.0) >30: 12 (8.5) Weight loss >10%: 15 (10.6%) Diabetes mellitus: 18 (12.8%) Cancer: 118 (83.7%) Pre-operative radiochemotherapy: 8 (5.7%)		Yes Antibacterial prophylaxis: All patients		Elective: 141 (100)
(Mingmalairak, Ungbhakorn et al, 2009)	Mingmalairak 2009, Thailand	Vicryl Plus	29.1 (SD NR)	26 (52)	NR	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Yes Antibiotic prophylaxis: All patients. Gentamicin 240 mg and metronidazole 500 mg, were given	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** Sutures as assessed	NR explicitly or by arm. Study does state that "Cases of appendicitis were divided into uncomplicate

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
							intravenously 30-60 minutes before operation	**Other:** "The appendectomy was done with standard technique."	d (76%), which were acute (24%) and suppurative (52%) and complicated appendicitis (24%), which were gangrene (8%) and ruptured (16%)."
		Vicryl	29.8 (SD NR)	35 (70)	NR		Yes Antibiotic prophylaxis: All patients. Gentamicin 240 mg and metronidazole 500 mg, were given intravenously 30-60 minutes before operation		
Primary: (Nakamura, Kashimura et al, 2013) Secondary: (Teine Keijinkai Hospital, 2010)	Nakamura 2013, Japan	Vicryl Plus	69.4 (11.3)	130 (63.1%*)	Renal impairment: 2 (1.0%*) Diabetes mellitus: 41 (19.9%*) Chronic obstructive pulmonary disease:10 (4.8%*) Mean (SD) BMI (kg/m^2): 23.2 (3.6)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Yes Antibacterial prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** Staples **Other:** NR	Elective: 206 (100)
		Vicryl	70.2 (11.1)	112 (54.9%*)	Renal impairment: 2 (1.0%*) Diabetes mellitus: 31 (15.2%*) Chronic obstructive pulmonary disease: 15 (7.4%*) Mean (SD) BMI (kg/m^2): 23.4 (3.8)		Yes Antibacterial prophylaxis: All patients		Elective: 204 (100)
(Olmez, Berkesoglu et al, 2019)	Olmez 2019, Turkey	PDS Plus	55.1 (16.3)	192 (43.1)	Smoker 100 (22.4) Previous abdominal midline incision 96 (21.5) Anemia 113 (25.3) Hypertension 86 (19.3) Diabetes mellitus 56 (12.5) COPD 32 (7.0) Malignant disease 28 (6.2) Chronic renal insufficiency 11 (2.4) Liver cirrhosis 7 (1.5)	**Bathing with soap:** Site cleaned with polyvidone-iodine **Nasal decolonisation:** NR **Other:** Site shaved prior to surgery (day before)	Yes Antibiotic prophylaxis: All patients. 1000mg cefazolin, 1000mg ceftriaxone, 500mg metronidazole prior to / at start of surgery	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** 3/0 polypropylene suture, which was removed on post-operative day 14 is complications had not occurred in the incision **Other:** NR	Emergency: 31 (6.9)
		PDS II	54.6 (16.9)	223 (50.1)	Smoker 169 (37.9) Previous abdominal midline incision 144 (32.3) Anemia 101 (22.6) Hypertension 78 (17.5) Diabetes mellitus 60 (13.4) COPD 25 (5.6)		Yes Antibiotic prophylaxis: All patients. 1000mg cefazolin, 1000mg ceftriaxone,		Emergency: 74 (16.6)

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
					Malignant disease 30 (6.7) Chronic renal insufficiency 9 (2.0) Liver cirrhosis 8 (1.7)		500mg metronidazole prior to / at start of surgery		
(Rasic, Schwarz et al, 2011)	Rasic 2011, Croatia	Vicryl Plus	58 (14.5)	49 (54)	Mean BMI: 22.7 (1.6) N (%) BMI <20: 13 (14) BMI 20-25: 70 (78) BMI >25: 7 (8)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Yes Antibiotic prophylaxis (given intravenously during induction of anaesthesia): all patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** Polyamide Ethicon 2-0 **Other:** NR	Elective: 91 (100)
		Vicryl	57 (14.7)	50 (54)	Mean BMI: 22.1 (1.4) N (%) BMI <20: 13 (14) BMI 20-25: 71 (77) BMI >25: 9 (9)				Elective: 93 (100)
Primary: (Renko, Paalanne et al, 2017) Secondary: (University of Oulu, 2010)	Renko 2017, Finland	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus, or PDS Plus)	7.2 (5.4)	483 (62)	N (%) Prematurity <35 weeks: 34 (4) Type 1 diabetes: 4 (<1) Immunosuppression: 9 (1) Asthma: 29 (4) Neurological disorder: 71 (9) Congenital anomaly: 83 (11) Heart defect: 7 (1) Miscellaneous: 24 (3)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Not reported whether antibiotic use was pre- or post-operative Prophylactic antibiotics: 236 (30%)	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** study suture (intracutaneous), non-absorbing skin sutures, staples, other sutures, undefined **Other:** Operating room used standard hygienic procedures to prevent SSIs in accordance with CDC recommendations (1999)	Emergency surgery: 95/728 (13%)
		Non-coated sutures (Vicryl, Monocryl, or PDS)	7.1 (5.5)	502 (64)	Prematurity <35 weeks: 34 (4); Type 1 diabetes: 5 (1); Immunosuppression: 6 (1); Asthma: 21 (3); Neurological disorder: 73 (9); Congenital anomaly: 73 (9); Heart defect: 11 (1); Miscellaneous: 27 (3)		Not reported whether antibiotic use was pre- or post-operative Prophylactic antibiotics: 245 (31%)		Emergency surgery: 92/725 (13%)
(Rozzelle, Leonardo et al, 2008)	Rozzelle 2008, USA	Vicryl Plus	9.7 (11.4) *The youngest patient in the study was 1 day old*	30 (65)	Weight <4 kg 6 (16) Recent CSF infection 3 (8) External ventricular drain prior to shunt op 5 (13)	**Bathing with soap:** Yes All participants received preoperative chlorhexidine skin cleansing and, betadine skin preparation **Nasal decolonisation:** NR	Yes All participants received preoperative intravenous antibiotics (cefazolin, or vancomycin if allergic to	**Sterile saline wash:** NR **Wound dressing:** NR **Method of skin closure:** Skin closures for all procedures were performed with	NR

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
						Other: Authors report use of iodine-impregnated adhesive drapes, and silicone shunt components were soaked in bacitracin solution before implantation	cephalosporins) and antibiotic wound irrigation prior to closure	poliglecaprone 25 sutures (Monocryl; Ethicon, Inc.). **Other:** NR	
		Vicryl	9.9 (9.8) *The youngest patient in the study was 1 day old*	18 (47)	Weight <4 kg 7 (15) Recent CSF infection 6 (13) External ventricular drain prior to shunt op 8 (17)		Yes All participants received preoperative intravenous antibiotics (cefazolin, or vancomycin if allergic to cephalosporins) and antibiotic wound irrigation prior to closure		NR
Primary: (Ruiz-Tovar, Llavero et al, 2020) Secondary: (Hospital General Universitario Elche, 2018)	Ruiz-Tovar 2020, Spain	Stratafix Symmetric Plus	65.8 (16.9)	28 (56.0*)	N (%) Hypertension: 22 (44) Diabetes mellitus: 11 (22) Dyslipidemia: 20 (40) Cardiopathy: 7 (14) COPD: 3 (6)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Clorhexidine-alcohol solution	Perioperative systemic antibiotics given and maintained for ≥5 days because all cases were considered severe intra-abdominal infection Prolongation decided on clinical evolution	**Wound dressing:** NR **Sterile saline wash:** Yes **Method of skin closure:** Staples **Other:** NR	Emergency 50 (100)
		PDS Plus Loop	64.7 (15.9)	26 (52.0*)	N (%) Hypertension: 24 (48) Diabetes mellitus:) 12 (24) Dyslipidemia, 17 (34) Cardiopathy, 9 (18) COPD: 2 (4)				Emergency 50 (100)
		PDS Loop	63.2 (17.8)	25 (50.0*)	N (%) Hypertension: 25 (50) Diabetes mellitus: 9 (18) Dyslipidemia: 15 (30) Cardiopathy: 7 (14) COPD: 2 (4)				Emergency: 50 (100)
(Ruiz-Tovar, Alonso et al, 2015)	Ruiz-Torvar 2015, Spain	Triclosan coated sutures (brand NR)	63.8 (15.5)	31 (62*)	Diabetes mellitus 16/50 (32%) High blood pressure 24/50 (48%) Dyslipidemia 16/50 (32%) Cardiopathy 12/50 (24%) Chronic obstructive pulmonary disease 6/50 (12%) Chronic renal failure 1/50 (2%)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Yes Peri-operative systemic antibiotics (imipenem 1 g/8 h intravenous [IV])	**Wound dressing:** NR **Sterile saline wash:**Yes; After fascial closure, subcutaneous tissue	NR

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
					Non-decompensated liver cirrhosis 1/50 (2%)		were used in both groups. In case of allergies to b-lactams, tigecycline (100 mg IV as starting dose, followed by 50 mg/12 h IV) was used. Both antibiotics were maintained for a minimum of 7 days	was irrigated with 500 mL of normal saline **Method of skin closure:** Staples **Other:** During the operation, the skin was prepared with chlorhexidine-alcohol solution, the incision was protected with adhesive plastic devices, body temperature was maintained with thermal blankets, and intravenous fluid infusion was optimized with a FloTrac sensor (Edwards, Irvine, CA).	
		Uncoated sutures (brand NR)	65.6 (14.9)	31 (60.8*)	Diabetes mellitus 15/51 (29 %) High blood pressure 25/51 (50 %) Dyslipidemia 18/51 (36 %) Cardiopathy 10/51 (20 %) Chronic obstructive pulmonary disease 5/51 (10 %) Chronic renal failure 2/51 (4 %) Non-decompensated liver cirrhosis 0		Yes Peri-operative systemic antibiotics (imipenem 1 g/8 h intravenous [IV]) were used in both groups. In case of allergies to b-lactams, tigecycline (100 mg IV as starting dose, followed by 50 mg/12 h IV) was used. Both antibiotics were maintained for a minimum of 7 days		NR
(Santos, Santos et al, 2019)	Santos 2019, Brazil	Vicryl Plus	62.01 (8.62)	175 (69.7)	Diabetes mellitus 92 (36.7) BMI < 18: 1 (0.4) BMI 18 – 25: 88 (38.3) BMI 26 – 30: 78 (33.9) BMI > 30: 63 (27.4)	**Bathing with soap:** Yes Preoperative decolonisation with a chlorhexidine bath one hour before going to the surgical centre. Asepsis was done on the operating room with soap chlorhexidine	Yes Antibiotic prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR	NR
		Vicryl	60.39 (9.03)	180 (70.0)	Diabetes mellitus 112 (43.6) BMI < 18: 1 (0.4) BMI 18 – 25: 84 (34.9) BMI 26 – 30: 85 (35.3) BMI > 30: 71 (29.5)		Yes Antibiotic prophylaxis: All patients	**Method of skin closure:** Sutures as assessed **Other:** NR	NR

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
						followed by alcoholic chlorhexidine **Nasal decolonisation: Yes** Nasal Mupirocine twice a day during the five days before surgery **Other:** NR			
(Seim, Tonnessen et al, 2012)	Seim 2012, Norway	Vicryl Plus	63.5 (0.7)	143* (89.4*)	Mean BMI (kg/m^2): 27.7 (SEM 0.3) Diabetes mellitus: 31 (19.4%) Peripheral vascular disease: 16 (10.0%)	**Bathing with soap:** Yes (shower with soap and Hibiscrub (chlorhexidinegluconate) the evening before and day of surgery) **Nasal decolonisation:** NR **Other:** Hair removal on afternoon of the day before surgery. Skin disinfected with chlorohexidine solution (5 mg/ml in 70% ethanol)	Yes Antibacterial prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** NR **Other:** Drape, compresses, and elastic bandages initially; customized stockings for approximately 3 weeks	Elective 164 (100)
		Vicryl	63.1 (0.8)	144* (88.3*)	Mean BMI (kg/m^2): 27.5 (SEM 0.3) Diabetes mellitus: 40 (24.5%) Peripheral vascular disease: 21 (12.9%)		Yes Antibacterial prophylaxis: All patients		Elective 164 (100)
(Soomro, Khurshaidi et al, 2017)	Soomro 2017, Pakistan	Triclosan coated sutures (brand NR)	Unclear: text states 25.70 (3.10) while table states 25.86 (3.51)	0	NR	**Bathing with soap:** All wounds were prepped using povidone iodine scrub and solution **Nasal decolonisation:** NR **Other:** NR	Yes Antibiotic prophylaxis: All patients	**Wound dressing:** Yes; “standard dressings” **Sterile saline wash:** NR **Method of skin closure:** NR **Other:** Standard post-operative instructions were given to all patients for wound care	NR
		Non-coated sutures (brand NR)	Unclear: text states 25.86 (3.51) while table states 25.70 (3.10)	0	NR		Yes Antibiotic prophylaxis: All patients		NR

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
Primary: (Sprowson, Jensen et al, 2018) Secondary: (Sprowson, Jensen et al, 2014)	Sprowson 2018, UK	Vicryl Plus	67.5 (10)	563 (46.0%*)	Hypertension: 586 (50.34) Atrial fibrillation: 57 (4.9) Ischemic Heart Disease: 81 (6.96) Hypothyroid: 74 (6.36) Type 1 Diabetes: 8 (0.69) Type 2 Diabetes:109 (9.36) Peripheral Vascular Disease: 66 (5.67) COPD: 43 (3.69) Dementia:1 (0.09) Alzheimers: 3 (0.26) Psoriatic arthritis: 3 (0.26) Rheumatoid arthritis: 21 (1.8)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** (Patients followed the standardised pathway from outpatient appointment to operation date)	Yes Antibacterial prophylaxis: All patients	**Wound dressing:** From October 2009, Aquacel Surgical dressings; prior to this, dressing choice at preference of surgeon **Sterile saline wash:** NR **Method of skin closure:** Subcuticular skin closure technique or metal clips **Other:** Standardised enhanced recovery pathway	Elective: 1223 (100)
		Vicryl	67.2 (9.7)	604 (45.6%*)	Hypertension:595 (46.74) Atrial fibrillation: 61 (4.79) Ischemic Heart Disease: 93 (7.31) Hypothyroid 99 (7.78) Type 1 Diabetes: 7 (0.55) Type 2 Diabetes: 135 (10.6) Peripheral Vascular Disease: 54 (4.24) COPD: 42 (3.3) Dementia: 1 (0.08) Alzheimers: 2 (0.16) Psoriatic arthritis: 8 (0.63) Rheumatoid arthritis: 34 (2.67)		Yes Antibacterial prophylaxis: All patients		Elective: 1323 (100)
Primary: (Sukeik, George et al, 2019) Secondary: (University College London, 2013)	Sukeik 2019, UK	Vicryl Plus	68.65 (10.90)	25 (30.9*)	Diabetes n(%): 10 (12.3*) BMI: mean 29.14 (SD 4.97)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Perioperative care plans (unspecified) similar for hip and knee procedures Patients have undergone pre-operative optimisation prior to surgery	Yes Antibiotic prophylaxis (first dose at induction of anaesthesia).	**Wound dressing:** Yes (for knee arthroplasty) **Sterile saline wash:** NR **Method of skin closure:** Skin clips **Other:** Anti-embolism stockings and low molecular weight heparin (thromboprophylaxis) From ISRCTN: standard postoperative treatment	Elective: 81 (100)
		Vicryl	67.85 (9.85)	24 (34.8*)	Diabetes n (%): 4 (5.8*) BMI: mean 28.70 (SD 5.13)				Elective: 69 (100)

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
Primary: (Sundaram K, Warren J et al, 2020a) Secondary: (The Cleveland Clinic, 2017)	Sundaram 2020a, USA	Stratafix Symmetric PDS Plus	68 (7)	14 (47)	Mean (SD) BMI, kg/m^2: =32.6 (5.76) Mean (SD) Charlson Comorbidity Index: 3.77 (1.78)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	No	**Wound dressing:** Surgical dressing **Sterile saline wash:** NR **Method of skin closure:** adhesive strips (Steristrips) **Other:** NR	Elective: 30 (100)
		Vicryl	66 (7)	13 (43)	Mean (SD) BMI, kg/m^2: 32.3 (4.95) Mean (SD): 3.37 (2.1)		No		Elective: 30 (100)
Primary: (Sundaram, Piuzzi et al, 2020b) Secondary: (The Cleveland Clinic, 2017)	Sundaram 2020b, USA	Stratafix Symmetric PDS Plus	61 (13)	17 (57)	Mean (SD) BMI, kg/m^2: 29 (4.8) Mean (SD) Charlson Comorbidity Index:1.8 (0.8)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	No	**Wound dressing:** Surgical dressing **Sterile saline wash:** NR **Method of skin closure:** adhesive strips (Steri-strips) **Other:** NR	NR but appears to be Elective: 30 (100)
		Vicryl	66 (10)	11 (37)	Mean (SD) BMI, kg/m^2: 30 (4.8) Mean (SD) Charlson Comorbidity Index: 1.8 (0.6)		No		NR but appears to be Elective: 30 (100)
Primary: (Tabrizi, Mohajerani et al, 2019) Secondary: (Shiraz University of Medical Sciences, 2018)	Tabrizi 2019, Iran	Vicryl Plus	44.73 (12.82)	83 (51.9)	Patients who were diabetic or smokers were excluded. Further details NR	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** Patients rinsed with 0.2% Chlorhexidine mouthwash before dental implant surgery and were instructed to continue using it for 7 days postoperatively	Yes Antibiotic prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** Yes in patients with a peri-implant infection: surgical sites were irrigated locally with normal saline and chlorhexidine 0.2% **Method of skin closure:** NR **Other:**	NR
		Vicryl	44.64 (12.24)	88 (55)	Patients who were diabetic or smokers were excluded. Further details NR		Yes Antibiotic prophylaxis: All patients		NR
Primary: (Thimour-Bergstrom, Roman-Emanuel et al, 2013) and (Steingrimsso	Thimour-Bergström 2013, Sweden	Vicryl Plus + Monocryl Plus	**Open vein harvesting:** 67.6 (8.3)	**Open vein harvesting**: 145* (78.8*) **Sternotomy:** 138* (77.1%*)	**Open vein harvesting:** Mean (SD) BMI: 27.6 (4.1) Diabetes: 46* (25%*) **Sternotomy:** Mean (SD) BMI: 27.7 (4.1) Diabetes: 45* (25.1%*)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR but operations conducted	Yes Antibacterial prophylaxis: All patients	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** one	Elective: 184 (100)

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
n, Thimour-Bergstrom et al, 2015) Secondary: (Turtiainen and Hakala, 2014) (Jeppsson, Thimour-Bergstrom et al, 2014) (Sahlgrenska University Hospital, 2010)			**Sternotomy**: 67.6 (8.1)			using standard techniques		continuous subcutaneous suture and one continuous intracutaneous suture **Other:** Wound covered with drape, compresses, and elastic bandage	
		Vicryl + Monocryl	**Open vein harvesting:** 66.9 (8.1) **Sternotomy:** 66.7 (8.2)	**Open vein harvesting:** 159* (83.7*) **Sternotomy:** 150* (84.3%*)	**Open vein harvesting:** Mean (SD) BMI: 27.6 (4.1) Diabetes: 50* (26.3%*) **Sternotomy:** Mean (SD) BMI: 27.5 (3.7) Diabetes: 47* (26.4%*)		Yes Antibacterial prophylaxis: All patients		Elective: 190 (100)
(Turtiainen, Saimanen et al, 2012)	Turtiainen 2012, Finland	Vicryl Plus and Monocryl Plus	72 (11)	87 (63)	Coronary artery disease 63 (45) Diabetes 43 (31) Hypertension 86 (62) Rheumatoid arthritis 5 (4) COPD 16 (12) Asthma 12 (9) Dialysis 1 (1) Current use of corticosteroids 19 (14) Current smoking 43 (31)	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Yes All but one of the included patients across both arms received antibiotic prophylaxis	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** NR **Other:** NR	Non-emergency surgery: 139 (100)
		Vicryl and Monocryl	72 (11)	86 (63)	Coronary artery disease 72 (53) Diabetes 44 (32) Hypertension 93 (68) Rheumatoid arthritis 7 (5) COPD 23 (17) Asthma 12 (9) Dialysis 6 (4) Current use of corticosteroids 15 (11) Current smoking 46 (34)		Yes All but one of the included patients across both arms received antibiotic prophylaxis		Non-emergency surgery: 137 (100)
(Williams, Sweetland et al, 2011)	Williams 2011, UK	Vicryl Plus or Monocryl Plus	Median: 61 (32–87)	0	NR	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	Antibiotic prophylaxis for surgery considered at high risk (high BMI, mastectomy, or axillary clearance): n=5	**Wound dressing:** Yes Wounds were dressed with Steri-Strips (3M, St. Paul, MN) and Tegaderm (3M) or Cosmopore (Hartmann USA, Rock Hill, SC) or Primapore (Smith &	Elective: 175 (100)

1c Data source *Endnote live link – to be added later*	**Study** *Author, year, location*	**Intervention or control, with name** *One row per arm*	**Age** *Mean (SD) years*	**Gender** *N (%) male*	**Pre-existing medical conditions** *N(%) with Diabetes / immunosuppression / asthma / neurological disorder / other (give details)*	**Pre-operative preparation to facilitate wound healing** *Bathing with soap: Yes / No / NR Nasal decolonisation: Yes / No / NR Other: Give details*	**Preoperative antibiotics** *Yes / No; if yes, give n (%)*	**Other post-operative care to facilitate wound healing** *Wound dressing: Yes / No / NR Sterile saline wash: Yes / No / NR Method of skin closure: Give details Other: Give details*	**N (%) emergency or elective surgery**
		Vicryl or Monocryl	Median: 59 (30–80)	0	NR		Antibiotic prophylaxis for surgery considered at high risk (high BMI, mastectomy, or axillary clearance): n=3	Nephew, Hull, UK), or Cosmopore alone, again at the discretion of the surgeon. **Sterile saline wash:** NR **Method of skin closure:** Sutures as assessed **Other:** NR	Elective: 175 (100)
Primary: (Zhang, Zhang et al, 2011) Secondary: (Ethicon Inc., 2008)	Zhang 2011, China	Vicryl Plus	Median 51.0 (range, min-max: 32.0-82.0)	0 (0)	BMI (kg/m^2),median 23.9 (range, min-max: 16.0-28.0) None of the patients had comorbid diabetes, COPD, or asthma	**Bathing with soap:** NR **Nasal decolonisation:** NR **Other:** NR	No	**Wound dressing:** NR **Sterile saline wash:** NR **Method of skin closure:** NR **Other:** NR	Elective: 51 (100)
		Chinese silk	Median 52.0 (range, min-max: 34.0-75.0)	0 (0)	BMI (kg/m^2),median 23.6 (range, min-max:18.2-34.0) None of the patients had comorbid diabetes, COPD, or asthma		No		Elective: 50 (100)

Table 2 Summary of all relevant abstracts

We identified and extracted data from 31 generally well conducted RCTs, thus we decided to exclude conference abstracts from the review because of the sparse data reporting and the potential for error and bias compared to full publications (Li G, Abbade LPF et al, 2017, Scherer R and Saldanha I, 2019). The evidence on the primary outcome and adverse events seemed robust enough and abstracts were unlikely to add significant detailed robust information.

Table 3 Summary of all relevant ongoing or unpublished studies

Clinicaltrials.gov and trial registries were checked for results for the following studies, but no results data were available. Trial records were also also cross-checked against published papers.

Data source *Endnote live link – to be added later*	**Study** *Author, year, country*	**Study design**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Outcomes**	**Status as detailed by J&J team**
Completed, no associated publication retrieved in searches							
(Cardiff and Vale University Health Board, 2009) NCT00830271	Cardiff and Vale University Health Board, 2020, UK	RCT	Female patients 18 years and older undergoing elective breast cancer surgery. Patients with inflammatory diseases, prior chemotherapy or radiotherapy, and immune diseases were excluded. / NHS Trust hospital / NR	Vicryl plus and Monocryl plus	Vicryl and Monocryl	Primary: reduction of surgical site infection (time frame: 6-7 months). Secondary: estimation time in hospital and return to work numbers of haematomas and seromas (Time Frame: 6-9 months)	Completed 2011 Not an Ethicon / J&J sponsored trial
(Cairo University, 2009) NCT01019447	Cairo university, 2011, Egypt	RCT	Patients of all ages undergoing surgery. / Medical centre / NR	Vicryl Plus Triclosan-coated polyglactin 910 antimicrobial sutures (Vicryl Plus)	Vicryl Polyglactin 910 antimicrobial sutures	Primary: signs of Surgical Site Infections (SSI) according to CDC criteria (Time Frame: 30 days (or 1 year in case of prosthesis)) Secondary: post-operative hospital stay in days (Time Frame: 30 days)	Completed 2011 Not an Ethicon / J&J sponsored trial
(North Karelia Central Hospital, 2010) NCT01101789	North Karelia Central Hospital, 2010, Finland	RCT	Patients between 18 and 100 years old undergoing peripheral vascular surgery / Hospital / NR	Triclosan coated suture	Regular sutures	Surgical wound infection (time frame: one month after surgery)	Completed 2011 Not an Ethicon / J&J sponsored trial
(Hospital General Universitario	Hospital General Universitario	RCT	Patients of all ages with fecal peritonitis / Medical centre / NR	Triclosan coated suture	Non-triclosan-coated suture	SSI (up to 60 days post-surgery)	Completed 2013

Data source *Endnote live link – to be added later*	Study *Author, year, country*	Study design	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Outcomes	Status as detailed by J&J team
Elche, 2013) NCT02018289	Elche, 2013, Spain						Not an Ethicon / J&J sponsored trial
(Zagazig University, 2016) NCT04137172	Zagazig University, 2019, Egypt	RCT	Patients aged 18 years and older undergoing surgery for primary or incisional ventral hernia. Patients undergoing revision or emergency surgery and patients with parastomal hernias were excluded. / Medical Centre / NR	Proline (1) sutures	PDS 0, a stratifix suture (STRATAFIX™ Symmetric PDS™ Plus Knotless Tissue Control Device); PDS LOOP 0	Primary: post-operative complications, including number of days spent in hospital (up to 6 months) Secondary: SSI CDC definition (up to 6 months post-surgery); surgical site occurrence (Hematoma, seroma, dehiscence, necrosis, non-healing wound found on abdominal exam, up to 6 months post-surgery); hernia reoccurrence (up to 6 months post-surgery)	Completed 2019 Not an Ethicon / J&J sponsored trial
Ongoing trials							
(Rothman Institute Orthopaedics, 2015) NCT02609464	Rothman Institute Orthopedics, PA	RCT	Inclusion: All patients receiving elective primary THA through the direct anterior approach Exclusion: Prior surgical incision or scar in close proximity of the proposed incision (<2 cm). Local skin conditions such as dermatitis, eczema, or psoriasis. Active or previous infection in the skin or the hip, Inflammatory arthritis; connective tissue or vascular disorders or diseases that would adversely affect wound healing including the use of oral or topical corticosteroid use	Stratafix Symmetric PDS Plus	Vicryl	Primary to evaluate the incidence of suture abscesses and other wound related problems after total hip replacement performed through the direct anterior approach with the use of subcutaneous barbed sutures compared to interrupted knotted sutures. Secondary objectives will be the assessment of [1] surgical site infection; [2] incidence of wound dehiscence; [3] surgical time and cost of suture used; and [4] wound appearance and [5] patient satisfaction with wound healing and appearance.	Ongoing Sponsored by Ethicon (IIS 15-202) N = 100
(The University of Texas Medical Branch, 2017) NCT03386240	University of Texas Medical Branch, Galveston, 2017, United States	RCT	Female patients aged 18 to 50 undergoing caesarean delivery. Immunosuppressed patients, patients with skin infections and patients with coagulopathy were excluded. / Medical centre / NR	Vicryl-plus, monocryl-plus, PDS-plus (Triclosan-coated Sutures)	Vicryl, monocryl, PDS (not coated with triclosan)	Composite of endometritis and/or wound infection and/or other post-cesarean infections (SSI) within 30 days of delivery.	Ongoing Not an Ethicon / J&J sponsored trial

Data source *Endnote live link – to be added later*	**Study** *Author, year, country*	**Study design**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Outcomes**	**Status as detailed by J&J team**
(Thomas Jefferson University, 2018) NCT03533595	Thomas Jefferson University, 2018, United States	RCT	Patients aged 18 to 75 undergoing thoracolumbar fusion of at least 3 vertebral levels. Patients with infections, diabetes and incidental durotomy were excluded. / Medical centre / NR	Stratafix Barbed Suture	Standard suture	Primary: reduced operating times (patients followed 6 months after surgery). Secondary: safety evaluation of wound dehiscence (time frame: patient followed for 6 months from surgery); safety evaluation of surgical site infection (ssi) rate (time frame: patient followed for 6 months from surgery); safety evaluation of 30 days readmission rates (time frame: patient followed for 30 days from surgery)	Ongoing Sponsored by Ethicon
(ClinAmygate, 2020) NCT04255927	ClinAmygate, 2020, Egypt	RCT	Patients aged 18 to 75 undergoing laparoscopic surgery. Patients with immunodeficiency disorders, patients receiving anti-cancer or immunosuppressive therapy, and patients with pre-operative infection were excluded. / Hospital / NR	Vicryl plus (Coated Polyglactin 910 with Triclosan)	Vicryl (Coated Polyglactin 910 without Triclosan)	Primary: port site infection (up to 30 days post-surgery). Secondary: hospital stay (up to 30 days)	Ongoing Not an Ethicon / J&J sponsored trial
(ClinAmygate, 2020) NCT04256824	ClinAmygate, 2020, Egypt	RCT	Patients aged 18 to 75 undergoing clean-contaminated wound surgery. Patients with immunodeficiency disorders, patients receiving anti-cancer or immunosuppressive therapy, and patients with pre-operative infection were excluded. / Hospital / NR	Coated Polyglactin 910 with Triclosan (coated vicryl plus)	Coated Polyglactin 910 without Triclosan (vicryl)	Primary: incidence of surgical site infection (up to 30 days post-surgery). Secondary: Hospital stay (up to 30 days)	Ongoing Not an Ethicon / J&J sponsored trial
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Data source *Endnote live link – to be added later*	Study *Author, year, country*	Study design	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Outcomes	Status as detailed by J&J team
			[redacted]			[redacted]	
(University of Birmingham, 2018) FALCON NCT03700749	University of Birmingham, 2019, Low and Middle Income Countries	RCT	Paediatric and adult patients (lower age limit is country-specific) with at least one abdominal incision that is ≥5cm (open or laparoscopic extraction site), with an anticipated clean-contaminated, contaminated or dirty surgical wound. / Hospitals / NR	2% alcoholic chlorhexidine and triclosan-coated suture; 10% aqueous povidone-iodine and triclosan-coated suture	2% alcoholic chlorhexidine non-coated suture; 10% aqueous povidone-iodine and non-coated suture	Primary: surgical site infection (SSI) within 30-days post surgery Secondary: SSI at discharge from hospital; mortality; unplanned wound opening; re-operation for SSI; participant readmission; resistance of organisms; questionnaire – health resource usage. All within 30-days post surgery.	Ongoing Not an Ethicon / J&J sponsored trial
(Agaplesion Diakonieklinikum Rotenburg Wümme Klinik für Allgemein-Viszeral- und Thorax-chirurgie, 2017) Matz 2019 DRKS00010047	AGAPLESION Diakonie Hospital Rotenburg (Wuemme), Department of General-, Visceral- and Thoracic Surgery, 2019, Germany	RCT	Patients 18 years or older with planned open abdominal surgery/ Medical centre / NR	Absorbable, monofile, triclosan-coated suture (Monocryl plus 4x0)	Continuous subcuticular suture with a absorbable, monofile, non-coated suture (Monocryl 4x0)	Primary: wound infection within 30 days postoperative. Secondary: risk factors to wound infections (sex, age, BMI, ASA, Diabetes mellitus, immunosuppression, blood loss, operating time); frequency of wound dehiscence; frequency of re-operation because of wound dehiscence; length of laparotomy; 30 days mortality, kind of laparotomy (longitudinal vs. transverse)	Ongoing Not an Ethicon / J&J sponsored trial
(Honghui Hospital Xi'an	Honghui Hospital Xi'an	RCT	Patients over 18 and under 80 years old undergoing primary	Triclosan coated sutures	Non-coated sutures	Wound closure; pain level (VAS); postoperative hospital stay;	Ongoing

Data source *Endnote live link – to be added later*	Study *Author, year, country*	Study design	Patient population, setting, and withdrawals/lost to follow up	Intervention	Comparator(s)	Outcomes	Status as detailed by J&J team
Jiaotong University, 2020) ChiCTR2000031795	Jiaotong University, 2020, China		spinal surgery. Those with infectious diseases, diabetes with poor blood control, and immunodeficiency were excluded. / Hospital / NR			satisfaction; frequency of changing wound dressing; inflammatory markers (white blood cells(WBC), C-reactive protein (CRP))	Not an Ethicon / J&J sponsored trial
(University Hospital Maastricht, 2007) ISRCTN32724539	University Hospital Maastricht, 2007, The Netherlands	RCT	Women between 16 and 65 years of age undergoing a breast reduction. Patients with diabetes, skin diseases, history of keloid formation, other degenerative diseases, and using immunosuppressive medication were excluded / Medical centre / NR	Triclosan coated suture	Standard suture	Primary: wound healing (complications and dehiscence registered) Secondary: scar quality (Colorimetric measurement one month after surgery and Subjective scar assessment by patients and one primary observer using the Patient and Observer Scar Assessment Scale (POSAS))	Ongoing Not an Ethicon / J&J sponsored trial
(Department of General Thoracic Surgery Graduate School of Medicine Chiba University, 2010) UMIN000003032	Department of General Thoracic Surgery, Graduate School of Medicine, Chiba University, 2010, Japan	RCT	Patients age 20 to 80 years old undergoing thoracotomy (except for wedge resection) for lung cancer surgery. Patients with history of chemotherapy, radiotherapy or malignant disease were excluded / Medical centre / NR	VICRYL PLUS*	VICRYL	Primary: wound infection rate Secondary: wound dehiscence rate, safety, colonization rate on the wound and suture.	Ongoing Not an Ethicon / J&J sponsored trial
(Rambam Health Care Campus, 2011) NCT01457859	Rambam Health Care Campus, 2011, Israel	RCT	Patients 18 years or older undergoing elective and urgent coronary artery bypass grafting requiring leg wound closure. Patients with prior antibiotic treatment were excluded. / Medical centre / NR	Triclosan coated surgical sewing threads (VICRYL+ and MONOCRYL+)	Conventional non-coated surgical sewing threads (POLYSORB and BIOSYN)	Primary: leg wound infection according to CDC SSI criteria (up to 45 days post-surgery). Secondary: antibiotics administered for leg wound infection (up to 45 days post-surgery); length of stay; incidence of readmission (up to 45 days post-surgery)	Ongoing Not an Ethicon / J&J sponsored trial
(Jana Morgan, 2012) ACTRN12612000768897	Jana Morgan, 2012, New Zealand	RCT	Female patients undergoing elective, semi-elective and emergency caesarean sections. Patients with diabetes type 1 and 2 were excluded. / Hospital / NR	Triclosan-coated sutures	Standard, non-antibacterial, sutures	Primary: SSI assessed using the standard follow-up tool to department - the "Lead Maternit Carer" (within 30 days post-surgery). Secondary: Wound/fascial dehiscence (within 30 days post-surgery)	Ongoing Not an Ethicon / J&J sponsored trial

Data source *Endnote live link – to be added later*	**Study** *Author, year, country*	**Study design**	**Patient population, setting, and withdrawals/lost to follow up**	**Intervention**	**Comparator(s)**	**Outcomes**	**Status as detailed by J&J team**
(Multicenter Clinical Study Group of Osaka Colorectal Cancer Treatment Group, 2020) JPRN-UMIN000042605	Multicenter Clinical Study Group of Osaka, Colorectal Cancer Treatment Group, 2020, Japan	RCT	Patients aged 20 years and over undergoing colorectal cancer surgery. Patients with history of surgical wounds on planned surgical site, history or radiotherapy or chemotherapy, and infection were excluded. / Hospital / NR	Triclosan-coated sutures (sutures used for fascial sutures will be absorbable sutures selected by each institution)	Uncoated sutures	Primary: incidence of surgical site infection. Secondary: surgical site complications other than SSI; post-operative hospital stay.	Ongoing Not an Ethicon / J&J sponsored trial
(University Tunis El Manar, 2016) NCT02847936	University Tunis El Manar, 2016, Tunisia	RCT	Pregnant patients undergoing episiotomy at delivery. Patients with immunodeficiency, history of keloids, diabetes mellitus or clinical signs of infection were excluded. / Medical centre / NR	Vicryl plus	Vicryl suture	Primary: number of sutures used (time frame: 2 hours); number of patients with wound complications (infection, hematoma, disruption, time frame: 1 week). Secondary: cost of the treatment with and without infection (time Frame: 2 weeks); number of patients with adverse outcomes (time frame: 2 weeks)	Ongoing Not an Ethicon / J&J sponsored trial

Table 4a Outcomes: Incidence of SSI

4a Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT unless specified*	**N (%) patients experiencing at least one SSI**	**Total number of SSIs**	**SSIs per 1000 bed days**
Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	Rate of SSI, according to CDC guidelines (2017)	Within 30 days post-surgery	Adult	All	PDS Plus + Vicryl Plus	86 (treated)	9 (10.4)	NR	NR
		Within 30 days post-surgery	Adult	All	Prolene + Vicryl	91 (treated)	19 (20.8)	NR	NR
Barac 2011, Hungary (Baracs, Huszar et al, 2011)	Detection of any SSI; no definition reported	Within 30 days following surgery	Adults	Clean-contaminated	PDS Plus	188	23 (12.2)	NR	NR
		Within 30 days following surgery	Adults	Clean-contaminated	PDS II	197	24 (12.2)	NR	NR
	Detection of any "late" surgical site infection; i.e. SSI presenting after hospital discharge	Within 30 days following surgery, and after hospital discharge, i.e. recognized in the outpatient setting	Adults	Clean-contaminated	PDS Plus	188	4 (2.1*)	NR	NR
		Within 30 days following surgery, and after hospital discharge, i.e. recognized in the outpatient setting	Adults	Clean-contaminated	PDS II	197	9 (4.6*)	NR	NR
Diener 2014, Germany (Diener, Knebel et al, 2014)	Incidence of superficial or deep SSI, based on modified CDC criteria, within 30 days after index operation	Within 30 days after index operation	Adults	All	PDS Plus	587 (analysed)	87 (14.8)	NR	NR
		Within 30 days after index operation	Adults	All	PDS II	598 (analysed)	96 (16.1)	NR	NR
Ford 2005, USA (Ford, Jones et al, 2005)	Presence of infection (an item on the wound healing assessment). An observed redness >3–5 mm from the wound margins, edema, purulent discharge, pain, and increased skin temperature were considered evidence of an infection; not confirmed by culture	At 80 (± 5) days post-surgery	Child	Clean or clean-contaminated	Vicryl Plus	91 (observed cases)	3 (3.3*)	NR	NR
		At 80 (± 5) days post-surgery	Child	Clean or clean-contaminated	Vicryl	44 (observed cases)	0 (0)	NR	NR
Galal 2011, Egypt (Galal and El-Hindawy, 2011)	Overall incidence of SSI, according to modified CDC criteria (1992)	Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	All	Vicryl Plus	230	17 (7)	NR	NR
		Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	All	Vicryl	220	33 (15)	NR	NR
		Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	Clean	Vicryl Plus	117	4 (3)	NR	NR
		Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	Clean	Vicryl	119	8 (7)	NR	NR
		Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	Clean-contaminated	Vicryl Plus	71	8 (11)	NR	NR

4a Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT unless specified*	**N (%) patients experiencing at least one SSI**	**Total number of SSIs**	**SSIs per 1000 bed days**
		Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	Clean-contaminated	Vicryl	72	14 (19)	NR	NR
		Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	Contaminated	Vicryl Plus	35	5 (14)	NR	NR
		Within 30 days post-discharge (1 year for prosthetic surgery)	Adult	Contaminated	Vicryl	36	11 (31)	NR	NR
Ichida 2018, Japan (Ichida, Noda et al, 2018)	Incidence of superficial or deep SSI according to the CDC criteria	Within 30 days post-surgery	Both	All	Vicryl Plus	508 (analysed)	35 (6.9)	NR	NR
		Within 30 days post-surgery	Both	All	Vicryl	505 (analysed)	30 (5.9)	NR	NR
Isik 2012, Turkey (Isik, Selimen et al, 2012)	Incidence of overall SSI, according to CDC criteria	Within 30 days post-surgery	NR	NR	Vicryl Plus	170*	9 (5.3)	NR	NR
		Within 30 days post-surgery	NR	NR	Vicryl	340*	19 (5.6)	NR	NR
	Incidence of sternal SSI, according to CDC criteria	Within 30 days post-surgery	NR	NR	Vicryl Plus	170	4 (2.4)	NR	NR
		Within 30 days post-surgery	NR	NR	Vicryl	340	12 (3.5)	NR	NR
	Incidence of leg SSI, according to CDC criteria	Within 30 days post-surgery	NR	NR	Vicryl Plus	142 (evaluable patients)	5 (3.5)	NR	NR
		Within 30 days post-surgery	NR	NR	Vicryl	260 (evaluable patients)	10 (3.8)	NR	NR
Justinger 2013, Germany (Justinger, Slotta et al, 2013)	Incidence of SSIs during the hospital stay and 2-week follow-up post-discharge, with SSI defined according to CDC criteria	Within 2 weeks post-discharge	Adult	All	PDS Plus	485 (treatment completers)	31 (6.4)	NR	NR
		Within 2 weeks post-discharge	Adult	All	PDS II	371 (treatment completers)	42 (11.3)	NR	NR
Karip 2016, Turkey (Karip, Celik et al, 2016)	Rate of infection, based on surgeon-assessed signs of infection (rash, fever, or purulent discharge) on physical examination	At 2 weeks post-surgery	Adult	NR	Monocryl Plus	54	5 (9.3)	NR	NR
		At 2 weeks post-surgery	Adult	NR	Monocryl	52	10 (19.2)	NR	NR
Lin 2018, Taiwan (Lin, Chang et al, 2018)	Incidence of SSI within 3 months post-surgery, based on wound condition	Within 3 months post-surgery	Adult	Clean	Vicryl Plus	51	0 (0)	NR	NR
		Within 3 months post-surgery	Adult	Clean	Vicryl	51	2 (3.9)	NR	NR
Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	Overall rate of incisional SSIs (superficial and deep) , according to CDC 1999 criteria	Within 30 days post-discharge	Adult	Clean-contaminated	Vicryl Plus + PDS Plus	140 (treatment completers)	18 (12.9)	NR	NR
		Within 30 days post-discharge	Adult	Clean-contaminated	Vicryl + PDS II	141 (treatment completers)	15 (10.6)	NR	NR
Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	Incidence of SSI: NR how this was determined	Unclear: NR but study suggests within 1 year post-surgery	Both	NR	Vicryl Plus	50	5 (10)	NR	NR
		Unclear: NR but study suggests within 1 year post-surgery	Both	NR	Vicryl	50	4 (8)	NR	NR

4a Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT unless specified*	**N (%) patients experiencing at least one SSI**	**Total number of SSIs**	**SSIs per 1000 bed days**
Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	Incidence of wound infection, according to CDC guidelines (1999)	Within 30 days post-discharge	Both	Clean-contaminated	Vicryl Plus	206	9 (4.3)	NR	NR
		Within 30 days post-discharge	Both	Clean-contaminated	Vicryl	204	19 (9.3)	NR	NR
Olmez 2019, Turkey (Olmez, Berkesoglu et al, 2019)	Incidence of SSI; definition NR but NICE guidance CG74 is referenced *Data for subgroups are calculated from Table 5 of the published paper; values for "all" patients are taken from Table 5 rather than the study abstract*	Within 30 days post-surgery	Adult	All	PDS Plus	445 (completers)	60 (13.5)	NR	NR
		Within 30 days post-surgery	Adult	All	PDS II	445 (completers)	116 (26.1)	NR	NR
		Within 30 days post-surgery	Adult	Clean	PDS Plus	18 (completers)	0 (0)	NR	NR
		Within 30 days post-surgery	Adult	Clean	PDS II	66 (completers)	18 (27.3)	NR	NR
		Within 30 days post-surgery	Adult	Clean-contaminated	PDS Plus	396 (completers)	54 (13.6)	NR	NR
		Within 30 days post-surgery	Adult	Clean-contaminated	PDS II	255 (completers)	62 (24.3)	NR	NR
		Within 30 days post-surgery	Adult	Contaminated	PDS Plus	30 (completers)	5 (16.7)	NR	NR
		Within 30 days post-surgery	Adult	Contaminated	PDS II	122 (completers)	34 (27.9)	NR	NR
		Within 30 days post-surgery	Adult	Dirty	PDS Plus	1 (completers)	1 (100)	NR	NR
		Within 30 days post-surgery	Adult	Dirty	PDS II	2 (completers)	2 (100)	NR	NR
Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	Presence of wound infection	Hospitalisation period	Adult	NR	Vicryl Plus	NR; 91 randomised	4 (4.3)	NR	NR
		Hospitalisation period	Adult	NR	Vicryl	NR; 93 randomised	12(13.2)	NR	NR
Renko 2017, Finland (Renko, Paalanne et al, 2017)	Occurrence of *any* (superficial and deep) SSI, defined using CDC 1992 criteria	Within 30 days post- surgery	Child	All	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus, or PDS Plus	mITT: 778	20 (3)	NR	NR
		Within 30 days post- surgery	Child	All	Non-coated sutures (Vicryl, Monocryl, or PDS)	mITT: 779	42 (5)	NR	NR
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	Incidence of shunt infections	Within 14 weeks post-surgery	Both	NR	Vicryl Plus	46 operations	2 (4.3)	NR	NR
		Within 14 weeks post-surgery	Both	NR	Vicryl	38 operations	8 (21)	NR	NR
Ruiz-Tovar 2020, Spain (Ruiz-Tovar,	Incidence of incisional SSI, as defined using CDC 1992 criteria	Within 30 days post- surgery	Adult	Contaminated and dirty	Stratafix Symmetric Plus	47 (analysed)	Incisional SSI 3 (6.4)	NR	NR
		Within 30 days post- surgery	Adult	Contaminated and dirty	PDS Plus Loop	45 (analysed)	Incisional SSI 4 (8.9)	NR	NR

4a Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT unless specified*	**N (%) patients experiencing at least one SSI**	**Total number of SSIs**	**SSIs per 1000 bed days**
Llavero et al, 2020)		Within 30 days post- surgery	Adult	Contaminated and dirty	PDS Loop	47 (analysed)	Incisional SSI 11 (23.4)	NR	NR
Ruiz-Tovar 2015, Spain (Ruiz-Tovar, Alonso et al, 2015)	Incidence of incisional SSI, as defined using CDC 1992 criteria	NR; presume 60 days post-surgery as this was longest follow up	NR	Dirty	Triclosan coated suture	50	5* (10)	NR	NR
		NR; presume 60 days post-surgery as this was longest follow up	NR	Dirty	Uncoated suture	51	18* (35.3)	NR	NR
Santos 2019, Brazil (Santos, Santos et al, 2019)	Saphenectomy wound infection was defined as hyperemia and peri-border cellulitis with opening (dehiscence or necrosis) of 3 cm or more in the longitudinal direction and drainage of purulent secretion	Within 30 days of the surgical procedure	NR but mean age suggests adult only	NR	Vicryl Plus	251 (completers)	13 (5.3)	NR	NR
		Within 30 days of the surgical procedure	NR but mean age suggests adult only	NR	Vicryl	257 (completers)	20 (7.9)	NR	NR
Seim 2012, Norway (Seim, Tonnessen et al, 2012)	Incidence of SSI , diagnosed based on positive bacterial culture and clinical judgement	Within 4 weeks post-surgery	Adult	NR	Vicryl Plus	160 (treatment completers)	16 (10.0)	NR	NR
		Within 4 weeks post-surgery	Adult	NR	Vicryl	163 (treatment completers)	17 (10.4)	NR	NR
Soomro, 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	Incidence of SSI according to CDC criteria (version NR)	Within 30 days post-surgery	Adult	Clean	Triclosan coated sutures (brand NR)	189	7 (3.7)	NR	NR
		Within 30 days post-surgery	Adult	Clean	Non-coated sutures (brand NR)	189	11 (5.8)	NR	NR
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Overall rate of incisional SSI (superficial and deep) according to Health Protection Agency definitions	Within 30 days post-surgery	Adult	NR	Vicryl Plus	1164 (analysed	21 (1.8)	NR	NR
		Within 30 days post-surgery	Adult	NR	Vicryl	1273 (analysed	32 (2.5)	NR	NR
Sukeik 2019, UK (Sukeik, George et al, 2019)	Occurrence of superficial SSIs, reported as a wound complication	At 2 weeks post-surgery	Adult	NR	Vicryl Plus	81	2 (2.5*)	NR	NR
		At 2 weeks post-surgery	Adult	NR	Vicryl	69	1 (1.4*)	NR	NR
	Occurrence of superficial and deep SSIs, reported as a wound complication	At 6 weeks post-surgery	Adult	NR	Vicryl Plus	81	4* (4.9*)	NR	NR
		At 6 weeks post-surgery	Adult	NR	Vicryl	69	1 (1.4*)	NR	NR
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	Occurrence of SSI (superficial or deep), usinig definitions adapted from Knee Society consensus criteria (2013), was assessed as part of	Within 90 days post-surgery	Adult	NR	Stratafix Symmetric PDS Plus	30	1 (3)	NR	NR
		Within 90 days post-surgery	Adult	NR	Vicryl	30	0 (0)	NR	NR

4a Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT unless specified*	**N (%) patients experiencing at least one SSI**	**Total number of SSIs**	**SSIs per 1000 bed days**
	'overall wound complications'								
Sundaram 2020b (Sundaram, Piuzzi et al, 2020b)	Occurrence of SSI (superficial or deep), based on Hip Society (2016) definitions, was assessed as part of 'overall wound complications'. SSIs were not reported in either the full publication, or in the TRR as an infection/ infestation under the 'other (non serious) adverse effect ' category (frequency threshold 0% for reporting).								
Tabrizi, 2019, Iran (Tabrizi, Mohajerani et al, 2019)	Incidence of SSI, defined as local erythematous changes in the mucosa around the dental implant with a purulent discharge, or localized abscess formation at the surgical site, and/or increasing pain and swelling in the operated area	28 days post-surgery *(unclear whether reported SSIs are those present on day 28, or all occuring between days 0-28)*	Adult	NR	Vicryl Plus	160	12 (7.5)	NR	NR
		28 days post-surgery *(unclear whether reported SSIs are those present on day 28, or all occuring between days 0-28)*	Adult	NR	Vicryl	160	11 (6.9)	NR	NR
Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013)	Incidence of SSI in the vein-harvesting leg, according to CDC definition (1992), within 60 days after surgery	Within 60 days post-surgery	Adult	NR	Vicryl Plus + Monocryl Plus	184 (treated)	23 (12.5)	NR	NR
		Within 60 days post-surgery	Adult	NR	Vicryl + Monocryl	190 (treated)	38 (20.0)	NR	NR
	Incidence of any sternal wound infection (superficial and deep), according to CDC definition, within 60 days after surgery	Within 60 days post-surgery	Adult	NR	Vicryl Plus + Monocryl Plus	179 (treated)	23 (12.8)	NR	NR
		Within 60 days post-surgery	Adult	NR	Vicryl + Monocryl	178 (treated)	20 (11.2)	NR	NR
Turtiainen, 2012, Finland (Turtiainen, Saimanen et al, 2012)	Incidence of SSI according to CDC 1992 criteria	Within 30 days post-surgery	Adult	NR	Vicryl Plus and Monocryl Plus	139	31 (22.3)	NR	NR
		Within 30 days post-surgery	Adult	NR	Vicryl and Monocryl	137	30 (21.9)	NR	NR
Williams 2011 UK (Williams, Sweetland et al, 2011)	Incidence of wound infection, according to CDC guidelines (1999)	Within 6 weeks post-surgery	Adult	Clean	Vicryl Plus + Monocryl Plus	66 (completers)	10 (15.2)	NR	NR
		Within 6 weeks post-surgery	Adult	Clean	Vicryl + Monocryl	61 (completers)	14 (22.9)	NR	NR
Zhang 2011, China (Zhang, Zhang et al, 2011)	Incidence of SSIs, based on ASEPSIS wound scores and CDC criteria	At 30 (and 90) days post-surgery *(Authors stated there were no further changes in the incidence of SSI through day 90)*	Adult	Clean	Vicryl Plus	46 (PP)	2 (4.3)	NR	NR
		At 30 (and 90) days post-surgery	Adult	Clean	Chinese silk	43 (PP)	5 (11.1)	NR	NR

4a Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT unless specified*	**N (%) patients experiencing at least one SSI**	**Total number of SSIs**	**SSIs per 1000 bed days**
		(Authors stated there were no further changes in the incidence of SSI through day 90)							

Table 4b Outcomes: Antibiotic use for SSI (including prescription, duration and dose)

Note: this table does not include studies in which all patients were administered with peri/post-operative antibiotic prophylaxis

Reporting of antibiotic use lacked detail and it was often not explicit whether antibiotics were given only to patients requiring treatment for an SSI, or whether they were provided to all patients as prophylaxis.

In order to include only the most relevant data in the analysis of antibiotic use for SSI, we extracted details of pre-operative antibiotics into Table 1c (summary of patient details). Outcome table 4b reports any data that appeared to relate to the number of patients treated with antibiotics for an SSI, whether this was explicitly reported by the authors, or suggested by the context of the data. This data informed the qualitative analysis of the outcomes "antibiotic use for SSI". Table 4b also notes studies in which the authors stated that antibiotics for SSIs were given, but do not report details of this treatment by arm.

4b Study *Author, year, country*	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention or control, with name**	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients receiving post-operative antibiotics**	**Reason for antibiotics, if reported** *SSI / NR*	**Types of antibiotics prescribed** *As described by authors*	**Duration and dose of antibiotics for SSI** *As reported by authors*
Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	Within 30 days post-surgery	Adult	All	PDS Plus + Vicryl Plus	92	2 (2.2*)	SSI	NR	NR
	Within 30 days post-surgery	Adult	All	Prolene + Vicryl	95	2 (2.1*)	SSI	NR	NR
Barac 2011, Hungary (Baracs, Huszar et al, 2011)	Outcome not reported for this study								
Diener 2014, Germany (Diener, Knebel et al, 2014)	Within 30 days after index operation	Adults	All	PDS Plus	587	126 (21.5)	NR	NR	NR
	Within 30 days after index operation	Adults	All	PDS II	598	112 (18.7)	NR	NR	NR
Ford 2005, USA (Ford, Jones et al, 2005)	80 (± 5) days post-implantation	Child	Clean or clean-contaminated	Vicryl Plus	76 (observed cases)	17* (22)	NR	NR	NR
	80 (± 5) days post-implantation	Child	Clean or clean-contaminated	Vicryl	38 (observed cases)	11* (29)	NR	NR	NR
Galal 2011, Egypt (Galal and El-Hindawy, 2011)	Outcome not reported for this study								
Ichida 2018, Japan (Ichida,	Up to 30 days post-discharge	Both	All	Vicryl Plus	508	88 (17.3)	SSI	NR	NR

4b Study *Author, year, country*	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention or control, with name**	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients receiving post-operative antibiotics**	**Reason for antibiotics, if reported** *SSI / NR*	**Types of antibiotics prescribed** *As described by authors*	**Duration and dose of antibiotics for SSI** *As reported by authors*
Noda et al, 2018)	Up to 30 days post-discharge	Both	All	Vicryl Plus	505	85 (16.8)	SSI	NR	NR
Isik 2012, Turkey (Isik, Selimen et al, 2012)	Outcome not reported for this study								
Justinger 2013, Germany (Justinger, Slotta et al, 2013)	Outcome not reported for this study								
Karip 2016, Turkey (Karip, Celik et al, 2016)	Outcome not reported for this study								
Lin 2018, Taiwan (Lin, Chang et al, 2018)	Within 3 months post-surgery	Adult	Clean	Vicryl Plus	51	0	SSI	NR	NR
	Within 3 months post-surgery	Adult	Clean	Vicryl	51	2 (3.9)*	SSI	Parenteral antibiotics: gentamicin + oxacillin: 1 Cefazolin: 1 Followed by unspecified oral antibiotics: 2	**Dose:** NR **Duration:** Parenteral antibiotics: 1 week Subsequent oral antibiotics: 1 week
Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	Outcome not reported for this study								
Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	Outcome not reported for this study								
Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	Outcome not reported for this study								
Olmez 2019, Turkey (Olmez, Berkesoglu et al, 2019)	NR: antibiotics for SSIs were given but details are not reported								
Rasic 2011, Croatia (Rasic,	Outcome not reported for this study								

4b Study *Author, year, country*	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention or control, with name**	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients receiving post-operative antibiotics**	**Reason for antibiotics, if reported** *SSI / NR*	**Types of antibiotics prescribed** *As described by authors*	**Duration and dose of antibiotics for SSI** *As reported by authors*
Schwarz et al, 2011)									
Renko 2017, Finland (Renko, Paalanne et al, 2017)	Outcome not reported for this study								
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	NR by arm: Seven patients receiving new shunt implants were re-randomised after removal of an infected shunt that had been placed during the study, and appropriate antibiotic therapy								
Ruiz-Tovar 2020, Spain (Ruiz-Tovar, Llavero et al, 2020)	NR: Intravenous antibiotics were maintained for at least 5 days [in all patients] because all cases were considered severe intra-abdominal infection. Decisions on prolonged antibiotic treatment was based on patient recovery from initial severe infection (present in all cases prior to surgery)								
Ruiz-Tovar 2015, Spain (Ruiz-Tovar, Alonso et al, 2015)	Outcome not reported for this study.								
Santos 2019, Brazil (Santos, Santos et al, 2019)	Outcome not reported for this study.								
Seim 2012, Norway (Seim, Tonnessen et al, 2012)	NR: All patients received intravenous Cefalotine during surgery.								
Soomro 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	Outcome not reported for this study.								
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Outcome not reported for this study.								
Sukeik 2019, UK (Sukeik, George et al, 2019)	Outcome not reported for this study.								
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	Outcome not reported for this study.								

4b Study *Author, year, country*	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention or control, with name**	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients receiving post-operative antibiotics**	**Reason for antibiotics, if reported** *SSI / NR*	**Types of antibiotics prescribed** *As described by authors*	**Duration and dose of antibiotics for SSI** *As reported by authors*
Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	Outcome not reported for this study.								
Tabrizi 2019, Iran (Tabrizi, Mohajerani et al, 2019)	NR: Antibiotics were not administered postoperatively								
Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013)	60 days post-surgery	Adults	NR	Vicryl Plus + Monocryl Plus	**Open vein harvesting:**184 (treated) **Sternotomy**: 179	**Open vein harvesting:** 20 (10.9) **Sternotomy**: 24 (13.4)	SSI	NR	NR
	60 days post-surgery	Adults	NR	Vicryl + Monocryl	**Open vein harvesting:**190 (treated) **Sternotomy**: 178	**Open vein harvesting:** 35 (18.4) **Sternotomy:** 24 (13.4)	SSI	NR	NR
Turtiainen 2012, Finland (Turtiainen, Saimanen et al, 2012)	NR: all but one patient across both arms received antibiotic prophylaxis. Whether the patient received any of the standardised antibiotic prophylaxis or some other antibiotic prophylaxis or antibiotic treatment had no effect on the incidence of surgical wound infections.								
Williams 2011, UK (Williams, Sweetland et al, 2011)	NR: authors state “The ASEPSIS scores were relatively low and inflated mostly by the use of antibiotics, mostly in primary care, although such use perhaps was justified for early and minor signs of inflammation” but no further details reported.								
Zhang 2011, China (Zhang, Zhang et al, 2011)	Outcome not reported for this study.								

Table 4c Outcomes: Hospital stay

						Initial stay			Readmission			
4c Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analyse** *ITT or mITT unless specified*	**Length of initial post-operative hospital stay** *As reported by authors If other than mean (SD), state measure*	**Reason for stay** *Due to SSI / overall / NR*	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients readmitted due to SSIs**	**Time to readmission** *As reported by authors If other than mean (SD), state measure*	**Length of readmission hospital stay** *As reported by authors If other than mean (SD), state measure*
Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	Outcome not assessed by this study, and all patients were discharged on the same day after surgery.											
Barac 2011, Hungary (Baracs, Huszar et al, 2011)	NR: Outcome assessed but no data were reported per arm.											
Diener 2014, Germany (Diener, Knebel et al, 2014)	Overall postoperative hospital stay in days	Within 30 days after index operation	Adult	All	PDS Plus	587	13.0 (7.4)	Overall	NR	NR	NR	NR
			Adult	All	PDS II	598	12.5 (6.3)	Overall	NR	NR	NR	NR
		Within 30 days after index operation	Adult	All	PDS Plus	587	2.3 (3.8)	NR	NR	NR	NR	NR
			Adult	All	PDS II	598	2.3 (3.6)	NR	NR	NR	NR	NR
Ford 2005, USA (Ford, Jones et al, 2005)	Outcome not assessed by this study.											
Galal 2011, Egypt (Galal and El-Hindawy, 2011)	Length of hospital stay was reported overall for patients with and without an SSI, and not according to treatment.											
Ichida 2018, Japan (Ichida, Noda et al, 2018)	Outcome not assessed by this study.											
Isik 2012, Turkey (Isik, Selimen et al, 2012)	Outcome not assessed by this study.											
Justinger 2013, Germany	Duration of hospital stay, days	Up to 2 weeks post-discharge	Adult	All	PDS Plus	485 (treatment completers)	Mean 11 (SEM 18) (median NR,	NR	NR	NR	NR	NR

						Initial stay			Readmission			
4c Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analyse** *ITT or mITT unless specified*	**Length of initial post-operative hospital stay** *As reported by authors If other than mean (SD), state measure*	**Reason for stay** *Due to SSI / overall / NR*	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients readmitted due to SSIs**	**Time to readmission** *As reported by authors If other than mean (SD), state measure*	**Length of readmission hospital stay** *As reported by authors If other than mean (SD), state measure*
(Justinger, Slotta et al, 2013)							range: 2 – 209)					
		Up to 2 weeks post-discharge	Adult	All	PDS II	371 (treatment completers)	Mean 15 (SEM 13) (median NR, range: 2 – 134)	NR	NR	NR	NR	NR
Karip 2016, Turkey (Karip, Celik et al, 2016)	Outcome not assessed by this study											
Lin 2018, Taiwan (Lin, Chang et al, 2018)	NR: Length of hospital stay was pre-specified as a secondary outcome but was not reported											
Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	Duration of hospital stay, days	Within 30 days post-discharge	Adult	Clean-contaminated	Vicryl Plus + PDS Plus	140 (treatment completers)	Mean 12.3 (SD 6.5) Median 11 (IQR: 9-15)	NR	NR	NR	NR	NR
		Within 30 days post-discharge	Adult	Clean-contaminated	Vicryl + PDS II	141 (treatment completers)	Mean 13.5 (SD 10.4) Median 11 (IQR: 9-15	NR	NR	NR	NR	NR
Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	Hospitalisation time in days	Unclear	Both	NR	Vicryl Plus	50	3.7 (SD NR)	Overall	NR	NR	NR	NR
		Unclear	Both	NR	Vicryl	50	3.7 (SD NR)	Overall	NR	NR	NR	NR
Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	Length of postoperative hospital stay, days	Within 30 days post-discharge	Both	Clean-contaminated	Vicryl Plus	206	Mean 15.2 (SD 11.6) Median 11 (range: 6-79)	Overall	NR	NR	NR	NR
		Within 30 days post-discharge	Both	Clean-contaminated	Vicryl	204	Mean 15.6 (SD 10.4) Median 11.5 (range: 6-93)	Overall	NR	NR	NR	NR
Olmez 2019, Turkey (Olmez,	Total hospital stay in days	Within 30 days post-surgery	Adult	All	PDS Plus	445 (completers)	7.46 (1.7)	Overall	NR	NR	NR	NR

						Initial stay			Readmission			
4c Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analyse** *ITT or mITT unless specified*	**Length of initial post-operative hospital stay** *As reported by authors If other than mean (SD), state measure*	**Reason for stay** *Due to SSI / overall / NR*	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients readmitted due to SSIs**	**Time to readmission** *As reported by authors If other than mean (SD), state measure*	**Length of readmission hospital stay** *As reported by authors If other than mean (SD), state measure*
Berkesoglu et al, 2019)		Within 30 days post-surgery	Adult	All	PDS II	445 (completers)	6.70 (2.2)	Overall	NR	NR	NR	NR
	Intensive care unit stay in days	Within 30 days post-surgery	Adult	All	PDS Plus	445 (completers)	2.98 (1.0)	Overall	NR	NR	NR	NR
		Within 30 days post-surgery	Adult	All	PDS II	445 (completers)	2.69 (0.8)	Overall	NR	NR	NR	NR
Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	Duration of hospital stay in days	Hospitalisation period	Adult	NR	Vicryl Plus	91	13.2 (1.3)	NR	NR	NR	NR	NR
		Hospitalisation period	Adult	NR	Vicryl	93	21.4 (2.8)	NR	NR	NR	NR	NR
Renko 2017, Finland (Renko, Paalanne et al, 2017)	Readmission due to SSIs	Within 30 days post-surgery	Child	All	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus, or PDS Plus	NR	NR	NR	778	5 (1)	NR	NR
		Within 30 days post-surgery	Child	All	Non-coated sutures (Vicryl, Monocryl, or PDS)	NR	NR	NR	779	17 (2)	NR	NR
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	Outcome not assessed by this study											
Ruiz-Tovar 2020, Spain (Ruiz-Tovar, Llavero et al, 2020)	Duration of hospital stay in days	30 days postoperatively	Adult	Contaminated and dirty	Stratafix Symmetric Plus	47	Median: 4 (range: 2-14)	NR	NR	NR	NR	NR
		30 days postoperatively	Adult	Contaminated and dirty	PDS Plus Loop	45	Median: 5 (range: 2-21)	NR	NR	NR	NR	NR
		30 days postoperatively	Adult	Contaminated and dirty	PDS Loop	47	Median: 8 (range: 2-60)	NR	NR	NR	NR	NR

						Initial stay			Readmission			
4c Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analyse** *ITT or mITT unless specified*	**Length of initial post-operative hospital stay** *As reported by authors If other than mean (SD), state measure*	**Reason for stay** *Due to SSI / overall / NR*	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients readmitted due to SSIs**	**Time to readmission** *As reported by authors If other than mean (SD), state measure*	**Length of readmission hospital stay** *As reported by authors If other than mean (SD), state measure*
Ruiz-Tovar 2015, Spain (Ruiz-Tovar, Alonso et al, 2015)	Duration of hospital stay in days	60 days post-surgery	NR	Dirty	Triclosan coated suture	50	Median: 9 (range: 7-32)	NR	NR	NR	NR	NR
		60 days post-surgery	NR	Dirty	Uncoated suture	51	Median: 9.5 (range: 7-54)	NR	NR	NR	NR	NR
Santos 2019, Brazil (Santos, Santos et al, 2019)	Outcome not assessed by this study.											
Seim 2012, Norway (Seim, Tonnessen et al, 2012)	Outcome not assessed by this study.											
Soomro 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	Outcome not assessed by this study.											
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Length of hospital stay, calculated as the number of nights in hospital from patient admission to discharge	30 days post-surgery	Adult	NR	Vicryl Pus	1164	Median 3.9	NR	1164	2 (0.17)	NR	NR
		30 days post-surgery	Adult	NR	Vicryl	1273	Median 4.1	NR	1273	0 (0)	NR	NR
Sukeik 2019, UK (Sukeik, George et al, 2019)	Duration of hospital stay in days	Discharge from hospital	Adult	NR	Vicryl Plus	81	6.23 (4.11)	NR	NR	NR	NR	NR
		Discharge from hospital	Adult	NR	Vicryl	69	6.13 (4.23)	NR	NR	NR	NR	NR
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	Wound-related readmission	90 days post-surgery	Adult	NR	Stratafix Symmetric PDS Plus	NR	NR	NR	30	0 (0)	NR	NR
		90 days post-surgery	Adult	NR	Vicryl	NR	NR	NR	30	0 (0)	NR	NR

						Initial stay			Readmission			
4c Study *Author, year, country*	**Outcome definition and measure**	**Timepoint of assessment**	**Subgroup: age** *Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analyse** *ITT or mITT unless specified*	**Length of initial post-operative hospital stay** *As reported by authors If other than mean (SD), state measure*	**Reason for stay** *Due to SSI / overall / NR*	**Number of patients analysed** *ITT or mITT unless specified*	**N(%) patients readmitted due to SSIs**	**Time to readmission** *As reported by authors If other than mean (SD), state measure*	**Length of readmission hospital stay** *As reported by authors If other than mean (SD), state measure*
Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	Outcome was assessed in this study but not reported.											
Tabrizi 2019, Iran (Tabrizi, Mohajerani et al, 2019)	Outcome not assessed by this study.											
Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013)	Outcome not assessed by this study.											
Turtiainen 2012, Finland (Turtiainen, Saimanen et al, 2012)	Postoperative hospital stay in days	Unclear	Adult	NR	Vicryl Plus and Monocryl Plus	139	5.5 (6.5)	NR	NR	NR	NR	NR
		Unclear	Adult	NR	Vicryl and Monocryl	137	5.2 (4.3)	NR	NR	NR	NR	NR
Williams 2011 UK (Williams, Sweetland et al, 2011)	Outcome not assessed by this study.											
Zhang 2011, China (Zhang, Zhang et al, 2011)	Outcome not assessed by this study.											

Table 4d Outcomes: Severity of SSIs

4d Study *Author, year, country*	**Outcome definition and measure** *Include name and scoring system*	**Timepoint of assessment**	**Subgroup** *Overall / Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**N (%) of patients by score** *e.g. ASEPSIS score Uninfected (0-10) Disturbed healing (11-20) Minor infection (21-30) Moderate infection (31-40) Severe infection (>40)*	**Score by arm** *Mean (SD) Mean (SE) Median (IQR) please state which*
Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	Superficial or deep SSI, according to CDC (1992) guidelines	Within 30 days post-surgery	Adult	All	PDS Plus + Vicryl Plus	86 (treated)	Superficial: 8 (9.3%*) Deep: 1 (1.2%*)	NR
	Superficial or deep SSI, according to CDC (1992) criteria	Within 30 days post-surgery	Adult	All	Prolene + Vicryl	91 (treated)	Superficial: 18 (19.8%*) Deep: 1 (1.1%*)	NR
Baracs 2011, Hungary (Baracs, Huszar et al, 2011)	Outcome was assessed but no data were reported by arm.							
Diener 2014, Germany (Diener, Knebel et al, 2014)	Superficial or deep, according to modified CDC (1992) criteria	Within 30 days after index operation	Adults	All	PDS Plus	587	Superficial: 53 Deep: 22 Missing data: 12	NR
			Adults	All	PDS II	598	Superficial: 56 Deep: 25 Missing data: 15	NR
Ford 2005, USA (Ford, Jones et al, 2005)	Outcome not assessed by this study.							
Galal 2011, Egypt (Galal and El-Hindawy, 2011)	Outcome not assessed by this study.							
Ichida 2018, Japan (Ichida, Noda et al, 2018)	Incidence of superficial or deep SSI according to the CDC criteria	Within 30 days post-surgery	Both	All	Vicryl Plus	508	Superficial: 23 (4.5) Deep: 12 (2.4)	NR
		Within 30 days post-surgery	Both	All	Vicryl	505	Superficial:19 (3.7) Deep: 11 (2.2)	NR
Isik 2012, Turkey (Isik, Selimen et al, 2012)	Outcome not assessed by this study, but it was noted that all sternal SSIs were superficial.							
Justinger 2013, Germany (Justinger, Slotta et al, 2013)	Outcome not assessed by this study.							
Karip 2016, Turkey (Karip,	Outcome not assessed by this study.							

4d Study *Author, year, country*	**Outcome definition and measure** *Include name and scoring system*	**Timepoint of assessment**	**Subgroup** *Overall / Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**N (%) of patients by score** *e.g. ASEPSIS score Uninfected (0-10) Disturbed healing (11-20) Minor infection (21-30) Moderate infection (31-40) Severe infection (>40)*	**Score by arm** *Mean (SD) Mean (SE) Median (IQR) please state which*
Celik et al, 2016)								
Lin 2018, Taiwan (Lin, Chang et al, 2018)	Incidence of SSI within based on wound condition	Within 3 months post-surgery	Adult	Clean	Vicryl Plus	51	Superficial: 0 (0) Deep: 0 (0)	NR
		Within 3 months post-surgery	Adult	Clean	Vicryl	51	Superficial: 2 (3.9%) Deep: 0 (0)	NR
Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	Rate of superficial or deep incisional SSIs, according to CDC 1999 criteria	Within 30 days post-discharge	Adult	Clean-contaminated	Vicryl Plus + PDS PLus	140 (treatment completers)	Deep: 4 (2.9) Superficial: 14 (10.0)	NR
		Within 30 days post-discharge	Adult	Clean-contaminated	Vicryl + PDS II	141 (treatment completers)	Deep: 8 (5.7) Superficial: 7 (4.7)	NR
Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	Incidence of superficial or deep incisional SSI; definition NR	Unclear	Both	NR	Vicryl Plus	50	Deep: 0 Superficial: 5 (10)	NR
		Unclear	Both	NR	Vicryl	50	Deep: 1 (2) Superficial: 3 (6)	NR
Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	Outcome not assessed by this study.							
Olmez 2019, Turkey (Olmez, Berkesoglu et al, 2019)	NR: Incidence of superficial or deep incisional SSI is reported, but details are not given by arm. The data reported is broken down by early and late onset, but again is not available by arm.							
Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	Outcome not assessed by this study.							
Renko 2017 Finland (Renko, Paalanne et al, 2017)	Superficial or deep SSI, according to CDC (1992) criteria	Within 30 days post-surgery	Child	All	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus, or PDS Plus	778	Superficial: 17 (2) Deep: 3 (<1)	NR
		Within 30 days post-surgery	Child	All	Non-coated sutures (Vicryl, Monocryl, or PDS)	779	Superficial: 28 (4) Deep: 14 (2)	NR
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	Outcome not assessed by this study.							

4d Study *Author, year, country*	**Outcome definition and measure** *Include name and scoring system*	**Timepoint of assessment**	**Subgroup** *Overall / Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**N (%) of patients by score** *e.g. ASEPSIS score Uninfected (0-10) Disturbed healing (11-20) Minor infection (21-30) Moderate infection (31-40) Severe infection (>40)*	**Score by arm** *Mean (SD) Mean (SE) Median (IQR) please state which*
Ruiz-Tovar 2020, Spain (Ruiz-Tovar, Llavero et al, 2020)	Outcome not assessed by this study.							
Ruiz-Tovar 2015, Spain (Ruiz-Tovar, Alonso et al, 2015)	Outcome not assessed by this study.							
Santos 2019, Brazil (Santos, Santos et al, 2019)	Outcome not assessed by this study.							
Seim 2012, Norway (Seim, Tonnessen et al, 2012)	Outcome not assessed by this study.							
Soomro 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	Outcome not assessed by this study.							
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Rate of superficial or deep SSI according to Health Protection Agency definitions	30 days post-surgery	Adult	NR	Vicryl Pus	1164	Superficial: 8 (0.7) Deep: 13 (1.1)	NR
		30 days post-surgery	Adult	NR	Vicryl	1273	Superficial: 11 (0.8) Deep: 21 (1.6)	NR
Sukeik 2019, UK (Sukeik, George et al, 2019)	ASEPSIS (1986) scoring system	Days 2 or 3 after the operation, and again on days 4 or 5 if the patient was still in hospital	Adult	NR	Vicryl Plus	81	Score 0-10: 75 (92.6*) Score >10: 6 (7.4*)	Mean: 2.54 (SD range: 1.41-3.68)
		Days 2 or 3 after the operation, and again on days 4 or 5 if the patient was still in hospital	Adult	NR	Vicryl	69	Score 0-10: 65 (94.2*) Score >10: 4 (5.8*)	Mean: 1.41 (SD range: 0.38-2.43)
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	Occurrence of SSI (superficial or deep), using definitions adapted from Knee Society consensus (2013), was assessed as part of 'overall wound complications'	90 days post-surgery	Adult	NR	Stratafix Symmetric PDS Plus	30	Superficial: 1 (3.33) Deep: NR	NR
		90 days post-surgery	Adult	NR	Vicryl	30	Superficial: 0 (0) Deep: NR	NR

4d Study *Author, year, country*	**Outcome definition and measure** *Include name and scoring system*	**Timepoint of assessment**	**Subgroup** *Overall / Adult / child / both / NR*	**Subgroup: wound class** *Clean / clean-contaminated / contaminated / dirty / all / NR*	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**N (%) of patients by score** *e.g. ASEPSIS score Uninfected (0-10) Disturbed healing (11-20) Minor infection (21-30) Moderate infection (31-40) Severe infection (>40)*	**Score by arm** *Mean (SD) Mean (SE) Median (IQR) please state which*
Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	Outcome not assessed by this study.							
Tabrizi 2019, Iran (Tabrizi, Mohajerani et al, 2019)	Outcome not assessed by this study.							
Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013)	ASEPSIS score at day 60 postoperatively: leg wounds	60 days post-surgery	Adult	NR	Vicryl Plus + Monocryl Plus	184 (treated)	NR	Mean (SD): 3.7 (8.7) Median (range): 0 (0-45)
	ASEPSIS score at day 60 postoperatively: leg wounds	60 days post-surgery	Adult	NR	Vicryl + Monocryl	190 (treated)	NR	Mean (SD): 5.4 (10.0) Median (range): 0 (0-43)
	ASEPSIS score at day 60 postoperatively: sternum wounds	60 days post-surgery	Adult	NR	Vicryl Plus + Monocryl Plus	179 (treated)	NR	Mean (SD): 3.3 (8.9) Median (range): 0 (0-42)
	ASEPSIS score at day 60 postoperatively: sternum wounds	60 days post-surgery	Adult	NR	Vicryl + Monocryl	178 (treated)	NR	Mean (SD): 3.3 (8.5) Median (range): 0 (0-45)
Turtiainen 2012, Finland (Turtiainen, Saimanen et al, 2012)	Deep or superficial infection according to CDC definition	30 days post-surgery	Adult	NR	Vicryl Plus and Monocryl Plus	139	Superficial: 24 (77% of all SSIs) Deep: 5 (16% of all SSIs)	NR
		30 days post-surgery	Adult	NR	Vicryl and Monocryl	137	Superficial: 22 (73% of all SSIs) Deep: 5 (17% of all SSIs)	NR
Williams 2011, UK (Williams, Sweetland et al, 2011)	ASEPSIS score at 6 weeks post-surgery	6 weeks post-surgery	Adult	Clean	Vicryl Plus or Monocryl Plus	66 (completers)	0: 59 (89.4) 1-9: 1 (1.5) 10+: 6 (9.1)	NR
		6 weeks post-surgery	Adult	Clean	Vicryl or Monocryl	61 (completers)	0: 53 (86.9) 1-9: 2 (3.3) 10+: 6 (9.8)	NR
Zhang 2011, China (Zhang, Zhang et al, 2011)	Mean SSI score on modified ASEPSIS scale	Day 90	Adult	Clean	Vicryl Plus	51	NR	Mean 3.2 (SD 3.6)
		Day 90	Adult	Clean	Chinese silk	50	NR	Mean 4.3 (SD 3.3)

Table 4e Outcomes: Details of relevant outcomes reported for people with protected characteristics

(e.g. older age, debilitation, comorbidities that may impact wound healing such as diabetes)

Study *Author, year, country*	**Details of protected characteristic of reported subgroup** *(as reported by authors) e.g. diabetes*	**Details of relevant outcomes reported for this subgroup** *(as reported by authors)*
Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	The impact of protected characteristics was not investigated in this study.	
Baracs 2011, Hungary (Baracs, Huszar et al, 2011)	The authors divided the examined population into three groups by BMI, and also reported SSI outcomes for patients who had pre-operative chemotherapy or chemo-radiotherapy (43 PDS Plus, 34 PDS II).	• In the undernourished group (BMI < 20 kg/m2), the SSI rate was 42.8% (3/7) in the coated suture and 27.3% (3/11) in the uncoated suture group • In the well-fed, normal, and slightly overweight group (BMI 20–30 kg/m2), the SSI rate was 10.9% (16/147) in the coated suture and 11.5% (16/139) in the uncoated suture group • In obese patients (BMI > 30 kg/ m2), the SSI rate was 11.8% (4/34) in the coated suture and 10.6% (5/ 47) in the uncoated suture group In patients who had had pre-operative chemotherapy or chemo-radiotherapy there were 4 SSI (9.3%) in the PDS Plus group and 2 SSI (5.9%) in the PDS II group. Radiotherapy was applied only in rectal cancers and did not affect abdominal wall healing. Authors state that more cases will be needed to draw any conclusions.
Diener 2014, Germany (Diener, Knebel et al, 2014)	Study reports multiple variables affecting the incidence of SSIs, but key population related criteria were: • Malignant disease • Chronic renal insufficiency • Anaemia • BMI	The final logistic regression model showed that several variables affected the occurrence of surgical site infection: • Malignant disease (OR 0.60, 95% CI: 0.38, 0.93; p=0.0236) • Chronic renal insufficiency (OR 2·96, 95% CI 1·36–6·46; p=0·0064) • Anaemia (OR 1·73, 95% CI 1·16–2·59; p=0·0071) • BMI (OR 1·09, 95% CI 1·05–1·14; p<0·0001)
Ford 2005, USA (Ford, Jones et al, 2005)	The impact of protected characteristics was not investigated in this study.	
Galal 2011, Egypt (Galal and El-Hindawy, 2011)	The authors reported the incidence of SSI by the numbers of risk factors in each group, based on the National Nosocomial Infections Surveillance risk factor.	At 30 days post-discharge (1 year for prosthetic surgery), the incidence of SSI was: • In the Vicryl Plus group, 3% for 0 risk factors, 15% for 1 risk factor, and 19% for 2 risk factors • In the Vicryl group, 7% for 0 risk factors, 19% for 1 risk factor, and 64% for 2 risk factors The statistical significance of differences between the two groups was not reported
Ichida 2018, Japan (Ichida, Noda et al, 2018)	The impact of protected characteristics was not investigated in this study.	
Isik 2012, Turkey (Isik, Selimen et al, 2012)	Protected characteristics were investigated in a multiple logistic regression analysis, but data were reported overall (for infected and non-infected groups) and not according to treatment.	
Justinger 2013, Germany (Justinger, Slotta et al, 2013)	Protected characteristics were investigated in a multiple logistic regression analysis, but data were reported overall (for infected and non-infected groups) and not according to treatment.	

Study *Author, year, country*	**Details of protected characteristic of reported subgroup** *(as reported by authors) e.g. diabetes*	**Details of relevant outcomes reported for this subgroup** *(as reported by authors)*
Karip 2016, Turkey (Karip, Celik et al, 2016)	The impact of protected characteristics was not investigated in this study.	
Lin 2018, Taiwan (Lin, Chang et al, 2018)	The impact of protected characteristics was not investigated in this study.	
Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	Protected characteristics were investigated in univariate analyses of risk factors for SSI, but data were reported overall and not according to treatment. Combinations of risk factors (obesity, single pre-operative dose of antibiotic prophylaxis, subcutaneous tissue closure, and penicillins plus beta-lactamase inhibitors as pre-operative antibiotic prophylaxis) were investigated in a multivariable logistic model including the treatment variable.	The authors found that a BMI of less than 30 was related to lesser risk of SSI.
Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	Gender The authors also compared infected and uninfected patients for age, body temperature and white blood cell count.	• The rate of surgical wound infection was higher in men than in women with the ratio of 3:2. Patients with infection were slightly older, had slightly higher body temperature and had slightly higher white blood cell count compared to uninfected patients; however, these parameters were not significantly different (p = 0.05)
Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	The impact of protected characteristics was not investigated in this study.	
Olmez 2019, Turkey (Olmez, Berkesoglu et al, 2019)	The impact of protected characteristics was not investigated in this study.	
Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	The impact of protected characteristics was not investigated in this study.	
Renko 2017, Finland (Renko, Paalanne et al, 2017)	The impact of protected characteristics was not investigated in this study.	
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	The impact of protected characteristics was not investigated in this study.	
Ruiz-Tovar 2020, Spain (Ruiz-Tovar, Llavero et al, 2020)	The impact of protected characteristics was not investigated in this study.	
Ruiz-Tovar 2015, Spain (Ruiz-Tovar,	The investigated clinical variables were age, gender, comorbidities, etiology of fecal peritonitis, incisional SSIs (including deep and superficial), mortality, and hospital stay.	The authors report that in the multivariable analysis, the use of triclosan-coated sutures was the only independent variable associated with a reduction in incisional SSIs (p = 0.026)

Study *Author, year, country*	**Details of protected characteristic of reported subgroup** *(as reported by authors) e.g. diabetes*	**Details of relevant outcomes reported for this subgroup** *(as reported by authors)*
Alonso et al, 2015)		
Santos 2019, Brazil (Santos, Santos et al, 2019)	Diabetes	In this study, diabetes was registered in 40.2% of the patients. However, a significant association between diabetes and infection in both groups was not found.
Seim 2012, Norway (Seim, Tonnessen et al, 2012)	Protected characteristics were investigated as predictors of leg wound infections, but data were reported overall (for infected and non-infected groups) and not according to treatment.	
Soomro 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	The impact of protected characteristics was not investigated in this study.	
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Additional analyses investigated the impact of older age (<70 vs >70 years) on rate of superficial and deep SS combine, but for the overall study population and not according to treatment group. No other protected characteristcs were studied.	
Sukeik 2019, UK (Sukeik, George et al, 2019)	The impact of protected characteristics was not investigated in this study.	
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	The impact of protected characteristics was not investigated in this study.	
Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	The impact of protected characteristics was not investigated in this study.	
Tabrizi 2019, Iran (Tabrizi, Mohajerani et al, 2019)	The impact of protected characteristics was not investigated in this study.	
Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013)	The impact of protected characteristics was not investigated in this study.	
Turtiainen 2012, Finland (Turtiainen,	The authors conducted a multivariate analysis and investigated the impact of BMI and corticosteroid use on SSI outcomes.	The results of the multivariate analysis indicated that obesity and the use of corticosteroids were independent predictors of surgical wound infection (SWI). • BMI >25 kg/m2: OR 3.14, 95% CI 1.63–6.07, p = 0.001

Study *Author, year, country*	**Details of protected characteristic of reported subgroup** *(as reported by authors) e.g. diabetes*	**Details of relevant outcomes reported for this subgroup** *(as reported by authors)*
Saimanen et al, 2012)		• Current use of corticosteroids: OR 3.13, 95% CI 1.35–7.22, p = 0.008
Williams 2011, UK (Williams, Sweetland et al, 2011)	The impact of protected characteristics was not investigated in this study.	
Zhang 2011, China (Zhang, Zhang et al, 2011)	The impact of protected characteristics was not investigated in this study.	

5 Details of relevant studies

Please give details of all relevant studies (all studies in table 4). Copy and paste a new table into the document for each study. Please use 1 table per study.

Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	
How are the findings relevant to the decision problem?	This randomised trial, which evaluated a combination of triclosan-coated sutures (PDS Plus + Vicryl Plus) and uncoated sutures (Prolene + Vicryl in adult patients undergoing wide excision and primary closure for pilonidal disease, reported comparative data for several outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Table 4a. This study found that: **Incidence of SSIs** There was a significantly lower rate of SSI within 30 days post-surgery in patients treated with triclosan-coated sutures (PDS Plus and Vicryl Plus) than in patients treated with uncoated sutures (Prolene and Vicryl), 10.5% vs 20.8%, respectively (p=0.044). **Antibiotic use for SSIs** Two patients in each group (2.2% and 2.1% for triclosan-coated and uncoated sutures, respectively) received antibiotherapy for signs of infection (leucocytosis and high fever). **Unreported outcomes** This study did not report data on hospital stay or readmission for SSI, severity of SSIs, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The reporting of methodology relating to the study design was limited. Operating surgeons were aware of the treatment allocated as they recognised the sutures used, although another surgeon conducted the subsequent assessment of the surgical site. Each patient received two different suture products according to intended use and tissue type. However, whilst Vicryl Plus and Vicryl sutures are both based on polygalactin, the PDS Plus and Prolene sutures differ in the material used, polydioxanone and polypropylene, respectively; as PDS is resorbable while Prolene is not, it is unclear what impact this may have had on the study. This study was conducted in one or more hospital surgical departments, with three surgeons conducting all operations. A different surgeon was responsible for all postoperative care, details of which were minimal. This study was conducted in Turkey and so may have limited generalisability to the NHS. The results of this study need to be considered in light of these limitations.
How was the study funded?	Not reported.

Baracs 2011, Hungary (Baracs, Huszar et al, 2011)	
How are the findings relevant to the decision problem?	This RCT compared triclosan-coated and uncoated absorbable sutures (PDS Plus and PDS II, respectively) in adults aged up to 80 years who underwent elective colorectal surgery. The study reported comparative data for only one outcome relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Table 4a. This study found that: **Incidence of SSIs** There was no difference in the overall occurrence of SSI within 30 days following surgery between patients receiving PDS Plus and PDS II sutures. However, significantly fewer of these SSIs occurred after discharge (i.e. in the outpatient setting) in the PDS Plus group (2.1%*) than in the PDS II group (4.6%*) (p=0.04). **Unreported outcomes** This study did not report data on antibiotic use for SSIs, readmission for SSI, and technology-related adverse events. Data on duration of hospital stay and severity of SSIs (number of patients with deep or superficial infection) were reported overall but not separately by treatment arm.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The overall reporting of this study was limited, in particular for methodology and patient characteristics. Comparative treatment data were only presented for one outcome relevant to the scope. The study was conducted in seven high-volume surgical institutions in Hungary. Surgery was conducted according to routine practice across sites, although some decisions were at the surgeon's discretion and details of pre-/post-operative care procedures were minimal. Conducted in Europe, the study should have reasonable generalisability to the UK setting.
How was the study funded?	Not reported.

Diener 2014 (PROUD), Germany (Diener, Knebel et al, 2014)	
How are the findings relevant to the decision problem?	This RCT, which evaluated the PDS Plus suture in comparison with the non-coated PDS II suture in adult patients who underwent abdominal laparotomy for any reason, reported data on a number of eligible outcomes.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** There was no difference in the occurrence of SSI within 30 days after index operation between patients receiving PDS Plus and PDS II sutures (OR 0.91, 95% CI 0·66–1·25; p=0·64). However, the observed reduction of 1.3%, was not considered clinically relevant from a surgical point of view. **Hospital stay** There was no difference between the PDS Plus and PDS II groups in the duration of stay in the intensive care unit (mean difference: 0.01 (95% CI: –0.41, 0.43, p=0.54) and in the length of postoperative hospital stay (mean difference: 0.47 (95% CI: –0.32, 1.25, p=0.99). **Antibiotic use for SSIs** 21.5% of patients treated with PDS Plus were taking antibiotics for any reason, compared with 18.7% of PDS II-treated patients. The significance of the difference observed between groups was not reported. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, or the severity of SSIs.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The study was initially designed as a single-centre RCT but was converted into a multicentre study when additional funding became available. The subsequent, substantial, protocol amendment was approved by the ethics committee. The study design allowed for early termination for efficacy or futility or recalculation of the sample size if the study was continued after the interim analysis. This study was conducted in Germany using standard surgical techniques and pre-/post-operative care, and so is considered generalisable to the UK setting.
How was the study funded?	Funded by a grant from Johnson & Johnson Medical Limited.

Ford 2005, USA (Ford, Jones et al, 2005)	
How are the findings relevant to the decision problem?	This singe-centre RCT compared triclosan-coated (Vicryl Plus) and uncoated (Vicryl) sutures in children aged 1 to 18 years who were scheduled for general surgery. It reports limited data on a number of outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4b. This study found that: **Incidence of SSIs** Three patients developed infections in the triclosan-coated (Vicryl Plus) suture group over the course of the study, but none of these were judged to be related to the suture. No infections were observed in the uncoated (Vicryl) suture group. **Antibiotic use for SSIs** By 80 (±5 days) post-surgery, 22% of patients treated with Vicryl Plus were taking antibiotics for any reason, compared w ith 29% of Vicryl-treated patients. The significance of the difference observed between groups was not reported. **Unreported outcomes** This study did not report data on hospital stay, readmission for SSIs, and severity of SSIs.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The main limitation of this study lay in its reporting, which lacked clarity and information. In particular, details of the methodology, participants, surgical procedures, and pre-/post-operative care were severely limited. In addition, the population was small, with approximately 150 patients randomised in a 2:1 ratio to the two suture materials, and it was reported to be open-label. This study, which focused primarily on the intraoperative handling characteristics of the two suture materials, was conducted in a single centre in the USA. However, surgical procedures and care pathways were not to described, and it is unclear how the minimal relevant data reported relates to different types of surgery. The results should therefore be interpreted with caution, although the setting should mean the study is generalisable to the UK.
How was the study funded?	Funded by a grant from Ethicon Inc.

Galal 2011, Egypt (Galal and El-Hindawy, 2011)	
How are the findings relevant to the decision problem?	This multi-centre RCT compared the use of triclosan-coated sutures (Vicryl Plus) with uncoated sutures (Vicryl) in all patients, regardless of age, gender, and risk factors, who were candidates for any surgical procedure during the study period. It reported data for only outcome relevant to the scope
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Table 4a. This study found that: **Incidence of SSIs** There was a significant difference at 30 days post-discharge (1 year for prosthetic surgery) between patients receiving triclosan-coated sutures (Vicryl Plus) and those receiving uncoated sutures (Vicryl), with SSI incidences of 7% and 15% respectively (p=0.011). The higher occurrence of SSIs in the Vicryl suture group was observed across all wound classes: 7% vs 3% for 'Clean', 19% vs 11% for 'Clean-Contaminated', and 31% vs 14% for 'Contaminated'. The statistical significance of between-group differences was not established. **Unreported outcomes** This study did not report data on antibiotic use for SSIs, readmission for SSIs, severity of SSIs, and technology-related adverse events. Although duration of hospital stay due to SSIs was assessed, it was reported overall for patients with and without infection and not according to treatment group.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	This study was a multi-centre study but it only reported the results from one centre. Although it conducted a subgroup analysis according to wound classification, there is a potential discrepancy in the reporting of the patient numbers for each treatment group which needs clarification. The patients treated at this hospital underwent surgery by the same team of surgeons in each speciality in the same operationg room. However, the local protocol for infection control was used and this may deviate from current modern practices, as acknowledged by the study authors. Since the study was conducted in Egypt it may have limited generalisability to the UK setting, and thus the results should be considered in light of the limitations.
How was the study funded?	Not stated

Ichida 2018, Japan (Ichida, Noda et al, 2018)	
How are the findings relevant to the decision problem?	This RCT, which compared triclosan-coated sutures (Vicryl Plus) and uncoated sutures (Vicryl) in patients who underwent a gastrointestinal operation, reported data for a number of outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Tables 4a and 4b. This study found that: **Incidence of SSIs** There was no significant difference in the incidence of SSI within 30 days post-surgery between patients treated with Vicryl Plus and Vicryl sutures, with infection rates 6.9% and 5.9%, respectively (p=0.609). **Antibiotic use for SSI** Within the 30 days following discharge, a slightly higher proportion of patients in the Vicryl Plus suture group received postoperative antibiotics (17.3%) compared with patients in t he Vicryl suture group (16.8%), but this difference did not reach statistical significance (p=0.868). **Unreported outcomes** This study did not report data on duration of hospital stay, readmission for SSI, severity of SSI, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	A limitation of this study was that the the sample size calculation was performed using data derived from a retrospective cohort of patients who underwent gastroenterologic surgery using the same procedure at this institution in 2012. The authors had used their own study due to a lack of published data. This study was conducted in in a single surgical department by staff surgeons and 'residents' who had been educated and trained in the procedure. Perioperative care protocols and wound management were as recommended by CDC guidelines. Since the study was conducted in Japan, a high income country, it should have reasonable generalisability to the UK setting.
How was the study funded?	Funded by the institution

Isik 2012, Turkey (Isik, Selimen et al, 2012)	
How are the findings relevant to the decision problem?	This RCT evaluated the use of triclosan-coated sutures (Vicryl Plus), compared with uncoated sutures (Vicryl), in reducing the incidence of sternal and leg wound infections in patients undergoing cardiac surgery. It reported data for only one outcome relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Table 4a. This study found that: **Incidence of SSIs** There were no statistically significant differences between triclosan-coated sutures (Vicryl Plus) and uncoated sutures (Vicryl) in either the overall indicidence of SSIs, or the development of SSIs at the two surgical sites, the sternum and leg. At 30 days post-surgery, 5.3% of patients treated with Vicryl Plus sutures developed an SSI compared with 5.6% of those treated with Vicryl sutures (p>0.05), with 2.4% and 3.5%, respectively, being sternal wound infections (p=0.596) and 3.5% and 3.8% being leg wound infections (p=1.000). All sternal SSI were superficial. **Unreported outcomes** This study did not report data on antibiotic use for SSIs, hospital stay, readmission for SSI, severity of SSI, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The overall reporting of this study was poor, with limited details of the study methodology, surgical procedures, and pre-/post-operative care of the patients. Not all of the patients underwent a surgical procedure which also necessitated an operation on the leg. This study was conducted in in a single surgical department in a private hospital in Turkey. All patients were provided with post-discharge training on wound care by a specialised nurse in cardiac rehabilitation. The study may have limited generalisability to the UK setting and the results should be viewed in light of the limitations.
How was the study funded?	Research Centers of Marmara University, Istanbul, Turkey

Justinger 2013, Germany (Justinger, Slotta et al, 2013)	
How are the findings relevant to the decision problem?	This randomised, clinical pathway controlled trial investigated the use of triclosan-coated sutures (PDS Plus) and uncoated sutures (PDS II) in adult patients undergoing a scheduled laparotomy with abdominal wound closure following a standard clinical pathway. It reported data for a number of outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** Results analysed for randomised patients who appear to have had successful treatment showed that significantly fewer SSIs occurred in patients receiving triclosan-coated sutures (PDS Plus) than in those receiving uncoated sutures (PDS II), 6.3% and 11.3%, respectively (p<0.05), during the hospital stay and 2-week follow-up post-discharge. **Hospital stay** Mean (SEM) duration of hospital stay was comparable between the PDS Plus group (11 ±18 days) and PDS II group (15 ±13 days) (p=0.300), and ranged from 2 to 209 days and 2 to 134 days, respectively. Use of PDS Plus suture decreased the likelihood of developing a wound infection (multivariateanalysis, OR 0.501, 95% CI: 0.3, 0.9; p<0.05). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, severity of SSI, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The main limitation of the study was the study design, a clinical pathway controlled randomised trial. Randomisation was conducted based on groups of patients rather than individual patients, and this could have a potential impact on subsequent analysis given the uncertainty in numbers of patients at various stages. In addition, reporting of the study was limited, in particular methodology details. This study was conducted in a single hospital in Germany, with all patients treated according to a standardised clinical pathway. Thus, it is considered generalisable to the UK setting, although the results should be viewed in light of the unusual study design.
How was the study funded?	Restricted grant from Johnson & Johnson, Summerville, NJ, USA

Karip 2016, Turkey (Karip, Celik et al, 2016)	
How are the findings relevant to the decision problem?	This revised RCT compared triclosan-coated sutures (Monocryl Plus) with uncoated sutures (Monocryl) in patients aged 18 to 55 years who were undergoing scheduled sinus excision followed by Karydakis flap repair for pilonidal sinus disease. Data for only one eligible outcome are reported.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Table 4a. This study found that: **Incidence of SSIs** At 2 weeks, there was no significant difference in rate of infection between the two groups, with SSIs occurring in 9.3% of patients treated with triclosan-coated sutures (Monocryl Plus) and 19.2% of patients treated with uncoated sutures (Monocryl) (p=0.233). Two of the 5 cases in the Monocryl Plus suture group and 3 of the10 cases in the Monocryl suture group were new infections since the 1-week post-operative review. **Unreported outcomes** This study did not report data on antibiotic use for SSIs, hospital stay, readmission for SSI, severity of SSI, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform the qualitative assessments of outcomes other than incidence of SSI and use of antibiotics for SSI. The study will not be included in the meta-analyses of these two outcomes as data are reported over a short time frame and may introduce inaccuracy and / or bias.
What are the limitations of this evidence?	The original trial studying the effect of antibiotic prophylaxis was terminated early due to safety concerns in patients not receving prophylaxis. Following revision of the trial protocol to focus on the secondary aim (effect of antibacterial sutures), the trial resumed with the patients who had been randomised to the antibiotic prophylaxis arm along with newly recruited patients. The main limitation was the small samples size of 106 patients overall. This study was conducted in the general surgery clinics of a Turkish hospital, with the same surgeon operating on all patients but no details of wound infection control. Thus, it may have limited generalisability to the UK setting and the results should be viewed in light of the limitations.
How was the study funded?	Not reported

Lin 2018, Taiwan (Lin, Chang et al, 2018)	
How are the findings relevant to the decision problem?	This single-centre RCT compared triclosan-coated (Vicryl Plus) and non-coated (Vicryl) sutures in adults aged 55 to 85 years who were undergoing elective, unilateral total knee arthroplasty for degenerative osteoarthritis. It reports limited data on a number of outcomes relevant to the scope
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Tables 4a and 4b This study found that: **Incidence of SSIs** There was no statistically significant difference in the incidence of SSI within 3 months post-surgery between patients treated with Vicryl Plus and Vicryl sutures; the rates were 0% and 3.9%, respectively (p=0.495). **Antibiotic use for SSI** Both patients with SSI in the Vicryl group were treated with 1 week parenteral antibiotics followed by a further week of oral antibiotics; the infections resolved without further complications **Unreported outcomes** This study did not report data on readmission for SSI, severity of SSI, and technology-related adverse events. Although duration of hospital stay was a pre-specified secondary outcome, no data were reported.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	This study had several limitations, in particular the small sample size (102 patients in total) which was considered insufficient to demonstrate the superiority of triclosan-coated sutures in the prevention of SSIs. In addition, only patients aged 55 to 85 years were eligible, the patients might have raised awareness of their wound conditions given the rigorous nature of the follow-up, and the definition of SSI was based only on skin/wound condition. This study was conducted in a single hospital with all patients treated similarly by the same experienced surgeon, and using the same treatment protocol and the standard clinical pathway. Since the study was conducted in Taiwan it may have limited generalisability to the NHS, and thus the results should be considered in light of the limitations.
How was the study funded?	Not reported.

Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	
How are the findings relevant to the decision problem?	This RCT compared triclosan-coated sutures (Vicryl Plus + PDS Plus) and uncoated sutures (Vicryl + PDS II) in adults aged 18 to 85 years who were candidates for elective colorectal resection. It reported data for a number of outcomes relevant to the scope
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** There was no significant difference in the rate of incisional SSI within 30 days post-discharge between patients treated with triclosan-coated sutures (Vicryl Plus + PDS Plus) and uncoated sutures (Vicryl + PDS II), with overall infection rates for deep and superficial SSIs of 12.9% and 10.6%, respectively; the odds ratio was 1.24 (95% CI: 0.60, 2.57; p=0.564). **Hospital stay** Duration of hospitalisation was similar between the two treatment groups, with mean (SD) values of 12.3 (6.5) days for triclosan-coated sutures compared with 13.5 (10.4) days for uncoated sutures (OR -1.22, 95% CI: -5.24, 2.83; p=0.546). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, or severity of SSI.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The main limitation of this study was that randomisation was conducted independently at each study centre and was not balanced for important and known patient and operative risk factors for SSIs. In addition, although all SSIs were confirmed by a second assessor according to standardised criteria, not all were confirmed by positive culture. The primary outcome did not include organ/space SSI because suture coating was not expected to be involved in the occurrence of intra-peritoneal collection. This study was conducted in four hospitals in Italy, and is thus considered generalisable to the UK setting.
How was the study funded?	Research grant from the University of Milano-Bicocca

Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	
How are the findings relevant to the decision problem?	This RCT evaluated the use of triclosan-coated sutures (Vicryl Plus) compared with uncoated sutures (Vicryl) to reduce wound infections in patients undergoing surgery for appendicitis. It reported data for sever al outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a, 4c and 4d. This study found that: **Incidence of SSIs** Timepoint of reporting of SSIs is unclear but appears to be nine months or one year. Overall incidence of SSIs is statistically similar between groups (intervention: 5 (10%), and control: 4 (8%), p=0.727) **Hospital stay** Length of hospital stay is statistically similar between groups, with a mean of 3.7 days for both groups (p=0.5). Standard deviations are not reported. **Severity of SSIs** Severity of SSIs was not assessed for statistical significance but appears similar between the two groups; there were 5 superficial and 0 deep SSIs in the intervention group, and 3 superficial and 1 deep SSI in the control group. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs or readmission for SSI.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The authors found no statistical significance in the difference between overall incidence of SSIs or length of stay in hospital between the two groups. However they conclude that a major factor for an infection at surgical wounds was the type of appendicitis, and that the current study showed a greater prevalence of infections in men (ratio of 3:2). Vicryl Plus was found to be safe and satisfactory in surgical practice, and the authors stated that before final conclusions could be drawn, further data were required from the remainder of patients enrolled in the study (the current paper reported only the first 100 patients randomised) This paper reports the preliminary results of a study conducted in Thailand, and therefore may have limited applicability to a UK setting.
How was the study funded?	This work was funded by the new researcher support project 2006 of Thammasat University, Thailand; this suggests that no external funding was involved.

Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	
How are the findings relevant to the decision problem?	This RCT evaluated the use of triclosan-coated sutures (Vicryl Plus) compared with uncoated sutures (Vicryl) to reduce wound infections and the associated costs in patients undergoing elective colorectal surgery. It reported data for a number of outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** The incidence of wound infection was 4.3% in patients treated with triclosan-coated sutures (Vicryl Plus), which was significantly lower than the 9.3% incidence reported in the uncoated suture (Vicryl) group (p=0.047). **Hospital stay** The mean duration of postoperative hospital stay was not significantly different for patients treated with Vicryl Plus sutures and those treated with Vicryl sutures, 15.2 and 15.6 days, respectively (p=0.71). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, severity of SSIs, and technology-related adverse effects.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The overall reporting of this study was poor, with limited details of study methodology and pre-/post-operative care of the patients. A high proportion (71%) of patients with wound infections were discharged after the same length of hospitalisation as non-infected patients, with infected wounds managed in the outpatient clinic; this could partially explain the lack of a significant difference between suture groups in duration of post-operative hospital stay. This study was conducted in in a single surgical department in a Japanese hospital. As Japan is a high income country, the results should have reasonable generalisability to the UK setting.
How was the study funded?	No external funding (self funding organisation)

Olmez 2019, Turkey (Olmez, Berkesoglu et al, 2019)	
How are the findings relevant to the decision problem?	This RCT evaluated the use of triclosan-coated sutures (PDS Plus) compared with uncoated sutures (PDS II) to reduce wound infections in patients undergoing a range of GI surgeries. It reported data for several outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** The authors state that their most important finding was the reduction of SSIs by up to 24% in the intervention arm. The abstract states that SSIs occurred in 200 patients; 85 in the intervention group and 115 in the control group (p = 0.016). However note that Table 5 (detailed breakdown of reporting of SSIs) reports a total of 176 SSIs, not 200, of which 60 occurred in the intervention group and 115 in the control group. **Hospital stay** Length of hospital stay is statistically different between groups in favour of the control group, with a mean of 7.46 (1.7) days in the intervention group and 6.70 (2.2) days in the control group (p = <0.0001). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, severity of SSIs by arm, readmission for SSIs, or adverse events related to treatment.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	Intervention and control groups were not evenly balanced with regard to gender, BMI, smoking status, and whether the patients had had a previous abdominal midline incision. This may have biased the study somewhat in favour of the intervention group, although no analyses were carried out to determine the potential impact of this effect. The study was conducted in Turkey and thus may have may have limited applicability to a UK setting.
How was the study funded?	No funding was declared, although the authors stated that they had no financial conflicts of interest

Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	
How are the findings relevant to the decision problem?	This RCT compared triclosan-coated (Vicryl Plus) and non-coated (Vicryl) sutures in adult patients with colorectal cancer scheduled for elective surgery during a one-year period from September 2008 to September 2009.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** Significantly fewer patients in the Vicryl Plus group had an SSI compared with patients in the Vicryl group during their hospitalisation after surgery: 4 (4.3%) and 12 (13.2%) respectively (p=0.035). **Hospital stay** Mean duration of hospital stay was significantly shorter in the Vicryl Plus group (13.2 ±1.3 days) than in the Vicryl group (21.4 ±2.8days) p<0.05). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, or the severity of SSI.
Will any information from this study be used in the economic model?	This study will be used to inform the qualitative assessments of outcomes other than incidence of SSI and use of antibiotics for SSI. The study will not be included in the meta-analyses of these two outcomes as data are reported over a short time frame and may introduce inaccuracy and / or bias.
What are the limitations of this evidence?	The overall reporting of this study was poor, with limited details of study methodology and potential inaccuracies in the data presented: percentage values for wound complications (in Table 2) appear to have been based on transposed numbers of patients randomised to the two groups. There was also a discrepancy between the mean duration of hospital stay for the Vicryl Plus group, as reported in the abstract and the main text. Outcome parameters were not assessed over the same time period for the entire study population, since they were only monitored during the hospitalisation period which would have varied on a patient basis. The study was conducted in in a single surgical department in Croatia. There were insufficient details of pre-/post-operative care procedures to establish whether they were similar to those used in the NHS care pathway. Thus, the study may have limited generalisability to the UK setting.
How was the study funded?	Not reported

Renko 2017, Finland (Renko, Paalanne et al, 2017)	
How are the findings relevant to the decision problem?	This study evaluated triclosan-coated sutures (Vicryl Plus, Monocryl Plus, PDS Plus) and the non-coated variants (Vicryl, Monocryl, PDS) in children awaiting emergency or elective daytime surgery for any reason. Data for several eligible outcomes are reported.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** Results from the primary analysis (modified ITT), showed that significantly fewer SSIs occurred in patients receiving triclosan-containing sutures than in those receiving triclosan-free sutures, 3% and 5%, respectively (RR 0.48, 95% CI: 0.28, 0.80; p=0.004), within 30 days post-surgery. **Hospital readmission** Readmission due to SSIs within 30 days post-surgery was significantly less with the use of triclosan-containing sutures than triclosan-free sutures, 5 patients (1%) vs 17 (2%), respectively (proportional difference: 1.5, 95% CI: 0.4, 2.9; p=0.01). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, or duration of hospital stay.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	A limitation of this study is the potential under-reporting of SSIs since not all suspected SSIs were cultured or photographed: some patients were not followed up in the study clinic but at their own local health-care facilities. This single-centre study was conducted in Finland, using hygienic procedures in accordance with CDC recommendations (1999) to prevent SSIs in the operating room. It is therefore considered generalisable to the UK setting. However, the results might not apply directly to adults with special patient-related risk factors, or undergoing contaminated surgeries, since they were reported for a paediatric population who were mainly healthy, and who underwent fairly short and generally clean surgeries with no special risk factors for SSIs.
How was the study funded?	Funded by the Alma and K A Snellman Foundation.

Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	
How are the findings relevant to the decision problem?	This RCT evaluated the use of triclosan-coated sutures (Vicryl Plus) compared with uncoated sutures (Vicryl) to reduce shunt infections in patients undergoing a CSF shunt surgery. It reported data for one outcome relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Table 4a. This study found that: **Incidence of SSIs** The authors found that wound closure with antimicrobial was associated with a significantly lower shunt infection risk (2; 4.3%) than uncoated suture wound (8; 21%) closure during the first 6 months after surgery. **Unreported outcomes** This study did not report data on use of antibiotics for shunt infection, severity of shunt infections, length of hospital stay or readmission for shunt infection, or adverse events related to treatment..
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	This study is limited by its small sample size and relatively short duration, with new patient enrollment halted at the second interim analysis in view of the significantly higher infection rate in the control group. Had the uncoated suture group experienced a more typical infection rate, a larger trial would have been required to show a statistically significant difference in early shunt infection risk. The study was conducted in the USA and should have good applicability to a UK setting.
How was the study funded?	This study was designed and conducted with no extramural research funding or commercial relationships.

Ruiz-Tovar 2020, Spain (Ruiz-Tovar, Llavero et al, 2020)	
How are the findings relevant to the decision problem?	This RCT investigated triclosan-coated barbed and non-barbed sutures (Stratafix Symmetric and PDS Plus Loop, respectively) and uncoated, non-barbed sutures (PDS Loop) in adult patients undergoing emergency surgery by laparotomy and midline approach. It reported data on a number of eligible outcomes.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** There was a significant difference in the incidence of incisional SSI within 30 days post-surgery between patients receiving Stratafix Symmetric, PDS Plus Loop and PDS Loop sutures, with rates of 6.4%, 8.9%, and 23.4%, respectively, being reported (3-group comparison, p=0.03). However, there were no separate comparisons of the triclosan-coated (Stratafix Symmetric and PDS Plus Loop) and uncoated (PDS Loop) sutures. **Hospital stay** There was a significant difference in the duration of hospital stay between the Stratifix Symmetric, PDS Plus Loop, and PDS Loop groups (3-group comparison, p=0.012), but no separate comparisons of the triclosan-coated (Stratafix Symmetric and PDS Plus Loop) and uncoated (PDS Loop) sutures were reported. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, or the severity of SSI.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The limitations of this study are that it might be underpowered as the study investigators used a suboptimal estimation of the SSI rate in the control group for the power calculation. In addition, there were no separate comparisons between the two types of triclosan-coated sutures and the uncoated suture. A per protocol analysis only was performed (vs ITT) This study was conducted in Spain and, therefore, is considered generalisable to the UK. Details of pre-/post-operative care, where reported, were concordant with the UK clinical pathway.
How was the study funded?	NCT03763279 reports Sponsor: Hospital General Elche

Ruiz-Tovar 2015, Spain (Ruiz-Tovar, Alonso et al, 2015)	
How are the findings relevant to the decision problem?	This RCT investigated triclosan-coated sutures (brand NR) and uncoated sutures (brand NR) in patients undergoing abdominal wall closure after open surgery for fecal peritonitis. It reported data on a number of eligible outcomes.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** A significant difference was shown in incidence of SSI between the two groups; the incisional SSI rate was 10% in the triclosan coated suture group and 35.3% in the uncoated suture group (p = 0.004; odds ratio [OR] = 0.204; 95% confidence interval [CI] 0.069–0.605). **Hospital stay** There was no significant difference in the duration of hospital stay between the triclosan coated and uncoated suture groups (median 9 days for the triclosan coated group and 9.5 days for the uncoated group; p=non-significant). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, or the severity of SSI.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	One of the limitations of this study is the small sample size, which prevents the performance of a multivariable analysis. ITT analysis was not conducted. This study was conducted in Spain and is therefore considered generalisable to the UK. Details of pre-/post-operative care, where reported, were concordant with the UK clinical pathway.
How was the study funded?	The authors report that no competing financial interests existed.

Santos 2019, Brazil (Santos, Santos et al, 2019)	
How are the findings relevant to the decision problem?	This RCT evaluated the use of triclosan-coated sutures (Vicryl Plus) compared with uncoated sutures (Vicryl) to reduce wound infections in patients undergoing coronary artery bypass graft surgery. It reported data for one outcome relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Table 4a. This study found that: **Incidence of SSIs** At six weeks, the SSI rates were 7.9% (20/257)) for the control arm and 5.3% (13/251) for the intervention arm (p=0.281). **Unreported outcomes** This study did not report data on severity of SSIs, use of antibiotics for SSIs, readmission for SSI, hospital stay, and technology-related adverse effects.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The authors observed a reduction in the risk of infection of 33.4% (5.3% vs. 7.9% in the triclosan and conventional groups, respectively) in the saphenectomy. This risk reduction cannot be explained by any clinical differences between the two groups and taking into account the results of other articles and therefore may be associated with the use of triclosan-impregnated suture. However, it did not reach statistically significance, probably because the infection rate in saphenectomy was lower than expected. Despite this the authors conclude that the result has clinical value because the use of this suture would avoid infection in every 39 patients This study was conducted in Brazil and therefore may have limited applicability to a UK setting.
How was the study funded?	This study was funded by Ethicon Inc., represented in Brazil by Johnson & Johnson do Brasil Indústria e Comércio de Produtos para Saúde Ltda. Grant # 10-107

Seim 2012, Norway (Seim, Tonnessen et al, 2012)	
How are the findings relevant to the decision problem?	This randomised study evaluated triclosan-coated sutures (Vicryl Plus) and uncoated sutures (Vicryl) in patients undergoing elective coronary artery bypass grafting with saphenous vein harvesting. Data were reported for only one outcome relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Table 4a. This study found that: **Incidence of SSIs** Patients treated with Vicryl Plus and Vicryl sutures showed similar rates of SSI at 4 weeks post-surgery, with 16 (10.0%) and 17 (10.4%) infections observed, respectively (p=1.00). **Unreported outcomes** This study did not report data on antibiotic use for SSI, duration of hospital stay, readmission for SSI, severity of SSI, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The reporting of methodology relating to the study design was limited. Operating surgeons were aware of the treatment allocated, and patients appear to have monitored their own wound healing as there were no scheduled follow-up assessments. The study focused on the incidence of and predictive factors for leg wound infections but did not use standard criteria or definitions for diagnosing SSI, using instead positive bacterial culture and clinical judgement. This study, which was conducted in in a single cardiothoracic surgery department in Norway, provided details of both pre- and post-operative care. It is therefore considered generalisable to the UK setting.
How was the study funded?	Not reported.

Soomro 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	
How are the findings relevant to the decision problem?	This randomised study evaluated triclosan-coated sutures (brand NR) and uncoated sutures (brand NR) in patients undergoing minor clean surgery for benign breast conditions. Data were reported for only one outcome relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	This study found that: **Incidence of SSIs** There was no statistically significant difference in the incidence of SSI with triclosan coated sutures and non-coated sutures at 30 days post-surgery, with 7 (3.7%) and 11 (5.8%) infections observed, respectively (p=0.507). **Unreported outcomes** This study did not report data on antibiotic use for SSI, duration of hospital stay, readmission for SSI, severity of SSI, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	Conclusions are restricted to clean wound type only, and the authors acknowledge that further studies with a larger sample size would be beneficial. The study was conducted in Pakistan and may have limited generalisability to a UK setting.
How was the study funded?	The authors stated that no pharmaceutical funding was taken.

Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	
How are the findings relevant to the decision problem?	This quasi-randomised controlled trial, which was conducted in the UK, compared triclosan-coated (Vicryl Plus) and non-coated (Vicryl) sutures in adult patients undergoing elective, primary, total hip or knee arthroplasties. Data on a number of eligible outcomes are reported.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** There was no significant difference between the two suture types in the rates of overall SSI (superficial and deep) at 30 days post-surgery, being 1.8% with triclosan-coated sutures (Vicryl Plus) and 2.5% with uncoated sutures (Vicryl) (p=0.266). **Hospital stay** Median length of hospital stay from patient admission to discharge was 3.9 days for patients treated with Vicryl Plus sutures and 4.1 days for patients treated with Vicryl sutures; the difference between the two groups was not statistically significant (p=0.386). One patient in the Vicryl Plus suture group and no patients in the Vicryl suture group were re-admitted to hospital for a *Clostridium difficile* infection. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, severity of SSIs, and technology-related adverse effects.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The main limitation of this study was the quasi-randomised design, with the interventions randomly assigned to study centre on a monthly basis. Block randomisation was used to reduce the effect of confounding due to differences between the three centres in the target population, local environment, and procedures. There was a significant difference between the three hospitals in the numbers of operations conducted (p<0.001). The study was powered to show significance if 60% reduction of SSIs is achieved (2.5% down to 1%). The study actually showed 28% reduction of the risk of SSIs, similar to the results of recent meta-analyses (De Jonge, Atema et al, 2017, Ahmed, Boulton et al, 2019). This study was conducted in the UK using a patient preoperative pathway and a standardised enhanced recovery pathway for the entire duration of the trial. However, individual surgeons decided on the surgical approach taken, and neither this nor the surgeon's grade were taken into consideration. Although generalisable to the NHS, the results should be viewed in light of these limitations.
How was the study funded?	Partially funded by Johnson & Johnson (UK)

Sukeik 2019, UK (Sukeik, George et al, 2019)	
How are the findings relevant to the decision problem?	This RCT evaluated triclosan-coated (Vicryl Plus) and uncoated (Vicryl) sutures in adult patients undergoing primary total hip or knee arthroplasties, but excludes those undergoing unilateral arthroplasties for trauma. Data for a number of eligible outcomes are reported.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a, 4c and 4d. This study found that: **Incidence of SSIs** The study did not specifically report incidence of SSIs as an outcome, considering it instead as a wound complication. Overall, few patients had SSIs during the follow-up period, although SSIs tended to occur more in patients in the Vicryl Plus group than in the Vicryl group: 2 and 1, respectively, at 2 weeks, and 4 and 1 at 6 weeks. **Hospital stay** There was no statistically significant difference in length of hospital stay between the Vicryl Plus and Vicryl groups (p=0.95), with patients in both groups staying on average approximately 6 days in hospital after surgery. **Severity of SSIs** Wound complications were noted more frequently at the 2 and 6 weeks follow up in the triclosan coated sutures group. There was no statistically significant difference between the two groups when comparing ASEPSIS scores of ≤10 to >10 (p=0.75). However, the overall mean ASEPSIS score was significantly higher for patients in the Vicryl Plus group than for patients in the Vicryl group, 2.5 vs 1.4 (p=0.036). **Unreported outcomes** This study did not report data on use of antibiotics for SSIs or readmission for SSI.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The premature termination of this study meant that fewer patients were enrolled than planned, this increases risk in a type II error, which means it was underpowered for the primary outcome (ASEPSIS score). Thus, the binary variable (ASEPSIS ≤10 vs >10) was considered insignificant.

	This study was conducted in the UK and, therefore, is applicable to the NHS. However, surgery was carried out at a single institution with operations performed according to the senior surgeon's default procedure.
How was the study funded?	No external financial support. The ISRCTN record indicates the study was funded by University College London.

Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	
How are the findings relevant to the decision problem?	This RCT assessed athrotomy closure using triclosan-coated barbed sutures (Stratafix Symmetric PDS Plus), in comparison with uncoated, nonbarbed sutures (Vicryl), in adults aged between 18 and 80 years who were undergoing a primary total knee arthroplasty for end-stage osteoarthritis. It also reported limited data on a number of outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Tables 4a and 4c. This study found that: **Incidence of SSIs** The study assessed the occurrence of SSI (superficial or deep) under the broader measure of wound complications. At 90 days post-surgery, only one patient in the triclosan suture group (Stratafix Symmetric PDS Plus) had developed a superficial SSI, compared with none in the uncoated suture group (Vicryl) (p=1.00). Similarly, a stitch abscess occurred in one Stratafix Symmetric-treated patient and no Vicryl-treated patents, respectively (p=1.00). **Readmission for SSIs** There were no wound-related readmissions in either of the suture groups. **Unreported outcomes** This study did not report data on antibiotic use for SSIs, hospital stay and severity of SSIs.
Will any information from this study be used in the economic model?	This study will not be used to inform the main meta-analyses of outcomes eligible for the systematic review, but will form part of a sensitivity analysis including studies assessing Stratafix Plus technologies.
What are the limitations of this evidence?	The main limitation of this study was the small sample size, with only 60 patients overall randomised to treatment. This was considered adequate for detecting differences in the main outcome, athrotomy closure, but the study was potentially underpowered for drawing conclusions in relation to secondary outcomes such as wound complications. There was a minor discrepancy between the full publication and the TRR in the eligibility criteria relating to BMI. This study was conducted in in a large healthcare system in the USA. Four fellowship-trained hip and knee arthroplasty surgeons conducted all the operations and directly supervised closure, but thre were no details of any pre-/post-operative care protocols in place. As the study was conducted in the USA, it should have good generalisability to the UK setting.
How was the study funded?	Investigator-initiated grant from Ethicon

Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	
How are the findings relevant to the decision problem?	This RCT investigated triclosan-coated barbed sutures (Stratafix Symmetric PDS Plus) and uncoated, nonbarbed sutures (Vicryl) in adults aged 18 to 80 years who were undergoing a primary total hip arthroplasty for end-stage osteoarthritis. It focused predominantly on operative measures, but did assess a number of eligible outcomes.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcome in the scope reported in Table 4a. This study found that: **Incidence of SSIs** The study reported the overall incidence of wound complications, which was defined to include SSIs (superficial and deep) amongst other events. The occurrence of SSIs was not reported in the full publication, nor in the TRR as a serious or other (non-serious) adverse effect at a 0% frequency threshold for reporting. One patient treated with a triclosan-coated barbed suture (Stratafix Symmetric PDS Plus) suffered a stitch abscess, whereas no patients did in the unbarbed, uncoated suture group (Vicryl) (p=1.00). **Unreported outcomes** This study did not report data on antibiotic use for SSIs, hospital stay and severity of SSIs. Data were not reported for readmission, despite it being an outcome measure.
Will any information from this study be used in the economic model?	The study does not report incidence of SSI or use of antibiotics for SSI in a format suitable for meta-analysis; for this reason it does not contribute to the quantitative analyses. The study assesses Stratafix Plus technology and is incorporated into the qualitative analyses of outcomes other than those assessed using meta-analysis.
What are the limitations of this evidence?	The main limitation of this study was the small sample size, with only 60 patients overall randomised to treatment. In addition, the study focused on operative measures and the power calculation was based on duration of arthrotomy closure, rather than a measure of patient efficacy. Thus, the reporting of patient outcomes was poor. Continuous locked suturing techniques were not used in the comparator group as it was not the standard of care. This study was conducted in in a single orthopaedic surgery department by two adult reconstruction fellowship-trained surgeons who either performed or directly supervised closure. However, details of pre-/post-operative care were not described. As the study was conducted in the USA, it should have good generalisability to the UK setting.
How was the study funded?	Investigator-initiated grant from Ethicon

Tabrizi 2019, Iran (Tabrizi, Mohajerani et al, 2019)	
How are the findings relevant to the decision problem?	This randomised controlled study assessed Vicryl Plus and Vicryl sutures in patients undergoing dental surgery for posterior mandible implants. Data were reported for only one outcome relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	This study found that: **Incidence of SSIs** There was no statistically significant difference in the incidence of SSI with Vicyl Plus and Vicryl sutures at 28 days post-surgery, with 12 (7.5%) and 11 (6.9%) infections observed, respectively (p=0.5). **Unreported outcomes** This study did not report data on antibiotic use for SSI, duration of hospital stay, readmission for SSI, severity of SSI, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The incidence of surgical site infection was significantly higher in those undergoing fresh socket implant placement than in those undergoing delayed placement of implants, irrespective of the type of suture used. As the numbers of subjects with delayed implant placement (262 cases) and fresh socket placement (58 cases) differed, the comparison of the incidence of infection may be associated with bias; a higher percentage of patients in the Vicryl Plus arm (21.2%) received fresh socket implants than in the Vicryl arm (15%). The study was conducted in Iran and may have limited generalisability to a UK setting.
How was the study funded?	Shahid Beheshti University of Medical Sciences funded the research.

Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013) (secondary analysis Steingrimsson 2015) (Steingrimsson, Thimour-Bergstrom et al, 2015)	
How are the findings relevant to the decision problem?	This RCT, which evaluated triclosan-coated sutures (Vicryl Plus and Monocryl Plus) in comparison with the non-coated sutures (Vicryl and Monocryl) in adult patients who underwent saphenous vein harvesting and sternotomy during elective cardiac surgery, reported data on a number of eligible outcomes.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4d. This study found that: **Incidence of SSIs** Leg-wound closure with triclosan-coated sutures (Vicryl Plus and Monocryl Plus) significantly reduced the incidence of SSIs within 60 days post-surgery compared with the use of uncoated sutures (Vicryl and Monocryl), 12.5% vs 20.0% (p=0.0497; RR: 0.63, 95% CI: 0.39, 1.00). However, there was no significant difference in the overall incidence of sternal SSI between the two groups, with comparable rates of 12.8% and 11.2% achieved in the triclosan-coated and uncoated suture groups, respectively (p=0.64). **Severity of SSIs** At 60 days after surgery, the ASEPSIS score tended to be lower in patients receiving triclosan-coated sutures (Vicryl Plus and Monocryl Plus) for leg wound closure than in patients receiving the uncoated sutures (Vicyl and Monocryl), mean scores 3.7 (8.7) and 5.4 (10.0), respectively, but this difference was not statistically significant (p=0.097). Similarly, there was no significant difference between groups in ASEPSIS scores for sternal wounds at 60 days postoperatively (p=0.985). **Use of antibiotics** At 60 days post-surgery in the open vein harvesting cohort, the Vicryl Plus + Monocryl Plus reported 11% of patients receiving post-operative antibiotics, compared to the control group which reported 13%. In the sternotomy cohort, the Vicryl Plus + Monocryl Plus reported 18% of patients receiving post-operative antibiotics, compared to the control group which reported 13%. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, hospital stay or readmission for SSIs, and technology-related adverse events.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The use of sternotomy as part of the overall cardiac procedure was not explicit in the primary publication of this study. Patients were similarly randomised to sternal wound closure using the same suture types and their outcomes monitored and assessed. These were published subsequently as a secondary analysis. However, this was potentially underpowered as the power analysis was performed for leg wound infections that have a somewhat higher incidence than in the sternotomy wound. This single-centre study was conducted in Sweden, using standard operative procedures. Thus, it is considered generalisable to the UK setting.
How was the study funded?	Supported by grants from the Västra Götaland Healthcare Region (ALF/LUA grant number 146281)) and Ethicon, Inc., Somerville, NJ, USA.

Turtiainen 2012, Finland (Turtiainen, Saimanen et al, 2012)	
How are the findings relevant to the decision problem?	This randomised controlled study assessed Vicryl Plus and Monocryl Plus in comparison with Vicryl and Monocryl sutures in patients undergoing peripheral lower limb vascular surgery.
Does this evidence support any of the claimed benefits for the technology? If so, which?	**Incidence of SSIs** The study concluded that wound closure with triclosan-coated sutures does not reduce the risk of wound infection after lower limb vascular surgery, with no difference between the triclosan group and the control group in the incidence of surgical wound infection. **Severity of SSIs** Severity of SSIs was similar between the two groups, with 24 (77 %) versus 22 (73 %) superficial wound infections and 5 (16 %) versus 5 (17 %) deep wound infections in the study and the control groups, respectively. **Length of stay in hospital** Length of stay in hospital was similar between groups, with a mean of 5.5 (6.5) and 5.2 (4.3) days postoperative stay for the intervention and control groups respectively. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs or hospital readmission for SSIs. No details of specifically technology related adverse events were reported.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	The authors note that "The limitation of our study is that the results apply only to patients undergoing peripheral vascular surgery. It is not clear if the result can be generalized to other surgical procedures." The study was conducted in Finland and as such should be otherwise generalisable to similar surgeries in a UK setting.
How was the study funded?	No funding is declared for this study.

Williams 2011, UK (Williams, Sweetland et al, 2011)	
How are the findings relevant to the decision problem?	This RCT evaluated the use of triclosan-coated sutures (Vicryl Plus or Monocryl Plus) compared with uncoated sutures (Vicryl or Monocryl) to reduce wound infections in patients undergoing elective surgery for breast cancer. It reported data for a number of outcomes relevant to the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4d. This study found that: **Incidence of SSIs** At six weeks, the SSI rates were 15.2% (10/66) for the intervention arm and 22.9% (14/61) for the control arm. **Severity of SSIs** Although there was a uniform tendency for lower SSI rates in the coated suture group, using ASEPSIS and Southampton scores, this did not reach statistical significance. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, readmission for SSI, hospital stay, and technology-related adverse effects.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model
What are the limitations of this evidence?	The authors note that had the CDC definitions been used to power the study, the differences in SSI rates between the two groups (control standard vs. antimicrobial-coated sutures) would have required approximately 400 patients to show a statistically significant difference at six weeks. This is more than twice as many patients as were actually randomised by the study, without taking into account the fact that the study assessed completers rather than an ITT population. ASEPSIS scores were low and SSI incidence was also low, making it difficult to see differences between the two arms.
How was the study funded?	This study was supported by an investigator-initiated grant from Ethicon

Zhang 2011, China (Zhang, Zhang et al, 2011)	
How are the findings relevant to the decision problem?	This randomised pilot study evaluated triclosan-coated (Vicryl Plus) and uncoated sutures (Chinese silk) in women undergoing scheduled, modified radical mastectomy for breast cancer. It reported data for a number of outcomes relevant to the scope
Does this evidence support any of the claimed benefits for the technology? If so, which?	Below is a summary of the evidence for the outcomes in the scope reported in Tables 4a and 4d. This study found that: **Incidence of SSIs** No SSIs were observed in the first 12 days after the operation. The incidence of SSIs was 4.3% with triclosan-coated (Vicryl Plus) sutures compared with 11.1% for uncoated (Chinese silk) sutures at 30 days post-surgery, with no further SSIs observed up to 90 days. **Severity of SSIs** SSI severity, as scored on a modified ASEPSIS scale, was lower (fewer signs associated with infection) for the Vicryl Plus suture group than for the Chinese silk group at all specified time points, although there was no statistically significant difference from day 12 onwards. At 90 days after the operation, the mean (SD) score was 3.2 (3.6) for patients treated with Vicryl Plus sutures and 4.3 (3.3) for patients treated with Chinese silk sutures. **Unreported outcomes** This study did not report data on use of antibiotics for SSIs, hospital stay and readmission for SSIs.
Will any information from this study be used in the economic model?	This study will be used to inform meta-analyses of outcomes eligible for the systematic review, the output of which will be used to inform the economic model.
What are the limitations of this evidence?	This study was a post-market, open-label pilot study which focused on cosmetic outcomes and did not conduct a formal sample size calculation. Thus, it might be underpowered to establish the significance of differences between treatments. Only 101 patients were randomised to treatment. Patients, surgeons and outcome assessors, aside from the central assessor of the primary endpoint, were aware of treatment allocation. The study was conducted in 6 first tier hospitals in China. Although surgical procedures and skin incision closure were performed in accordance with unified standard of care, pre- and post-operative care methods were not described and might have been subject to regional variation. Since the study was conducted in Asia it will have limited generalisability to the UK setting. Thus, the results should be considered in light of the limitations.
How was the study funded?	Funded by Ethicon Inc. and Johnson & Johnson

6 Adverse events

Describe any adverse events and outcomes associated with the technology in national regulatory databases such as those maintained by the MHRA and FDA (Maude). Please provide links and references.

A hand search of the MHRA database was conducted on 10 February 2021 using the terms 'PDS Plus Antibacterial (polydioxanone) Suture', 'MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture', 'Coated VICRYL Plus Antibacterial (polyglactin 910) Suture' and 'STRATAFIX Suture'. No adverse events (AE) have been reported on the MHRA database.

A hand search of the FDA (Maude) database was conducted on 2 February 2021 using the terms 'PDS Plus Antibacterial (polydioxanone) Suture', 'PDS', 'PDS Plus Antibacterial', 'STRATAFIX Suture', 'STRATAFIX', 'Coated VICRYL Plus Antibacterial (polyglactin 910) Suture', 'VICRYL', 'Coated VICRYL', 'VICRYL Plus Antibacterial', 'MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture', 'MONOCRYL', 'MONOCRYL Plus', 'MONOCRYL Plus Antibacterial'.

The MHRA database and FDA (Maude) search dates were limited from 1 January 2000 to 1 February 2021.

[redacted]

PDS Plus Antibacterial (polydioxanone) Suture yielded 156 reports of AE's. A summary of AE's related to the PDS Plus Antibacterial (polydioxanone) Suture are reported below.

- Suture that was placed broke leading to patients experiencing abdominal incision dehiscence.
- Patients with broken sutures required a reoperation.
- Patients experienced superficial or deep surgical site infections post-op or wound dehiscence.
- Suture separated from the needle

STRATAFIX Suture yielded 30 reports of AE's. A summary of AE's related to STRATAFIX Suture are reported below.

- Suture broke post-op causing infection
- Needle pulled off the suture during procedure
- Suture broke post-op leading patients to experience dehiscence
- Suture absorbed soon after operation

Coated VICRYL Plus Antibacterial (polyglactin 910) Suture yielded 497 reports of AE's. A summary of AE's related to Coated VICRYL Plus Antibacterial (polyglactin 910) Suture is reported below.

- Needle pulled off the suture during the procedure
- Patients experience wound dehiscence following a needle/suture break
- Patient experienced symptoms post-op related to an infection
- Suture was knotted with the needle holder
- Post-op patient developed wrapping lesions around the incision.
- Suture dissolved shortly after operation

MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture yielded 187 reports of AE's A summary of AE's related to MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture is reported below.

- Patient experienced pain, redness, inflammation, and irritation around incision

- Suture broke during surgery
- Suture detached from needle
- Suture material broke when removing it from packaging

Suture became detached from the needle during normal handling

Describe any adverse events and outcomes associated with the technology in the clinical evidence.

Adverse events were not widely reported, and it was often unclear from the reporting in the included studies whether there was a relationship between the adverse events reported and the technology in use. Clinical advice was sought and suggested that the majority of adverse events reported were possibly related to surgical technique or additional variables other than the type of suture in use. Adverse events reported in MHRA, FDA and Maude are a combination of events secondary to the surgical technique and events that are multifactorial. With the information available it is difficult to attribute the cause of the event to the suture used.

Six studies reported adverse events explicitly stated by the study authors to have a possible or probably relation to the technology under assessment. Only one study (Rasic 2011) found a statistically significant difference between arms in the incidence of a technology related adverse event. This study reported that during the hospitalisation period, 7 (7.5%) and 16 (17.5%) of patients in the intervention and comparator arms respectively experienced an inflammatory reaction to the skin suture. The p value for the comparison of arms (0.039) showed a statistically significant difference.

In the intervention and comparator arms respectively, Diener 2014 reported 0 and 2 (1.3%) incidences of at least one serious adverse event with probable causal relation to the technology within 30 days of surgery. The p value for the comparison was not significant.

Sukeik 2019 reported that at 6 weeks post surgery, 2 (2.5%) and 0 patients in the intervention and comparator arms respectively experienced irritation from the suture. The p value for the comparison was not significant.

Renko 2017 reported that at 30 days post-surgery, 6 patients in both arms (of 45 and 46 patients in intervention and control arms respectively) experienced a failure of their sutures to reabsorb.

Zhang 2011 reported that at 90 days post-surgery, 2 (3.9%) and 3 (6.0%) of patients in the intervention and control arms respectively experienced an AE “possible” related to either the technology or the procedure. No statistical comparison was made.

Ford 2005 reported that at 75 to 85 days post-surgery, no patients had experienced any recorded device related AEs. Mingmalairak 2009 also reported that at 1 year post surgery, “the authors found no allergy or adverse effects”.

Table 6 Technology related adverse events

Study *Author, year*	**Outcome definition and measure**	**Time point of assessment**	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**Number of patients experiencing event (%)**	**Difference between treatments**
Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	Outcome was not assessed by this study.					
Baracs 2011, Hungary (Baracs, Huszar et al, 2011)	Outcome was not assessed by this study.					
Diener 2014, Germany (Diener, Knebel et al, 2014)	At least one serious adverse event with possible causal relation to intervention.	Within 30 days after index operation	PDS Plus	583	21 (13.9)	P = 0·68 (Mantel-Haenszel test, two-sided)
			PDS II	602	17 (10.8)	
	At least one serious adverse event with probable causal relation to intervention.	Within 30 days after index operation	PDS Plus	583	0	
			PDS II	602	2 (1.3)	
Ford 2005, USA (Ford, Jones et al, 2005)	Device-related AEs, recorded at each follow-up visit.	80 (± 5) days post-isurgery	Vicryl Plus	98	0 (0)	No difference
	Device-related AEs, recorded at each follow-up visit.	80 (± 5) days post-surgery	Vicryl	49	0 (0)	
Galal 2011, Egypt (Galal and El-Hindawy, 2011)	Outcome was not assessed by this study.					
Ichida 2018, Japan (Ichida, Noda et al, 2018)	Outcome was not assessed by this study.					
Isik 2012, Turkey (Isik, Selimen et al, 2012)	Outcome was not assessed by this study.					
Justinger 2013, Germany (Justinger, Slotta et al, 2013)	Outcome was not assessed by this study.					
Karip 2016, Turkey (Karip, Celik et al, 2016)	Outcome was not reported by arm.					
Lin 2018, Taiwan (Lin, Chang et al, 2018)	Outcome was not assessed by this study.					
Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	Occurrence of incision swelling; unclear whether suture related.	Within 30 days post-discharge	Vicryl Plus + PDS Plus	140 (treatment completers)	26 (18.6)	OR 1.38 (95% CI: 0.73, 2.61), p=0.322
	Occurrence of incision swelling; unclear whether suture related.	Within 30 days post-discharge	Vicryl + PDS II	141 (treatment completers)	20 (14.2)	
	Occurrence of incision redness; unclear whether suture related.	Within 30 days post-discharge	Vicryl Plus + PDS Plus	140 (treatment completers)	43 (30.7)	OR 1.20 (95% CI: 0.71, 2.02), p=0.486
	Occurrence of incision redness; unclear whether suture related.	Within 30 days post-discharge	Vicryl + PDS II	141 (treatment completers)	38 (26.9)	
Mingmalairak 2009, Thailand	“the authors found no allergy or adverse effects.”	1 year post-surgery	Vicryl Plus	50	0	NR
	“the authors found no allergy or adverse effects.”	1 year post-surgery	Vicryl	50	0	

Study *Author, year*	**Outcome definition and measure**	**Time point of assessment**	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**Number of patients experiencing event (%)**	**Difference between treatments**
(Mingmalairak, Ungbhakorn et al, 2009)						
Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	Outcome was not assessed by this study.					
Olmez 2019, Turkey (Olmez, Berkesoglu et al, 2019)	Outcome was not reported by arm.					
Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	Patients with inflammatory reaction to skin suture	Hospitalisation period	Vicryl Plus	NR	7 (7.5)	0.039
	Patients with inflammatory reaction to skin suture	Hospitalisation period	Vicryl	NR	16 (17.5)	
Renko 2017, Finland (Renko, Paalanne et al, 2017)	Frequency of findings of absorbable suture(s) not resorbing	30 days post-surgery	Triclosan-coated sutures (Vicryl Plus, Monocryl Plus, or PDS Plus	778	45 (6)	p=1.0
	Frequency of findings of absorbable suture(s) not resorbing	30 days post-surgery	Non-coated sutures (Vicryl, Monocryl, or PDS)	779	46 (6)	
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	Outcome was not reported by arm.					
Ruiz-Tovar 2020, Spain (Ruiz-Tovar, Llavero et al, 2020)	Reoprts rate of evisceration but this is deemed by clinical input to be unlikely to be technology related.					
Ruiz-Tovar 2015, Spain (Ruiz-Tovar, Alonso et al, 2015)	Death prior to assessment of outcomes. Mortality causes were multi-organ failure secondary to septic status, and all deaths occurred within 96 hours postoperatively. U*nknown whether this was related to suture type*	Within 60 days post-surgery	Triclosan coated sutures	55	5 (9.1*)	p=not significant
	Death prior to assessment of outcomes. Mortality causes were multi-organ failure secondary to septic status, and all deaths occurred within 96 hours postoperatively. U*nknown whether this was related to suture type*	Within 60 days post-surgery	Uncoated sutures	55	4 (7.3*)	
Santos 2019, Brazil (Santos, Santos et al, 2019)	Wound pain	30 days post-surgery	Vicryl Plus	251 (completers)	25 (10.0)	p = 0.011
	Wound pain	30 days post-surgery	Vicryl	257 (completers)	46 (17.9)	
	Wound hyperthermia	30 days post-surgery	Vicryl Plus	251 (completers)	4 (1.6)	p = 0.028
	Wound hyperthermia	30 days post-surgery	Vicryl	257 (completers)	14 (5.4)	
Seim 2012, Norway (Seim,	Outcome was not assessed by this study.					

Study *Author, year*	**Outcome definition and measure**	**Time point of assessment**	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**Number of patients experiencing event (%)**	**Difference between treatments**
Tonnessen et al, 2012)						
Soomro 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	Outcome was not assessed by this study.					
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Technology-related adverse effects were not amongst the postoperative complications reported.					
Sukeik 2019, UK (Sukeik, George et al, 2019)	Patients with irritation from suture	6 weeks post-surgery	Vicryl Plus	81	2 (2.5*)	NR
	Patients with irritation from suture	6 weeks post-surgery	Vicryl	69	0 (0)	NR
	Serous discharge *(unclear from authors' reporting whether this is related to intervention)*	6 weeks post-surgery	Vicryl Plus	81	1 (1.2*)	NR
	Serous discharge *(unclear from authors' reporting whether this is related to intervention)*	6 weeks post-surgery	Vicryl	69	0 (0)	
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	Occurrence of stitch abscess, defined as a collection of purulent fluid in association with the site of a suture	90 days post-surgery	Stratafix Symmetric PDS Plus	30	1 (3)	Fisher's exact test, p=1.00
	Occurrence of stitch abscess, defined as a collection of purulent fluid in association with the site of a suture	90 days post-surgery	Vicryl	30	0 (0)	
Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	Occurrence of stitch abscess, defined as a collection of purulent fluid in association with the site of a suture	90 days post-surgery	Stratafix Symmetric PDS Plus	30	1 (3)	Fisher's exact test, p=1.00
	Occurrence of stitch abscess, defined as a collection of purulent fluid in association with the site of a suture	90 days post-surgery	Vicryl	30	0 (0)	
Tabrizi 2019, Iran (Tabrizi, Mohajerani et al, 2019)	Outcome was not assessed by this study.					
Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013)	Outcome was not assessed by this study.					
Turtiainen 2012, Finland (Turtiainen, Saimanen et al, 2012)	Outcome was not assessed by this study.					
Williams 2011, UK (Williams, Sweetland et al, 2011)	Outcome was not assessed by this study.					
Zhang 2011, China (Zhang, Zhang et al, 2011)	AEs possibly related to device and procedure	Intraoperative through 90 days post-operative	Vicryl Plus	51	2 (3.9)	NR

Study *Author, year*	**Outcome definition and measure**	**Time point of assessment**	**Intervention**	**Number of patients analysed** *ITT or mITT unless specified*	**Number of patients experiencing event (%)**	**Difference between treatments**
	AEs possibly related to device and procedure	Intraoperative through 90 days post-operative	Chinese sillk	50	3 (6.0)	

7 Evidence synthesis and meta-analysis

Although evidence synthesis and meta-analyses are not necessary for a submission, they are encouraged if data are available to support such an approach.

If an evidence synthesis is not considered appropriate, please instead complete the section on qualitative review.

If a quantitative evidence synthesis is appropriate, describe the methods used. Include a rationale for the studies selected.

A high level assessment of the similarity of studies and availability of data was performed. Where meta-analysis was possible, i.e. sufficient homogenous studies reported suitable data, we used statistical methods to analyse and summarise the results of the included studies. Where data were appropriate for pooling following the feasibility assessment, we statistically pooled the results for the outcomes of interest using both fixed- and random-effects models in R . We compared results to assess the robustness of the model chosen and susceptibility to outliers. Potential sources of heterogeneity were defined a priori by sensitivity and subgroup analyses as detailed in Section 1 (adults only, children only, clean wounds only and non-clean wounds only).

Assessment of the similarity of studies for meta-analysis

Populations

The thirty one included studies encompassed a wide range of surgeries, including (but not limited to) multiple types of abdominal surgery, knee and hip arthroplasty, surgery for pilonidal disease, coronary artery bypass graft surgery with saphenous vein harvesting, breast surgery, dental surgery, sinus excision and implantation of a cerebrospinal fluid shunting device.

Two studies assessed a paediatric population ((Renko, Paalanne et al, 2017)(Ford, Jones et al, 2005)). Twenty two studies (Arslan, Atasoy et al, 2018, Baracs, Huszar et al, 2011, Galal and El-Hindawy, 2011, Justinger, Slotta et al, 2013, Karip, Celik et al, 2016, Lin, Chang et al, 2018, Mattavelli, Rebora et al, 2015, Olmez, Berkesoglu et al, 2019, Rasic, Schwarz et al, 2011, Ruiz-Tovar, Llavero et al, 2020, Santos, Santos et al, 2019, Seim, Tonnessen et al, 2012, Soomro, Khurshaidi et al, 2017, Sprowson, Jensen et al, 2018, Sukeik, George et al, 2019, Sundaram K, Warren J et al, 2020a, Sundaram, Piuzzi et al, 2020b, Tabrizi, Mohajerani et al, 2019, Thimour-Bergstrom, Roman-Emanuel et al, 2013, Turtiainen, Saimanen et al, 2012, Williams, Sweetland et al, 2011, Zhang, Zhang et al, 2011) assessed adult only populations, and four studies assessed mixed populations including adults and children (Ichida, Noda et al, 2018, Mingmalairak, Ungbhakorn et al, 2009, Nakamura, Kashimura et al, 2013, Rozzelle, Leonardo et al, 2008). The final two studies did not provide sufficient information to determine whether participants were all children, all adults, or mixed (Isik, Selimen et al, 2012, Ruiz-Tovar, Alonso et al, 2015). These two studies were not included in the child or adult subgroup analyses.

Studies of all surgery types were retained for the meta-analysis. Studies of all populations were also retained, as subgroup analyses were planned for both adult only and paediatric only populations.

Interventions
Twenty six studies assessed either Vicryl Plus, Monocryl Plus, or PDS Plus against an uncoated suture material. Two further studies assessed unnamed triclosan coated sutures against uncoated sutures (Ruiz-Tovar, Alonso et al, 2015, Soomro, Khurshaidi et al, 2017). As per the review protocol both these studies were included and were retained for the analyses, as the likelihood that they were assessing Plus Sutures was agreed to be high. One study (Ruiz-Tovar, Llavero et al, 2020) assessed three arms; Stratafix Symmetric Plus, PDS Plus, and uncoated PDS. The final two studies (Sundaram K, Warren J et al, 2020a, Sundaram, Piuzzi et al, 2020b) assessed Stratafix Symmetric Plus against an uncoated suture.

As the barbed design of the Stratafix range of sutures is different to that of Vicryl Plus, Monocryl Plus, and PDS Plus, Sundaram 2020a and Sundaram 2020b were deemed not to be suitable for inclusion in the main meta-analysis, and were included as a sensitivity analysis only, to assess their impact on the results. Sundaram 2020b did not report outcomes of interest in a format that could be incorporated into the meta-analysis so its inclusion was not influential on the results. Only the PDS Plus and uncoated PDS arms of Ruiz-Tovar 2020 were included in the main meta-analysis. No studies compared triclosan coated Stratafix with uncoated Stratafix.

Comparators
All studies compared a triclosan coated suture against a non-coated suture material.

Outcomes
In accordance with the CDC definition of an SSI, all but four studies reported the incidence of SSIs at around 30 days or later. Of these four, one study (Justinger, Slotta et al, 2013) reported SSIs at two weeks post discharge, with a mean length of stay of 11 and 15 days for the intervention and control arms respectively. As the total of hospital stay and the two week follow up period is close to 30 days for both arms, this study was retained. One further study (Sundaram, Piuzzi et al, 2020b) did not report data on incidence of SSIs in a format suitable for inclusion in the meta-analysis; timepoint of assessment for this outcome was also unclear.

The final two studies reported incidence of SSI at two weeks post-surgery (Karip, Celik et al, 2016) and during the hospitalization period only (Rasic, Schwarz et al, 2011). Rasic 2011 reported a mean hospital stay of 13.2 and 21.4 days for the intervention and comparator arms respectively. Rasic 2011 would not have recorded any SSIs occurring outside a hospital setting, and given the difference in mean length of hospitalization for patients within two arms, the study may have recorded more SSIs for the comparator arm because of the longer mean observation window. Rasic 2011 was therefore removed from the meta-analysis. Karip 2016 reported incidence of SSIs at two weeks post-surgery. The CDC definition of an SSI is an infection occurring within 30 days of surgery; Karip 2013 was removed from the meta-analysis as the possibility remained that infection rates in the two arms might have diverged after the two week time point and the different rate of change between the two arms might have a differential impact on the outcome. The study would have failed to capture this.

Study Designs
All studies were randomized controlled trials. The majority of studies randomized individual patients to the intervention or control arm. Studies that used other methods were Justinger 2013,

Germany (randomized groups of patients rather than individuals), and Sprowson 2018, UK (quasi randomised based on monthly assignment of the participating hospitals to one of the two interventions). One further study, Rozelle 2008, USA, randomised procedures rather than patients; 84 shunt procedures were performed in 61 patients. Patients receiving new shunts following successful treatment of a shunt infection, and patients undergoing revision more than 6 months after randomization were rerandomized, and included again in the assessment. However, as patients were successfully and fully treated for their shunt infections prior to re-implantation, Rozelle 2008 was retained for inclusion in the meta-analyses.

The studies were conducted across a span of at least fifteen years, with the earliest study published in 2005 (Ford, Jones et al, 2005) and the most recent included studies published in 2020 (Sundaram K, Warren J et al, 2020a, Sundaram, Piuzzi et al, 2020b). Clinical pathways and practices are likely to have changed somewhat across this timespan. However as the meta-analysis utilitses within-study comparisons, this was not considered to be a significant problem.

Conclusion
There was an overall lack of heterogeneity across all the studies, which was confirmed by the quantitative assessment (Figure 7a and 7b). Sundaram 2020a, Sundaram 2020b, Karip 2013 and Rasic 2011 were excluded from the meta-analyses.

Subgroup analyses
Subgroup analyses of adult only and paediatric only studies were conducted.

Subgroup analyses by clean / non-clean wound type were also conducted. Where reported, we recorded authors' descriptions of the status of the wounds assessed in each study. Where the authors did not explicitly report this information, the independent opinion of three clinicians was sought as to the likely wound status following the surgery detailed in each of the studies. The categorisation of the wound status was then compared across the clinicians and any divergence of opinion discussed. The decisions reached (see Table 7a) determined which subgroup analysis each study would contribute to.

Selection of data for analyses
The Thimour-Bergström 2013 study contributed two sets of data to the meta-analysis. Patients in this study were undergoing coronary artery bypass, or coronary artery bypass plus valve surgery, using a saphenous vein graft and sternotomy. The primary paper (Thimour-Bergstrom, Roman-Emanuel et al, 2013) reported details of leg wounds, and a secondary paper (Steingrimsson, Thimour-Bergstrom et al, 2015) from the trial reported details of sternum wounds. These two sets of data are indicated in the analysis plots by the tags "LEG" and "STERNUM". Both sets of data were used, as clinical input deemed the two wound sites to be independent of each other.

Table 7a Mapping of surgery onto wound type (for studies which did not explicitly report wound type)

Study	Surgery type	Clinical opinion on likely wound type for purposes of subgroup analyses: *clean, clean-contaminated, contaminated, dirty, or "likely to be mixed"?*
Ford 2005, USA (Ford, Jones et al, 2005)	General surgical procedures (no further details)	Mixed (clean and clean-contaminated)
Isik 2012, Turkey (Isik, Selimen et al, 2012)	Various cardiac surgical procedures Vicryl Plus arm: Coronary artery bypass graft: 147 (86.5) Valve repair: 17(10) Coronary artery bypass graft + valve repair : 6 (3.5) Other: 0 (0) Vicryl Plus arm: Coronary artery bypass graft: 263 (77.4) Valve repair: 50 (14.7) Coronary artery bypass graft + valve repair: 25 (7.4) Other: 2 (0.6)	Clean
Karip 2016, Turkey (Karip, Celik et al, 2016)	Sinus excision followed by Karydakis flap repair	Clean-contaminated
Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	Appendicitis surgery, including acute, supparative, gangrenous and ruptured appendix surgery.	Clean-contaminated
Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	Elective colorectal carcinoma surgery through a midline incision	Clean-contaminated
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	Implantation of cerebrospinal fluid (CSF) shunting device	Clean
Santos 2019, Brazil (Santos, Santos et al, 2019)	Saphenectomy during coronary artery bypass graft, with and without cardiopulmonary bypass: (CPB) CPB: Vicryl Plus arm: 238 (94.8) Vicryl arm: 241 (93.8)	Clean
Seim 2012, Norway (Seim, Tonnessen et al, 2012)	Coronary artery bypass graft surgery with saphenous vein harvesting	Clean
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Primary total hip or knee arthroplasty	Clean
Sukeik 2019, UK (Sukeik, George et al, 2019)	Unilateral knee and hip arthroplasty	Clean
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	Total knee arthroplasty using medial para-patella approach	Clean
Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	Total hip arthroplasty (posterior approach) with repair of posterior capsule and short external rotator	Clean

Study	Surgery type	Clinical opinion on likely wound type for purposes of subgroup analyses: *clean, clean-contaminated, contaminated, dirty, or "likely to be mixed"?*
Tabrizi, 2019, Iran (Tabrizi, Mohajerani et al, 2019)	Dental implant surgery to place three dental implants in the posterior mandible	Clean-contaminated
Thimour-Bergström 2013, Sweden(Thimour-Bergstrom, Roman-Emanuel et al, 2013)	Coronary artery bypass, or coronary artery bypass plus valve surgery, using a saphenous vein graft and sternotomy	Clean
Turtiainen, 2012, Finland (Turtiainen, Saimanen et al, 2012)	Non-emergency lower-limb arterial surgery	Clean

Meta-analysis (pooling effect sizes)

We conducted six meta-analyses of published SSI studies. In order to include a study in the analyses, a mean or median and suitable variance data for the outcome in question were required for both the intervention and comparator arms of the study. The total number of patients analysed for that outcome per arm was also required.

The primary outcome of interest was the relative risk (RR) of developing a SSI between the intervention (Plus Sutures) and control group. This analysis was conducted six times: once including all studies that provided sufficient data; once for a subset of studies that assessed SSI occurrence in adults; once for a subset of studies that assessed SSI occurrence in children; once for a subset of studies that assessed SSI occurrence in those with clean wounds; once for a subset of patients that assessed SSI occurrence in those with non-clean wounds; and once with Stratafix Plus included as an intervention for a sensitivity analysis (Ruiz-Tovar 2005 and Sundaram 2020a). This analysis was conducted once on all studies that provided sufficient data. RR is the ratio of the probability of an event occurring in the intervention group compared to the probability of an event occurring in the control group. A RR = 1 (or close to 1) means that little or no difference in risk levels between the two groups, a RR <1 suggests a decrease in risk in the intervention group, whereas a RR >1 suggests an increase in risk in the intervention group. Both fixed and random effect models were fitted to the data.

The Mantel-Haenszel method was used to pool effect sizes ((Mantel and Haenszel, 1959, Robins, Greenland et al, 1986)) and the Sidik-Jonkman estimator was used to calculate τ^2 in the random effects models ((Sidik and Jonkman, 2007)). The Hartung-Knapp adjustment was used in the random effects models ((IntHout, Ioannidis et al, 2014)). Finally, a continuity correction of 0.5 was used in studies with zero event counts.

Between-study Heterogeneity and outliers

Three heterogeneity measures were used to assess the degree of heterogeneity within the pooled studies; Cochrane's Q, Higgins and Thompson's I^2 and τ^2. The Higgins rule of thumb ((Higgins, Thompson et al, 2003)) states that an I^2 of 25%, 50% and 75% represents low, moderate and substantial study heterogeneity respectively. Furthermore, prediction intervals are displayed for all meta-analyses to provide a range of expected effects for future studies to fall within based on current evidence ((IntHout, Ioannidis et al, 2016)).

Studies were defined as an outlier if the study's confidence interval did not overlap the confidence interval of the pooled effect (i.e. there is high certainty that the study cannot be part of the "population" of effect sizes used within the meta-analysis).

Publication Bias

Funnel plot analysis and Egger's test of the intercept were used to assess publication bias ((Egger, Davey Smith et al, 1997)).

Software

All statistical analyses were conducted using R version 4.0.2 ((R Core Team, 2020)), with additional R packages meta (v4.16-2; (Balduzzi S, Rucker G et al, 2019)) and dmetar (v0.0.9000; (Harrer M, Cuijpers P et al, 2019)).

Quantitative confirmation of similarity assessment

The similarity assessment details the reasons for the exclusion of the four studies that did not inform the meta-analysis.

In addition to the similarity assessment, influence analysis was also conducted to detect and remove any extreme influence on the overall effect size. The Baujat diagnostic plot ((Baujat, Mahe et al, 2002)) below (Figure 7a) shows that no study highly influenced the pooled effect size while also highly contributing to the overall heterogeneity of the meta-analysis. Furthermore, a Leave-One-Out analysis (Figure 7b) showed that no single study highly influenced heterogeneity or the pooled effect size with I2 ranging from 33% to 41% and the pooled effected size ranging from 0.67 to 0.70. Therefore, these figures show that the removal of Rasic 2011, Karip 2016, and Sundaram 2020a and 202b (based on the similarity assessment) did not unduly influence the primary outcome. Note that the scales on the Baujat x-axis are relatively small and therefore, although studies lie to the right handside of the plot (normally an indicator of high influence), in this case the studies do not appear to be exerting undue influence. Furthermore, the Diener 2014 study stands alone at the top of the plot, this is most likely to be due to the large sample size of this study relative to the others found in the literature. This results in higher heterogeneity and higher influence on the pooled results.

Figure 7a: Baujat diagnostic plot of all SSI incidence studies

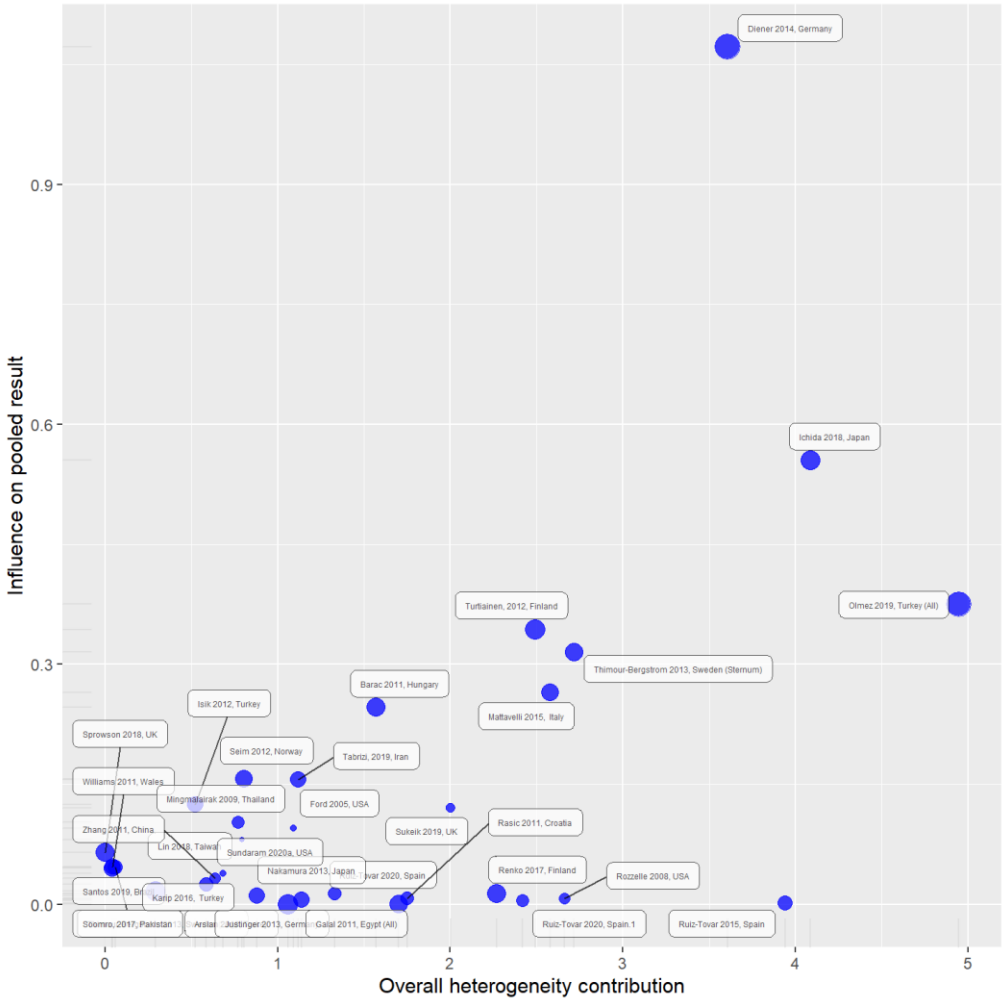
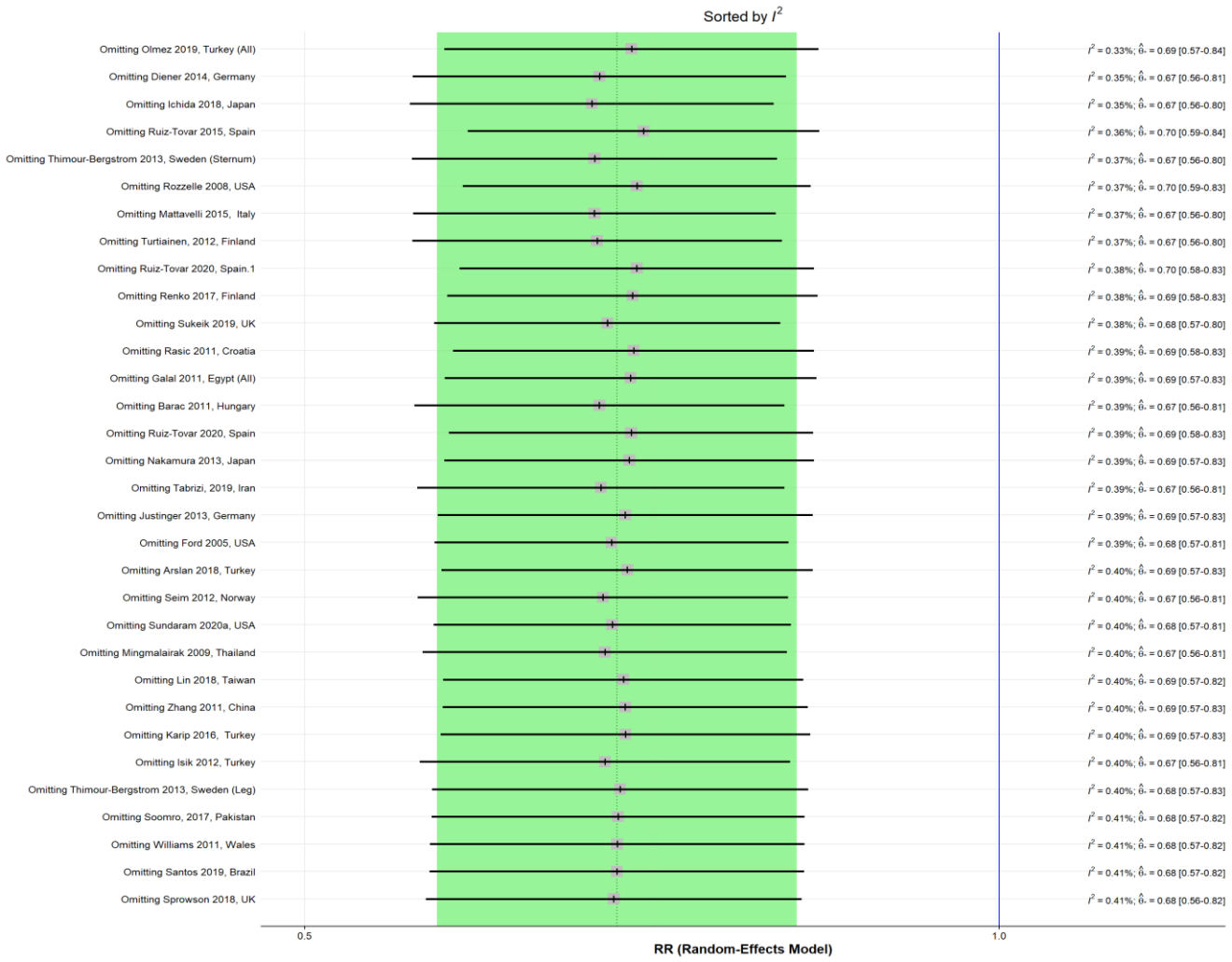


Figure 7b: Leave-One-Out plot of all SSI incidence studies



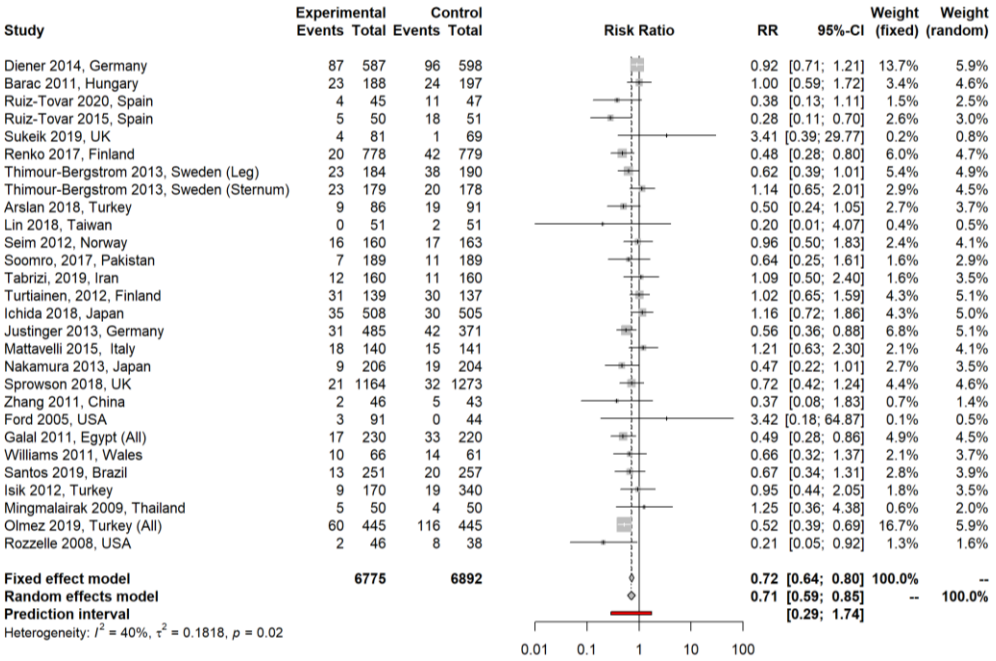
Report all relevant results, including diagrams if appropriate.

All SSI studies

Both the fixed and random effect model produced an estimated RR <1 (Figure 7c). Moreover, in both models the 95% confidence interval does not include 1, indicating a statistically significant reduction in the risk of SSI development (p < 0.001 and p = 0.001 respectively).

The fixed effect model estimated a RR of 0.72 (95% confidence interval; 0.64 to 0.80). This indicates those in the Plus Sutures group had a 28% reduction in the risk of developing an SSI compared to those in the control group. The random effects model estimated a RR of 0.71 (95% CI; 0.59 to 0.85). No outliers or publication bias were noted during the analysis of the available evidence. Results are based on 6775 and 6892 total patients in the Plus Sutures and control arm respectively, and on a total of 499 and 697 events in the Plus Sutures and control arm respectively.

Figure 7c: Meta- analysis results - All SSI incidence studies

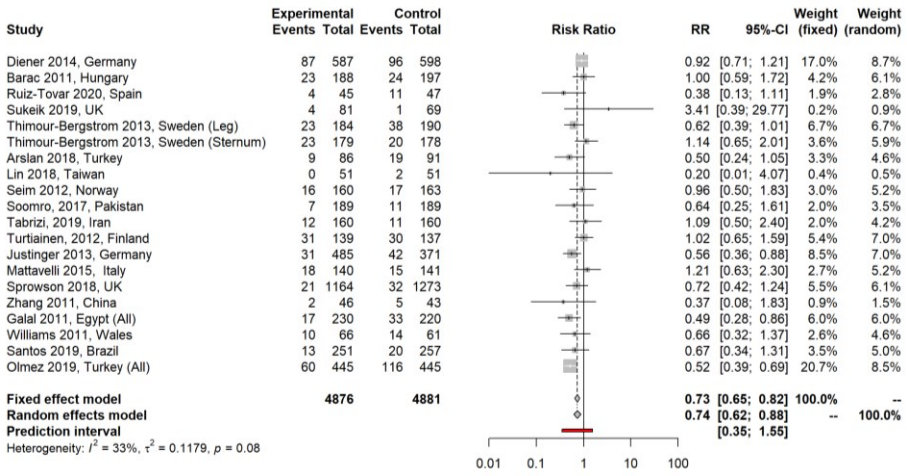


Adult only SSI studies

Both the fixed and random effect model produced an estimated RR <1 (Figure 7d). Moreover, in both models the 95% confidence interval does not include 1, indicating a statistically significant reduction in the risk of SSI development (p < 0.001 and p = 0.002 respectively).

The fixed effect model estimated a RR of 0.73 (95% confidence interval; 0.65 to 0.82). This indicates those in the Plus Sutures group had a 27% reduction in the risk of developing an SSI compared to those in the control group. The random effects model estimated a RR of 0.74 (95% CI; 0.62 to 0.88). No outliers or publication bias were noted during the analysis of the available evidence. Results are based on 4876 and 4881 total patients in the Plus Sutures and control arm respectively, and on a total of 411 and 557 events in the Plus Sutures and control arm respectively.

Figure 7d: Meta- analysis results – Adult only SSI incidence studies

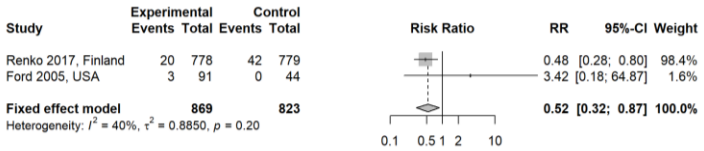


Children only SSI studies

Only two studies were conducted in children, therefore due to a lack of data, a robust random effects model could not be constructed (i.e. the model resulted in clinically implausible confidence intervals). As a result, only a fixed effects model was performed for the children only subgroup. The fixed effect model produced an estimated RR <1 (Figure 7e). Moreover, the 95% confidence interval does not include 1, indicating a statistically significant reduction in the risk of SSI development (p = 0.012).

The fixed effect model estimated a RR of 0.52 (95% confidence interval; 0.32 to 0.87). This indicates those in the Plus Sutures group had a 48% reduction in the risk of developing an SSI compared to those in the control group. No outliers or publication bias were noted during the analysis of the available evidence. Results are based on 869 and 823 total patients in the Plus Sutures and control arm respectively, and on a total of 23 and 42 events in the Plus Sutures and control arm respectively.

Figure 7e: Meta- analysis results – Children only SSI incidence studies

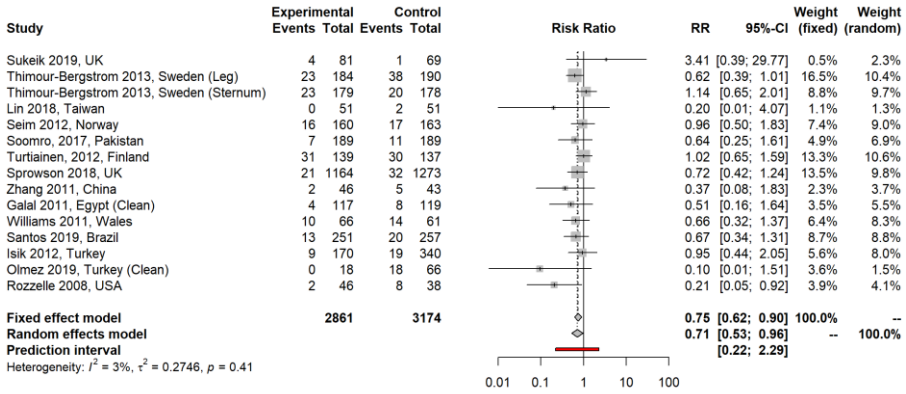


Clean wound only SSI studies

Both the fixed and random effect model produced an estimated RR <1 (Figure 7f). Moreover, in both models the 95% confidence interval does not include 1, indicating a statistically significant reduction in the risk of SSI development (p = 0.003 and p = 0.029 respectively).

The fixed effect model estimated a RR of 0.75 (95% confidence interval; 0.62 to 0.90). This indicates those in the Plus Sutures group had a 25% reduction in the risk of developing an SSI compared to those in the control group. The random effects model estimated a RR of 0.71 (95% CI; 0.53 to 0.96). No outliers or publication bias were noted during the analysis of the available evidence. Results are based on 2861 and 3174 total patients in the Plus Sutures and control arm respectively, and on a total of 165 and 240 events in the Plus Sutures and control arm respectively.

Figure 7f: Meta- analysis results – Clean wound only SSI incidence studies

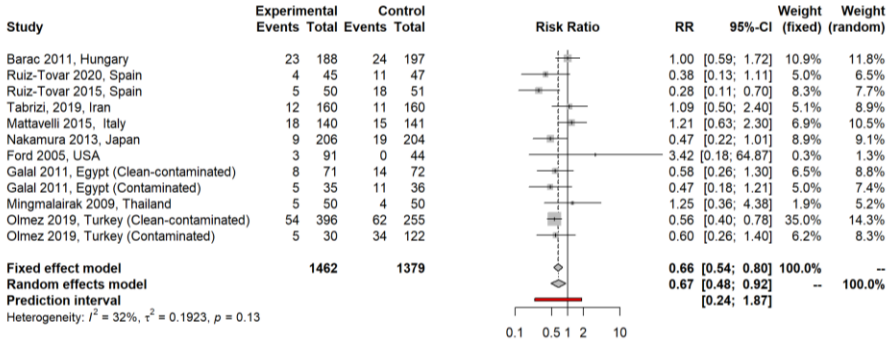


Non-clean only SSI studies

Both the fixed and random effect model produced an estimated RR <1 (Figure 7g). Moreover, in both models the 95% confidence interval does not include 1, indicating a statistically significant reduction in the risk of SSI development (p < 0.001 and p = 0.019 respectively).

The fixed effect model estimated a RR of 0.66 (95% confidence interval; 0.54 to 0.80). This indicates those in the Plus Sutures group had a 34% reduction in the risk of developing an SSI compared to those in the control group. The random effects model estimated a RR of 0.67 (95% CI; 0.48 to 0.92). No outliers or publication bias were noted during the analysis of the available evidence. Results are based on 1462 and 1379 total patients in the Plus Sutures and control arm respectively, and on a total of 151 and 223 events in the Plus Sutures and control arm respectively.

Figure 7g: Meta- analysis results – Non-clean wound only SSI incidence studies

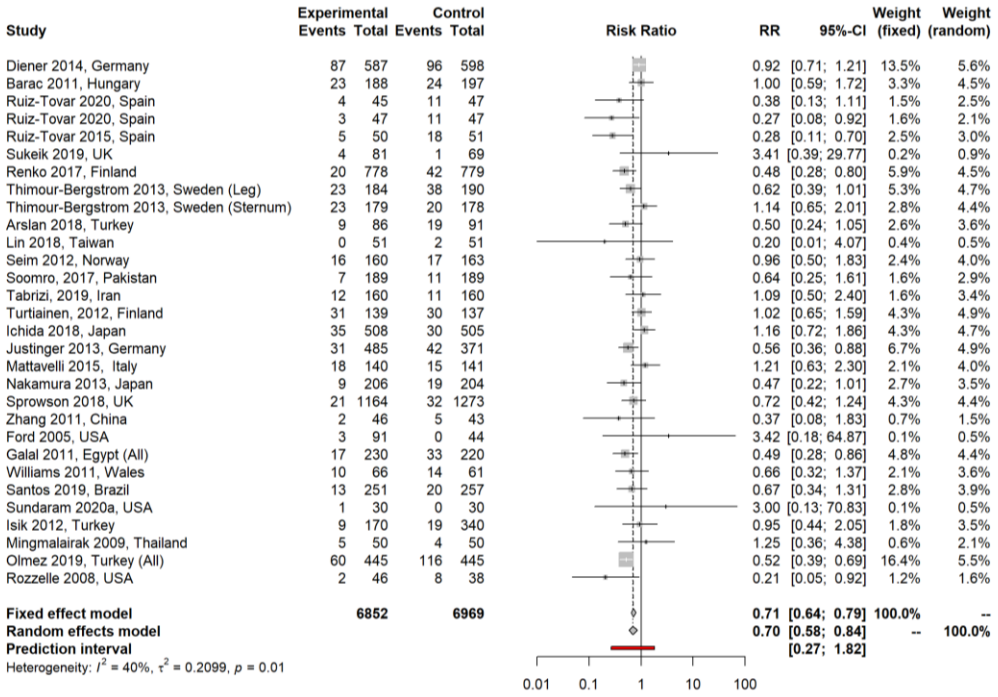


All SSI studies – Stratafix sensitivity analysis

Both the fixed and random effect model produced an estimated RR <1 (Figure 7h). Moreover, in both models the 95% confidence interval does not include 1, indicating a statistically significant reduction in the risk of SSI development (p < 0.001 and p < 0.001 respectively).

The fixed effect model estimated a RR of 0.71 (95% confidence interval; 0.64 to 0.79). This indicates those in the Plus Sutures (including Stratafix Plus) group had a 29% reduction in the risk of developing an SSI compared to those in the control group. The random effects model estimated a RR of 0.70 (95% CI; 0.58 to 0.84). No outliers or publication bias were noted during the analysis of the available evidence. Results are based on 6852 and 6969 total patients in the Plus Sutures/Stratafix Plus and control arm respectively, and on a total of 503 and 708 events in the Plus Sutures and control arm respectively.

Figure 7h: Meta- analysis results - All SSI incidence studies (sensitivity analysis)



Explain the main findings and conclusions drawn from the evidence synthesis.

Plus Sutures were found to significantly reduce the risk of developing a SSI compared to those in the control group in all analyses conducted, included subgroup analyses by age and wound type. The inclusion of Stratafix Plus as an intervention within a scenario analysis did not significantly alter the findings of the study, with a significant reduction in the risk of developing an SSI compared with the control group still reported, independently of type of surgery. Both a Baujat diagnostic plot and a Leave-One-Out analysis showed these results to be robust and not overly influenced by any one study.

Qualitative review

Please only complete this section if a quantitative evidence synthesis is not appropriate.

Explain why a quantitative review is not appropriate and instead provide a qualitative review. This review should summarise the overall results of the individual studies with reference to their critical appraisal.

Post-operative use of antibiotics

A quantitative evidence synthesis was not appropriate for this outcome for the following reasons:

- Reporting of antibiotic use lacked detail and it was often not explicit whether antibiotics were given only to patients requiring treatment for an SSI, or whether they were provided to all patients as prophylaxis
- Follow up durations for reporting this outcome varied widely from within 30 days to 3 months

Overall, 6 studies reported information on antibiotic use for the management of SSI. In Arslan 2018, two patients in each group (2.2% and 2.1% for triclosan-coated and uncoated sutures, respectively) received antibiotherapy for signs of infection (leucocytosis and high fever) (Arslan, Atasoy et al, 2018). In Ford 2005, by 80 (±5 days) post-surgery, 22% of patients treated with Vicryl Plus were taking antibiotics for any reason, compared with 29% of Vicryl-treated patients (Ford, Jones et al, 2005). The significance of the difference observed between groups was not reported. In Diener et al (2014) 21.5% of patients treated with PDS Plus were taking antibiotics for any reason, compared with 18.7% of PDS II-treated patients (Diener, Knebel et al, 2014). The significance of the difference observed between groups was not reported. In Ichida et al 2018, within the 30 days following discharge, a slightly higher proportion of patients in the Vicryl Plus suture group received postoperative antibiotics (17.3%) compared with patients in the Vicryl suture group (16.8%), but this difference did not reach statistical significance (p=0.868) (Ichida, Noda et al, 2018). In Lin et al 2018, both patients with SSI in the Vicryl group were treated with 1 week parenteral antibiotics followed by a further week of oral antibiotics; the infections resolved without further complications (Lin, Chang et al, 2018). Finally, Thimour-Bergström (2013) reported that at 60 days post-surgery in the open vein harvesting cohort, the Vicryl Plus + Monocryl Plus reported 11% of patients receiving post-operative antibiotics, compared to the control group which reported 13% (Thimour-Bergstrom, Roman-Emanuel et al, 2013). In the sternotomy cohort, the Vicryl Plus + Monocryl Plus reported 18% of patients receiving post-operative antibiotics, compared to the control group which reported 13%.

In none of these studies was information on antibiotics use a formal endpoint, and as such, none of these studies but one reported statistical p values, or were powered to evaluate this outcome. It should be noted as well that based on clinical expert opinion, practices in terms of antibiotic use post-operatively vary widely from surgeon to surgeon, and country to country, regardless of a confirmed SSI. The decision to prescribe will be dependent on local policies and may differ from inpatient to outpatient settings. Furthermore, the majority of studies do not document the indication for giving antibiotics; the use of antibiotics in surgical patients may be due to infections at sites other than the surgical site. For instance, in Arslan 2018, the protocol pre-specified that postoperative administration of antibiotics was an exclusion criteria while it was not specified in the other studies. In some studies antibiotic use was specifically associated with an SSI like in Thimour-Bergström 2013, but in others such as Ford 2005 it was given for various reasons.

Four out of 6 studies (Arslan, Atasoy et al, 2018, Ichida, Noda et al, 2018, Lin, Chang et al, 2018, Thimour-Bergstrom, Roman-Emanuel et al, 2013) reported SSI as the reason for antibiotic use.

Length of Hospital Stay and Incidence of Readmission

A quantitative evidence synthesis was not appropriate for this outcome for several reasons. Firstly, the outcome was pooled from studies conducted in multiple countries, and the length of stay data are heavily influenced by the health system of the country. Secondly, outcomes related to length of stay included a mix of post-operative length of stay and overall length of stay, and the follow-up times ranged from 30 to 90 days (in some cases limited to the hospitalisation or not even recorded). In none of the studies was length of stay said to be associated with SSI. Finally, changes in length of stay could be attributable to several reasons, especially the type of surgical procedures performed in which average length of stay differs significantly. Demonstrating a length of stay difference in surgical procedures with a longer length of stay at baseline (such as abdominal/colorectal) is more likely compared to procedure with short length of stay at baseline such TKA/THA or C-section. Accordingly, it was decided that analysing the data with a meta-analysis would lead to biases in the results.

Furthermore studies reported this outcome with multiple descriptive statistics. Reported central measures varied across studies some being, mean other medians. and in terms of range parameters there was a mix of IQR, SD, and min/max. In two studies, there were no ranges reported along the central measure (Mingmalairak, Ungbhakorn et al, 2009, Sprowson, Jensen et al, 2018). Five studies reported variance around a mean, and the reported variance appeared to suggest that the data was skewed towards the majority of patients experiencing a relatively short length of stay. When the distribution is not normal (ie skewed), the correct measure to report is the median with interquartile ranges. A meta-analysis of means is only appropriate in situations where the data for the expected outcome follows a normal distribution (or an approximate normal distribution). However, meta-analysis of means can also be conducted on data for very large trials due to the central limit theorem. However, in this case, as it is expected that the true distribution of the length of stay outcome is asymmetrical (i.e. it is not possible to have a length of stay less than 0 days) it was deemed that the data was heavily skewed. This was confirmed by all studies reporting a mean ± 1.96*SD that would encompass a length of stay of less than 0 days. Based on the Cochrane handbook, although it is possible to apply statistical transformations to skewed data

for large sample sizes, using skewed outcome data often leads to misleading results (Deeks JJ, Higgins JPT et al, 2019). Cochrane recommends that in the presence of skewed data, the most suitable approach is to request appropriate data summaries from the trialists or the acquisition of individual patient data. This allows the data to be transformed and presented on a scale which makes the outcome data follow an approximate normal distribution. For this reason, it was decided that a meta-analysis of reported skewed means would not be relevant.

Twelve studies (Diener, Knebel et al, 2014, Justinger, Slotta et al, 2013, Mattavelli, Rebora et al, 2015, Mingmalairak, Ungbhakorn et al, 2009, Nakamura, Kashimura et al, 2013, Olmez, Berkesoglu et al, 2019, Rasic, Schwarz et al, 2011, Ruiz-Tovar, Llavero et al, 2020, Ruiz-Tovar, Alonso et al, 2015, Sprowson, Jensen et al, 2018, Sukeik, George et al, 2019, Turtiainen, Saimanen et al, 2012) reported data on length of hospital stay. Six studies reported a mean value only, with all but one study also reporting variance around the mean. Three studies reported both a mean and a median, with variance around at least one measure.

Overall out of 12 studies, nine studies did not show a statistical difference in length of hospital stay, and three studies reported a statistical significant difference in length of hospital stay.

Ruiz-Tovar 2020 showed a p value of 0.006 for triclosan coated (Stratafix Plus and PDS Plus) versus non-coated (PDS) sutures, Rasic 2011 reported a p value of less than 0.05 for Vicryl Plus against Vicryl, and Olmez 2019 reported a difference of p = <0.0001 for PDS Plus against PDS. The lengths of stay reported by these studies for patients in the intervention and comparator arms respectively were median 5 (range 2-21) and median 8 (range 2-60) by Ruiz-Tovar 2020, mean and SD of 13.2 (1.3) and 21.4 (2.8) by Rasic 2011, and mean and SD of 7.46 (1.7) and 6.70 (2.2) by Olmez 2019.

The three studies finding a significant difference between length of hospital stay for the intervention and control arms assessed emergency surgery by laparotomy and midline approach (Ruiz-Tovar, Llavero et al, 2020), elective colorectal carcinoma surgery through a midline incision (Rasic, Schwarz et al, 2011) and a variety of abdominal surgeries (Olmez, Berkesoglu et al, 2019).

While the authors of Ruiz-Tovar 2020 highlighted that the study may be underpowered for the primary outcome, no significant risk of bias was found to be present in the Rasic 2011 or Olmez 2019 studies.

Incidence of Readmission

Three studies reported rates of readmission; Sundaram 2020a reported no readmissions in either arm, Sprowson 2018 reported two (0.17%) readmissions in the intervention arm and none in the comparator arm, and Renko 2017 reported 5 (1%) readmissions in the intervention arm and 17 (2%) in the comparator arm. Due to the low incidence of readmission and limited number of trials reporting this outcome, is is difficult to draw robust conclusions.

Severity of SSI and ASEPSIS score

Only three studies reported severity using a mean or median ASEPSIS score by arm. These three studies were (Sukeik, George et al, 2019)(Thimour-Bergstrom, Roman-Emanuel et al, 2013) (data reported for both sternum and leg infections) and (Zhang, Zhang et al, 2011). Mean ASEPSIS

score for wounds in the intervention arms varied from 2.54 (Sukeik 2019) to 3.7 (Thimour-Bergstrom 2013, leg wounds) and from 1.41 (Sukeik 2019) to 5.4 (Thimour-Bergstrom 2013, leg wounds) for wounds in the comparator arms.

Insufficient data were available for a meta-analysis of this outcome.

Superficial and deep SSIs

Sixteen of the 31 studies did not report data on what proportion of SSIs were deep or superficial (Ford, Jones et al, 2005, Galal and El-Hindawy, 2011, Isik, Selimen et al, 2012, Justinger, Slotta et al, 2013, Karip, Celik et al, 2016, Nakamura, Kashimura et al, 2013, Rasic, Schwarz et al, 2011, Rozzelle, Leonardo et al, 2008, Ruiz-Tovar, Alonso et al, 2015, Santos, Santos et al, 2019, Seim, Tonnessen et al, 2012, Soomro, Khurshaidi et al, 2017, Sundaram, Piuzzi et al, 2020b, Tabrizi, Mohajerani et al, 2019, Williams, Sweetland et al, 2011, Zhang, Zhang et al, 2011).

Two further studies reported SSI by type for the whole randomised population, but not by treatment arm (Baracs, Huszar et al, 2011, Olmez, Berkesoglu et al, 2019).

The remaining thirteen studies did report type of SSIs by treatment arm (Arslan, Atasoy et al, 2018, Diener, Knebel et al, 2014, Ichida, Noda et al, 2018, Lin, Chang et al, 2018, Mattavelli, Rebora et al, 2015, Mingmalairak, Ungbhakorn et al, 2009, Renko, Paalanne et al, 2017, Ruiz-Tovar, Llavero et al, 2020, Sprowson, Jensen et al, 2018, Sukeik, George et al, 2019, Sundaram K, Warren J et al, 2020a, Thimour-Bergstrom, Roman-Emanuel et al, 2013, Turtiainen, Saimanen et al, 2012).

Two of the 13 studies reported a statistically significant difference ($p \leq 0.05$) in the number of different types of SSIs between treatment arms (Renko, Paalanne et al, 2017, Ruiz-Tovar, Llavero et al, 2020). Renko 2017 reported a lower rate of deep SSI in the triclosan arm compared to the control arm (3/778 (<1%) and 14/779 (2%) respectively, p=0.004) within 30 days post-operation (Renko, Paalanne et al, 2017). Ruiz-Tovar 2020 reported a lower rate of incisional SSI in the Stratafix Symmetric arm (6.4%) than the PDS Plus arm (8.9%) and the PDS loop arm (23.4%) (p=0.03) within 30 days post-surgery (Ruiz-Tovar, Llavero et al, 2020).

Five of the 13 studies reporting by treatment arm did not report a p value (Arslan, Atasoy et al, 2018, Diener, Knebel et al, 2014, Mingmalairak, Ungbhakorn et al, 2009, Sukeik, George et al, 2019, Turtiainen, Saimanen et al, 2012). Arslan 2018 reported that 9.3% of participants in the triclosan arm and 19.8% in the control arm experienced superficial SSIs, and that 1.2% and 1.1% experienced deep SSIs within 30 days post-surgery (Arslan, Atasoy et al, 2018). Mingmalairak 2009 reported that 3 patients in the Vicryl arm and 5 patients in the Vicryl Plus arm experienced superficial SSIs, and that 1 patient in the Vicryl arm and 0 patients in the Vicryl Plus arm experienced deep SSIs within 1-year follow-up (Mingmalairak, Ungbhakorn et al, 2009). Diener 2014 reported that in the PROUD trial, 53/587 participants in the PDS Plus arm and 56/598 participants in the PDS II arm experienced superficial SSIs, and that 22/587 in the PDS Plus arm and 25/598 in the PDS II arm experienced deep SSIs within 30 days after operation (Diener, Knebel et al, 2014). Sukeik 2019 reported that 1 patient in the Vicryl arm and 3 patients in the Vicryl Plus arm experienced superficial SSIs, and that 0 patients in the Vicryl arm and 1 patient in the Vicryl Plus arm experienced deep SSIs at 6 weeks post-surgery (Sukeik, George et al, 2019).

Turtianinen 2012 reported that 24 (77%) patients in the triclosan arm and 22 (73%) patients in the control arm experienced superficial SSIs, and that 5 (16%) in the triclosan arm and 5 (17%) in the control arm experienced deep SSIs within 30 days post-surgery (Turtiainen, Saimanen et al, 2012).

In conclusion, three studies (Arslan, Atasoy et al, 2018, Renko, Paalanne et al, 2017, Ruiz-Tovar, Llavero et al, 2020) reported more substantial differences between arms for both superficial and deep wounds, while the remaining nine studies do not show any substantial difference between the two arms in deep or superficial wounds. In summary, no consistent difference emerges between deep or superficial wounds or between the two arms.

Wound dehiscence

Twenty-one studies did not report data on wound dehiscence (Baracs, Huszar et al, 2011, Ford, Jones et al, 2005, Galal and El-Hindawy, 2011, Ichida, Noda et al, 2018, Isik, Selimen et al, 2012, Justinger, Slotta et al, 2013, Lin, Chang et al, 2018, Mattavelli, Rebora et al, 2015, Mingmalairak, Ungbhakorn et al, 2009, Nakamura, Kashimura et al, 2013, Olmez, Berkesoglu et al, 2019, Rozzelle, Leonardo et al, 2008, Ruiz-Tovar, Llavero et al, 2020, Ruiz-Tovar, Alonso et al, 2015, Seim, Tonnessen et al, 2012, Soomro, Khurshaidi et al, 2017, Sprowson, Jensen et al, 2018, Sundaram, Piuzzi et al, 2020b, Turtiainen, Saimanen et al, 2012, Williams, Sweetland et al, 2011, Zhang, Zhang et al, 2011).

One further study reported dehiscence for the whole randomised population, but not by treatment arm (Santos, Santos et al, 2019).

The remaining nine studies reported dehiscence by treatment arm (Arslan, Atasoy et al, 2018, Diener, Knebel et al, 2014, Karip, Celik et al, 2016, Rasic, Schwarz et al, 2011, Renko, Paalanne et al, 2017, Sukeik, George et al, 2019, Sundaram K, Warren J et al, 2020a, Tabrizi, Mohajerani et al, 2019, Thimour-Bergstrom, Roman-Emanuel et al, 2013), six of which made a statistical comparison of arms. One study reported a statistically significant difference ($p \leq 0.05$) between treatment arms (Rasic, Schwarz et al, 2011). This study reported a dehiscence rate of 1.1% in the coated suture (Vicryl Plus) arm, compared to 7.7% in the non-coated suture (Vicryl) arm ($p = 0.027$) during the hospitalization period (Rasic, Schwarz et al, 2011).

Three of the nine studies did not report p values for the comparison of arms (Diener, Knebel et al, 2014, Sukeik, George et al, 2019, Tabrizi, Mohajerani et al, 2019). Diener 2014 reported that in the PROUD trial, within 30 days of the operation 66/587 patients in the coated suture (PDS Plus) arm and 81/598 in the non-coated suture (PDS II) arm experienced dehiscence (Diener, Knebel et al, 2014). Sukeik 2019 reported that 0 patients in the Vicryl arm and 1 in the Vicryl Plus arm experienced wound dehiscence (Sukeik, George et al, 2019) at 6 weeks post-operation. Tabrizi 2019 (Tabrizi, Mohajerani et al, 2019) reported that 19 (11.9%) patients in the Vicryl Plus arm and 11 (6.9%) in the Vicryl arm experienced surgical site dehiscence at 28 days post-operation.

In conclusion, of the nine studies reporting data by arm on incidence of wound dehiscence, five of the six studies reporting a statistical comparison showed no significant difference between triclosan coated sutures and uncoated sutures with regards dehiscence rate. The sixth study did find triclosan to result in a significant reduction in dehiscence, although we note that this study

assessed patients during the hospitalization period only (Rasic, Schwarz et al, 2011); the mean hospital stay for patients in the comparator arm was 21.4 days while the mean stay for patients in the intervention arm was 13.2 days. For this reason the conclusions of the Rasic study may be subject to bias. Of the remaining studies reporting data by arm on wound dehiscence, their findings appeared to indicate that triclosan coated sutures may result in a slight reduction in incidences of wound dehiscence. These findings are in line with those of a recent systematic review (Guo, Pan et al, 2016).

Pain

Twenty-four studies did not report any data on pain (Arslan, Atasoy et al, 2018, Baracs, Huszar et al, 2011, Galal and El-Hindawy, 2011, Ichida, Noda et al, 2018, Isik, Selimen et al, 2012, Justinger, Slotta et al, 2013, Karip, Celik et al, 2016, Mattavelli, Rebora et al, 2015, Mingmalairak, Ungbhakorn et al, 2009, Nakamura, Kashimura et al, 2013, Olmez, Berkesoglu et al, 2019, Rasic, Schwarz et al, 2011, Rozzelle, Leonardo et al, 2008, Ruiz-Tovar, Alonso et al, 2015, Seim, Tonnessen et al, 2012, Soomro, Khurshaidi et al, 2017, Sprowson, Jensen et al, 2018, Sundaram K, Warren J et al, 2020a, Sundaram, Piuzzi et al, 2020b, Tabrizi, Mohajerani et al, 2019, Thimour-Bergstrom, Roman-Emanuel et al, 2013, Turtiainen, Saimanen et al, 2012, Williams, Sweetland et al, 2011, Zhang, Zhang et al, 2011).

The remaining seven studies all reported data on pain by treatment arm (Diener, Knebel et al, 2014, Ford, Jones et al, 2005, Lin, Chang et al, 2018, Renko, Paalanne et al, 2017, Ruiz-Tovar, Llavero et al, 2020, Santos, Santos et al, 2019, Sukeik, George et al, 2019).

Three of the seven studies reported no statistically significant difference between arms in pain outcomes. Three studies did report a statistically significant difference (p= ≤ 0.05) Ford, 2005 #394}(Lin, Chang et al, 2018, Ruiz-Tovar, Llavero et al, 2020). Ford 2005 reported that at Day 1 post-surgery 68% of participants in the triclosan-coated suture (Vicryl Plus) arm reported pain, compared to 89% in the non-coated suture (Vicryl) arm (p=0.01) (Ford, Jones et al, 2005). It was unclear how this study measured patient pain. Lin 2018 used the mean (SD) visual analogue score for pain, and reported a higher VAS score in the triclosan arm compared to the control at Day 1 post-operation (8.6 (1.0) versus 8.1 (0.9) respectively, p=0.0017) (Lin, Chang et al, 2018). There was no statistically significant difference between the arms at other timepoints (baseline, day 3, 2 weeks, 4 weeks and 3 months post-surgery). Ruiz-Tovar 2020 reported a mean (SD) VAS pain score at 48 hours post-operation of 48.7 (11.1) in the non-coated suture (PDS loop) arm, 29.2 (9.5) in the triclosan-coated barbed suture (Stratafix Symmetric) arm and 33.6 (10.2) in the triclosan-coated polydioxanone loop (PDS Plus) arm (p=0.044) (Ruiz-Tovar, Llavero et al, 2020).

The final study of the seven reporting by treatment arm did not report a p value (Santos, Santos et al, 2019). Santos 2019 reported that 25 (10%) of patients in the triclosan arm and 46 (17.9%) in the conventional suture arm experienced wound pain (Santos, Santos et al, 2019).

In conclusion, of the seven studies reporting pain by treatment arm, three studies found no statistically significant difference between arms, and three studies reported statistically significant differences, but not all in the same direction. Ford 2005 found incidence of pain to be less with triclosan sutures, Ruiz-Tovar 2020 found pain at 48 hours post-surgery to be less in the two triclosan coated arms than in the comparator arm, and Lin 2018 found pain to be worse with

triclosan sutures, but only at day one post-surgery (at all other timepoints no difference between arms was found). The final study, with no p value calculated, indicated that fewer patients in the triclosan arm experienced pain.

Table 7b Risk of bias assessment for RCTs (MTEP suggested risk of bias)

Study	Was randomisation carried out appropriately?	Was the concealment of treatment allocation adequate?	Were the groups similar at the outset of the study in terms of prognostic factors, for example, severity of disease?	Were the care providers and participants blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were the outcome assessors blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were there any unexpected imbalances in dropouts between groups? If so, were they explained or adjusted for?	Is there any evidence to suggest that the authors measured more outcomes than they reported?	Did the analysis include an intention to-treat analysis? If so, was this appropriate and were appropriate methods used to account for missing data?	Additional info
Arslan 2018, Turkey (Arslan, Atasoy et al, 2018)	Unclear Randomised in blocks at a ratio of 1:1, but method of sequence generation (e.g., by computer) not reported	Unclear No details of allocation concealment reported	Yes Baseline and clinical characteristics for the groups appear similar, with non-significant p values between groups	No Partially-blinded: the operating surgeon was not blinded as they recognised the sutures. However, since postoperative care was conducted by another surgeon they were presumably unaware of treatment assignment, although not explicitly stated. Blinding of the patients was not reported	Unclear A surgeon other than the operating surgeon (who was not blinded) assessed the surgical site. He/she was presumably unaware of treatment assignment, although not explicitly stated	No No unexpected imbalance in study discontinuations, which were few and all due to protocol violations, between groups	No All pre-specified primary and secondary outcomes were reported	No Analysis population comprised all treated patients	NA
Baracs 2011, Hungary (Baracs, Huszar et al, 2011)	Yes Randomisation carried out by computer software (stored in a password protected website) and could not be influenced manually	No No details of allocation concealment reported	Yes Baseline characteristics for the groups appear similar, with non-significant p values between groups for all recorded data points	Unclear TRR record states masking was "Double (Care Provider, Outcomes Assessor)" but no details in paper of how this was achieved	Unclear TRR record states masking was "Double (Care Provider, Outcomes Assessor)" but no details in paper of how this was achieved	Unclear Withdrawals were not reported by arm	Yes Not all stated secondary outcomes were reported and outcomes in publication not stated in TRR	No Per protocol population appears to have been used; no details of how this was adjusted for	NA
Diener 2014, Germany (Diener,	Yes	Yes	Yes	Yes	Yes	No imbalances	No	Yes	NA

Study	Was randomisation carried out appropriately?	Was the concealment of treatment allocation adequate?	Were the groups similar at the outset of the study in terms of prognostic factors, for example, severity of disease?	Were the care providers and participants blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were the outcome assessors blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were there any unexpected imbalances in dropouts between groups? If so, were they explained or adjusted for?	Is there any evidence to suggest that the authors measured more outcomes than they reported?	Did the analysis include an intention to-treat analysis? If so, was this appropriate and were appropriate methods used to account for missing data?	Additional info
Knebel et al, 2014)	The authors used a centralised web-based device (Randomizer Software) for randomisation, with a specific code for each participating centre, to achieve equivalent groups. Permuted-block randomisation with an allocation ratio of 1:1 and a block size of 4 was used.	Use of randomisation software ensured "the randomisation sequence was concealed"	The study groups were well balanced in terms of patient and procedure characteristics	Patients, surgeons, and the outcome assessors were masked to the suture material used	Outcome assessment was masked and monitored	3.3% and 3.1% of patients in the intervention and control arm were excluded or dropped out	All outcomes reported	Analysis conducted using modified ITT to represent clinical practice Missing values for primary outcome were replaced by random imputation with probability equal to the SSI rate recorded for the complete cases in the respective treatment group	
Ford 2005, USA (Ford, Jones et al, 2005)	Unclear Patients were randomised to treatment at a ratio of 2:1, but method of sequence generation (e.g., by computer) not reported	Unclear No details of allocation concealment reported	Unclear Authors stated that there were no differences in baseline demographic variables between the treatment groups. However, demographic details, where reported, were very limited and not reported separately according to suture group	No Study reported to be open-label	Unclear The primary endpoint was the surgeon's blinded assessment of the overall intraoperative handling characteristics of each suture. However, the study was reported to be open-label	No A similar proportion of patients withdrew or were lost to follow-up in each group	No All pre-specified primary and secondary outcomes were reported	No Analysis based on observed cases, i.e., patients at each assessment point	Small sample size with only 151 patients randomised to the two treatments; the 2:1 ratio meant group sizes of 100 and 51 patients
Galal 2011, Egypt (Galal and El-	Yes A computer-generated list was	Unclear Treatment allocation was by random	Yes No significant differences	Yes Double-blind trial. The research	Yes Double-blind trial. The	No No withdrawals or loss to follow-up. All	No Primary outcome	Unclear ITT not explicitly reported but all	Yes The number of patients in each

Study	Was randomisation carried out appropriately?	Was the concealment of treatment allocation adequate?	Were the groups similar at the outset of the study in terms of prognostic factors, for example, severity of disease?	Were the care providers and participants blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were the outcome assessors blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were there any unexpected imbalances in dropouts between groups? If so, were they explained or adjusted for?	Is there any evidence to suggest that the authors measured more outcomes than they reported?	Did the analysis include an intention to-treat analysis? If so, was this appropriate and were appropriate methods used to account for missing data?	Additional info
Hindawy, 2011)	used to randomise patients to treatment	dispensing, one at a time, a sealed pack containing the suture; unclear whether the packs were numbered, opaque, and free of any identifying marks	between the two groups in demographics and risk factors for SSI	team (surgeon, nurse, microbiologist) and patients were unaware of the treatment assigned	research team (surgeon, nurse, microbiologist) and patients were unaware of the treatment assigned	enrolled patients were included in the analyses	reported. Secondary outcomes were not pre-specified but other outcomes evaluated were reported	enrolled patients appear to have been analysed according to the treatment allocated. No methods to account for missing data were described	group according to wound classification needs clarification as there is a potential error in the reporting in Table 2. However, it is unclear whether all patients had their wound classified and whether any patients had >1 wound site (e.g., CABG). The authors acknowledged that the local protocol for infection control they followed may deviate from current modern practices
Ichida 2018, Japan (Ichida, Noda et al, 2018)	Unclear Patients randomised to treatments using permuted blocks with block size of 2, but method of sequence generation (e.g., by computer) not reported	Yes Treatment allocation was conducted using sealed envelopes according to the randomisation list. A research nurse opened the sealed envelope and delivered the allocated sutures to	Yes The treatment groups were well balanced in terms of preoperative demographic characteristics and there were no significant differences between them	Yes Patients, surgeons, and nurses in the surgical wards, were all blinded to treatment allocation. Coated and uncoated sutures were removed from	Yes The surgeons who assessed the wound status were also blinded, because the used suture material could not be identified	No There were no losses to follow-up or study discontinuations in either group	No The primary end point was reported. Secondary end points were not prespecified. However, the authors also reported the incidence of	No The analysis was conducted using the modified ITT population (excluded patients who did not receive any of the allocated interventions) and methods used to	Yes Given a lack of published data, the authors performed the sample size calculation using data derived from a retrospective cohort of patients

Study	Was randomisation carried out appropriately?	Was the concealment of treatment allocation adequate?	Were the groups similar at the outset of the study in terms of prognostic factors, for example, severity of disease?	Were the care providers and participants blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were the outcome assessors blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were there any unexpected imbalances in dropouts between groups? If so, were they explained or adjusted for?	Is there any evidence to suggest that the authors measured more outcomes than they reported?	Did the analysis include an intention to-treat analysis? If so, was this appropriate and were appropriate methods used to account for missing data?	Additional info
		the operating theatre. Neither the reseach nurse nor the doctor who prepared the envelopes were involved in the operation or follow-up		their packaging and placed in the operating theatre with any identifying marks. The sutures looked identical in physical appearance and were indistinguishable in terms of physical properties (e.g., texture, tying properties). The randomisation code was kept separately from the trial data until the end of the study	postoperatively. The randomisation code was kept separately from the trial data until the end of the study		bacterial species found in infected wounds	account for missing data were not reported	who underwent gastroenterologic surgery and had their abdominal wounds closed by the same procedure at their institution in 2012
Isik 2012, Turkey (Isik, Selimen et al, 2012)	No Sequential randomisation of patients to treatment	Unclear No details of allocation concealment reported	Yes The two groups were similar with regard to demographics and clinical characteristics, with no significant differences between them	Unclear Reported to be a double-blind trial, but no further details provided.Patients were allocated the treatment during the operation, when the nurse delivered the suture materials to the operating room	Unclear Reported to be a double-blind trial; no other details relating to the outcome assessment were provided	No Details of dropouts were not described. It appears that all included patients were analysed for sternal wound infections but not for leg wound infections. although this is likely to reflect the nature of the surgery undertaken	No The main outcome was reported and there were no secondary outcomes	No ITT analysis not explicitly conducted. The analysis appears to have been conducted on evaluable patients at follow-up at each of the two surgical sites (sternum and leg)	NA
Justinger 2013,	Unclear	Unclear	Yes	Yes	Yes	Unclear	Unclear	No	Yes

Study	Was randomisation carried out appropriately?	Was the concealment of treatment allocation adequate?	Were the groups similar at the outset of the study in terms of prognostic factors, for example, severity of disease?	Were the care providers and participants blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were the outcome assessors blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were there any unexpected imbalances in dropouts between groups? If so, were they explained or adjusted for?	Is there any evidence to suggest that the authors measured more outcomes than they reported?	Did the analysis include an intention to-treat analysis? If so, was this appropriate and were appropriate methods used to account for missing data?	Additional info
Germany (Justinger, Slotta et al, 2013)	Randomisation conducted in a group fashion, assigning groups of 50 to 100 consecutive patients to either of the two groups, rather than assigning treatments to individual patients. The method of sequence generation (e.g., by computer) not reported	Details of group/treatment allocation were not reported	Baseline demographics of the two groups were generally comparable, with no significant differences between them	There is a discrepancy betweem the full text publication and the TRR in terms of masking. The published article describes this study as a double-blind trial. Surgeons and patients were all blinded to treatment allocation. The sutures were indistinguishable in terms of their physical properties. The TRR describes the trial as open label (i.e. no masking)	Wound monitors were reported to blinded to treatment allocation	Patient dropouts were reported overall but not by treatment group	The primary outcome was reported. Although no secondary end points were pre-specified in the published article, there were some specified in the TRR which have not been reported. The authors did, however, report the proportion of bacterial species found in infected wounds	The analysis appears to have been conducted on randomised patients operated on who completed successful treatment. Methods to account for missing data were not reported	The study was a clinical pathway controlled trial, with randomisation conducted in a group fashion rather than individual patients. This was apparently used for logistic reasons and to facilitate a high patient recruitment rate. Details of patient flow through the study lacked clarity
Karip 2016, Turkey (Karip, Celik et al, 2016)	Yes Patients randomised (1:1 ratio) to treatment using a randomisation program from the Internet	Unclear No details of allocation concealment reported	Unclear The two groups were of similar age and BMI, but no other baseline demographics or clinical characteristics were reported	Unclear Reported to be double-blind, with patients unaware of and having no information on their treatment. However, there were no details of the operating surgeon being blinded to the suture material used	Yes The surgeon who conducted post-operative assessments did not perform the surgery and was unaware of treatment allocation	No Dropouts were not explicitly reported, but all randomised patients (in the revised trial) appear to have been included in the analysis	No All pre-specified primary and secondary outcomes in the revised trial were reported	Unclear ITT not explicitly reported but all randomised patients appear to have been included in the analysis. No methods to account for missing data were described	Yes The original trial was designed primarily to investigate the effect of antibiotic prophylaxis, and secondarily of antibiotic-coated sutures. Following safety concerns, the 'without antibiotic

Study	Was randomisation carried out appropriately?	Was the concealment of treatment allocation adequate?	Were the groups similar at the outset of the study in terms of prognostic factors, for example, severity of disease?	Were the care providers and participants blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were the outcome assessors blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were there any unexpected imbalances in dropouts between groups? If so, were they explained or adjusted for?	Is there any evidence to suggest that the authors measured more outcomes than they reported?	Did the analysis include an intention to-treat analysis? If so, was this appropriate and were appropriate methods used to account for missing data?	Additional info
									prophylaxis' arm (n=21) was terminated early, and following protocol revision and approval, the trial continued with the 15 patients in the antibiotic prophylaxis arm and a further 91 patients recruited; the patients in the terminated arm were excluded from further analysis. The overall sample size was small, with 106 patients randomised to the two suture materials
Lin 2018, Taiwan (Lin, Chang et al, 2018)	Unclear Unspecified randomisation protocol was used to number sealed envelopes containing the suture materials, which were then randomly given to the patients	Yes Treatments were allocated using consecutively numbered sealed envelopes containing the suture materials. Only the circulating	Unclear No significant differences between patients in the limited demographic characteristics reported (age, gender, height and weight)	Yes Patients, clinical staff, operating surgeons, and the independent study nurse who prospectively collected all perioperative information and outcome measures, were	Yes Radiographic and clinical assessments were conducted by an experienced clinician, blinded to group assignment and patients' demographic	No No study withdrawals or loss to follow-up in either group	Yes Not all secondary outcomes were reported, including length of hospital stay and some measures of skin condition	Yes All patients completed the study and were included in the analysis. Methods to account for any missing data were not reported.	Yes Specific age range of eligible patients. Small sample size, with approximately 50 patients randomised to each of the two groups. This was considered insufficient to

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		nurse who opened the envelopes and the scrub nurse who handled the suture materials were aware of the treatments allocated, but they were not involved in evaluating the study		unaware of the assigned treatment	data. Perioperative information and outcome measures were conducted by an independent study nurse who was also blinded to the treatment		The TRR does not list all the outcomes specified in the publication, although it does refer to them in the trial rationale, with the addition of duration of antibiotic use		demonstrate the superiority of triclosan-coated sutures in preventing SSIs in total knee arthroplasty. The authors also highlighted that the rigorous nature of the follow-up might have raised patient awareness of their wound conditions, and that the definition of SSI was limited to skin involvement only.
Mattavelli 2015, Italy (Mattavelli, Rebora et al, 2015)	Yes Computerised randomisation list used to assign patients to treatment. Each study centre had an independent list	Yes Treatment was allocated using sealed, opaque, numbered envelopes that were opened sequentially by a registered nurse not involved in the trial	Yes The two groups were well balanced in terms of demographic and baseline characteristics, although there was variation in some risk factors. The uncoated suture group contained a higher proportion of patients with a BMI <19 (7.1% vs 2.8% in the	No Patients were unaware of the treatment allocated for the full period of evaluation. Operating surgeons were aware of the suture material used as the trial organisers at each hospital were unable to obtain	Yes Outcome assessors were unaware of the allocated treatment for the full period of evaluation	No Patient dropout due to a need for re-operation were similar in the two groups, and there were no losses to follow-up	No All pre-specified primary and secondary outcomes were reported, as were the multivariate analyses of risk factors for SSI	No The analysis appears to have been conducted on patients completing the study, and methods to account for missing data were not reported	Yes The randomisation was not balanced for important and known patient and operative risk factors for SSIs. A second assessor confirmed all SSIs, but only 40% were

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			triclosan-coated group) and a lower proportion of patients with pre-operative radiochemotherapy (5.7% vs 12.1%). No statistical analysis was conducted	blind suture packages. They were not permitted to divulge the treatment allocation to patients or other staff during the study duration					confirmed by positive culture. Organ/space SSIs were not included in the primary outcome because suture coating was not expected to be involved in the occurrence of intra-peritoneal collection
Mingmalairak 2009, Thailand (Mingmalairak, Ungbhakorn et al, 2009)	Yes Sutures randomised by use of a random table (Fisher RA, Yate F. Statistic table for biological, agricultural and medical research. 6th ed. London: Longman Group; 1974: 134.)	Yes Study was randomised and "The surgeon could not separate both types of sutures"	Yes Groups were similar in age, weight and height; there were more men in the control arm but the difference did not reach statistical significance (p = 0.065)	Yes Surgeons and surgical assistants were blinded	Unclear Study claims to be double blind but no details are given beyond stating that the surgeons were blinded	No All patients randomised were assessed and followed up	No All stated outcomes are reported but reporting is incomplete in places (e.g., no SDs reported)	Yes All patients completed the study and were included in the analysis.	No
Nakamura 2013, Japan (Nakamura, Kashimura et al, 2013)	Unclear No details of random sequence generation or randomisation procedure	Unclear Treatments were allocated using numbered envelopes, but appropriate safeguards (e.g., use of sealed or opaque envelopes, sequential numbers) were not described	Yes Patients in both groups were similar in terms of demographics and risk factors for SSIs, with no significant differences between them	No Patients, were blinded to the treatment assigned, whereas the surgeons were aware of the suture used	Yes The physicians who assessed the wound infections were blinded to the treatment assignment	No All randomised patients completed the study and were included in the analysis	No All pre-specified primary and secondary outcomes were reported, including the secondary outcome (postoperative hospital stay) which was	Yes ITT conducted since all randomised patients received the allocated intervention and were included in the analysis. Methods to account for any missing data were not reported	Yes A high proportion (71%) of patients with wound infections were discharged after the same length of postoperative stay as non-infected patients, with infected wounds

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							specified in the TRR but not the published article		managed in the outpatient clinic. This was considered to be one of the factors why the reduction in hospital stay found with triclosan-coated sutures was less than that observed in other studies.
Olmez 2019, Turkey (Olmez, Berkesoglu et al, 2019)	Yes A computer generated list was used, created by an independent computer consultant	Unclear Unclear how treatment concealment was carried out	No More males in control group than intervention group (p = 0.037); higher BMI in control than intervention group (p = <0.0001); more smokers in control than intervention group (p = <0.0001)	Unclear No details reported of blinding of surgeons, patients or care / nursing staff	Yes Follow up and control tests were performed by a blinded researcher	No Both groups enrolled 450 patients and analysed 445	No All stated outcomes were reported to some degree, although not all outcomes were clearly reported per arm	No Study assessed completers only. No details given of methods for accounting for missing data	No
Rasic 2011, Croatia (Rasic, Schwarz et al, 2011)	Yes Computer-generated randomisation in blocks of 10	Yes Suture packets were prepared in sealed and numbered opaque envelopes, and assigned in order in the operating room	Yes No statistically significant differences between groups in the limited baseline characteristics reported (age, gender, BMI)	Unclear No details of blinding reported	Unclear The patients were monitored by the same surgical team, but no details of blinding reported	Unclear Study discontinuations were not reported, other than no deaths in either group	Yes Primary and secondary outcomes were not explicit, but two of the parameters monitored appear not to have been reported	Unclear Analysis population not described. Table and figures did not report numbers of patients analysed. The percentage values reported in Table 2 appear to have been miscalculated using transposed numbers	Yes Outcome parameters were not assessed over the same time period for the entire study population, since they were only monitored during the

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							(readmissions and haematomas) No TRR available	of patients randomised to the two groups	hospitalisation period which would have varied on a patient basis
Renko 2017, Finland (Renko, Paalanne et al, 2017)	Yes Computerised randomisation list in permuted blocks of four in a random order	Yes Sealed, numbered opaque envelopes with the study group. The study nurse opened envelope and attached the study code and form to the child's medical records, which accompanied child to the operating room	Yes The groups were well balanced in terms of baseline and perioperative characteristics	Yes Two study nurses masked the suture packages, and all patients and their parents, and all other study personnel, were blinded to the study code. The packages containing the sutures were taped with opaque material so that only the code was visible to the operating room staff. Suture materials were similar in colour, feel, and smell	Yes Aside from the two study nurses who masked the suture packages and who did not participate in data collection or entry, all study personnel were blinded to the treatment code	No Reasons for dropout were similar	No The primary endpoint and all post hoc analyses were reported Primary outcome reported in TRR, but no safety outcome reported or intention for post hoc analyses	Yes The primary analysis was conducted using modified ITT, but methods to account for missing data were not described. If at least some amount of study suture material was used during the operation according to allocation, the patient was analysed in his or her allocation group. Per-protocol analyses were conducted for patients with no major protocol violations	The authors noted as a study limitation that not all suspected SSIs were cultured or photographed because some patients were treated at their own local health-care facilities instead of the study clinic
Rozzelle 2008, USA (Rozzelle, Leonardo et al, 2008)	Yes Randomisation was performed by the assignment of letter codes to study and placebo suture types	Yes The suture type corresponding to a particular letter code was known only to operating room nurses and scrub technicians	Yes Patient population characteristics did not differ significantly with regard to any factors known or suspected to influence shunt infection risk. Sex	Yes Participants and investigators were blinded to treatment assignment, because study and placebo sutures were indistinguishable	Unclear Unclear who performed outcome assessments	Unclear NR by arm. Two patients with shunt infections subsequently died within the surveillance period. Both patients were infants with severe congenital	No All specified outcomes are reported, although no correlation was found between patient baseline characteristics	Yes All patients randomised were analysed	No

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			distribution between the groups was unequal, with a weak statistical trend toward more males in the Vicryl Plus group, but sex has never been identified as a risk factor for shunt infection	after removal of the package labeling		anomalies whose parents ultimately decided to withdraw care	and shunt infection		
Ruiz-Tovar 2020, Spain (Ruiz-Tovar, Llavero et al, 2020)	Yes Use of a random-number table	Unclear Operating surgeon was unaware of treatment allocation before consenting, enrolling and initiating surgery. No other details of allocation concealment reported	Yes No significant differences between groups in baseline characteristics or surgical procedure	No Patients and epidemiology nurses were masked to the suture material used. The operating surgeon knew the suture assignment before starting the abdominal wall closure	Yes Outcomes were assessed by epidemiology nurses, and other surgeons in the team, who were masked to group assignment	No No lost to follow-up or discontinuations in any group, and no significant difference between groups in patients excluded from the analysis	Yes There is a discrepancy between the TRR and full text publication in how the primary and secondary outcomes are defined. TRR reports one primary and one secondary outcome Full text publication includes both TRR outcomes as primary and add others as secondary	No ITT Per protocol analysis was used as authors considered that deceased patients or those undergoing reoperation might mask the results	Authors highlight that the study might be underpowered as they used a suboptimal estimation of the SSI rate in the control group for the power calculation. The study was not powered for the development of the aggregation variables investigated in secondary analyses
Ruiz-Tovar 2015, Spain	Yes	Yes	Yes	No	Yes	No	No	No	NA

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(Ruiz-Tovar, Alonso et al, 2015)	The patients were randomized by means of a sequentially numbered container method	Those who made the diagnosis…were blinded to the selection of the patient from the sequentially numbered container	Non-significant p values for all reported between group comparisons	Epidemiology nurse who evaluated the outcome of the surgical incision was the only person blinded to the allocated treatment	Epidemiology nurse who evaluated the outcome of the surgical incision was blinded to the allocated treatment	Death occurred in 9.1% and 7.3% of intervention and control groups respectively. No other dropouts were recorded	All stated outcomes were reported	Study assessed only those patients surviving to provide assessment data	
Santos 2019, Brazil (Santos, Santos et al, 2019)	Yes A table was generated using a specific computational routine	Yes The cardiovascular surgeon did not have prior access to the table (allocation was concealed)	Yes P values comparing basline age, gender, BMI and diabetes status were all non-significant	Yes Randomisation remained blinded to all participants in the surgical procedure, as well as to all those who were involved in its follow-up, except for the professionals responsible for randomisation and masking. In the masking process, counselors, the nurses responsible for the randomisation, the secretary, and surgical technologists learned about the drawn sutures/patients. Surgeons, the researchers and their assistants,	Yes The researchers and their assistants were masked	No Drop outs were similar across arms (38 and 37 for intervention and control groups respectively)	No All specified outcomes are reported	No The study assessed outcomes using completers, with no description of any accounting for missing data	No

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				and the patients were masked					
Seim 2012, Norway (Seim, Tonnessen et al, 2012)	Unclear No details of random sequence generation or randomisation procedure	Unclear Treatment allocation was conducted using sealed envelopes which the surgeon opened on the day of surgery. It was not reported whether sequentially numbered, opaque envelopes were used.	Yes Baseline demographic and clinical characteristics of the groups were comparable. With the exception of glucose levels, which were significantly higher in the Vicryl group (p=0.05), there were no significant differences between groups	No All surgeons were aware of the suture material used. Blinding of the patients and other study personnel was not reported	Unclear Blinding of the outcome assessors and patients was not reported. Following discharge, patients appear to have monitored their own wound healing	No Drop-outs were few in both groups, and all were losses to follow-up	No Primary and secondary outcomes were not explicitly specified. However, the study did report appropriate data in relation to the study aims	No The analysis included all treatment completers	Yes No scheduled follow-up visits. Patients only appear to have been referred for GP examination post-discharge in the case of adverse healing or signs of infection
Soomro 2017, Pakistan (Soomro, Khurshaidi et al, 2017)	No No details of random sequence generation or randomiation procedure provided	No No details of treatment concealment procedure provided	Unclear The only baseline demographic reported is age, which was similar between arms	No The principal investigator was blinded. Blinding of the patients and other study personnel such as surgeons was not reported	Yes The principal investigator was blinded	No All patients randomised are accounted for in reporting of the outcome	No Primary and secondary outcomes were not explicitly specified. However, the study did report appropriate data in relation to the study aims	Yes All patients completed the study and were included in the analysis. Methods to account for any missing data were not reported	Yes Study included only clean wounds and the authors state that further studies with a larger sample size are needed
Sprowson 2018, UK (Sprowson, Jensen et al, 2018)	Unclear Quasi-randonised trial with treatments assigned according to date	Yes Treatments allocated using sealed, opaque envelopes randomised	Yes The two groups were well matched in demographics and comorbidities and were reported	No The patients, research team, statistician, and clinical staff were all blinded to the	Yes Outcome assessors were blinded to the treatment assigned. The	No Losses to follow-up and deaths in the first 6 weeks were similar in the two groups, and no	No All primary and secondary endpoints specified in the	No Rreported to be ITT but appears to be a modified ITT as patients who died or discontinued the study	Yes Authors stated that it was impossible to randomise individual

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	of surgery. Randomisation based on monthly assignment of the hospitals to one of the two interventions, with each centre providing one of the treatments for a calendar month	according to date of surgery. Envelopes were opened at the start of the month so allocation was unknown at the time when the patient was put on the waiting list (mean 3 months prior to surgery)	to be representative of patients undergoing total hip or knee arthroplasty in the UK. There were no statistically significant differences between the two groups	treatment assigned. The participating surgeon was aware of the suture material allocated	statistician was also blinded	patients withdrew consent following randomisation	published study were reported. There were a few discrepancies between the secondary endpoints reported in the TRR, published protocol, and full text article	were not included in the analyses. Missing data was not expected to be a major concern, but was imputed if judged appropriate. Imputed datasets were analysed and reported, along with appropriate sensitivity analyses. Table II reports demographics and cpmorbidities etc. for patients randomised to each group (n=1223 and n=1323) , but data appear to have been based on the mITT set (n=1164 and n=1273	patients to treatments for practical reasons (outlined in published protocol), and the approach taken was the best option. There was a significant difference in the numbers of operations conducted at the three hospitals (p<0.001). Neither the differences in surgical approach between surgeons, nor the grade of the surgeon were taken into consideration
Sukeik 2019, UK (Sukeik, George et al, 2019)	Yes Randomisation was conducted by an external company. Block randomisation with unequal block size. Randomisation codes were only	Yes Letter codes, corresponding to suture type, were assigned to the two groups and were known only to a team member who was not involved in the operation.	Yea Patient demographics were comparable between groups, although there was a non-statistically significant difference in the proportion of patients with	Yes Patients and surgeons were blinded to the assigned treatment. Both sets of sutures were indistinguishable once nurses had	Yes Personnel involved in assessing the wounds were blinded to treatment assignment	No Similar numbers of patients in each group did not attend the 6-week follow-up	No TRR retrospectively registered Few discrepancies in primary and secondary endpoints	Unclear ITT analysis conducted but methods used to address missing data were not reported and 11 patients overall did not attend the 6-week follow-up	Yes The trial was terminated prematurely due to the unavailability of the sutures after Dec 2014 (with 150 of 420 intended patients). The

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	broken in the case of a serious adverse event	Consecutive allocation of treatments was conducted using sealed envelopes containing letter code cards	diabetes (12.3%* Vicryl Plus vs 5.8%* Vicryl)	removed the package labelling			reported in TRR and full text		study was thus underpowered and the binary variable (ASEPSIS ≤10 vs >10) considered insignificant
Sundaram 2020a, USA (Sundaram K, Warren J et al, 2020a)	Unclear Computerised randomisation system used to randomise patients (1:1 ratio), but method of sequence generation (e.g. by computer) was not reported	Unclear Sealed envelopes in a random order were used to allocate patient treatment. Not stated whether the envelopes were opaque and sequentially numbered	Yes Table 1 shows that the two groups were well balanced in demographics and baseline characteristics, with no statistically significant differences between the two groups	No Reported to be a single-blind trial. A random envelope, which dictated the suture to be used, was drawn at the start of each arthroplasty. Research personnel revealed the treatment assignment to the surgeon, but the patients remained unaware of the assigmment	Yes Research personnel who conducted outcome assessments were blinded to the allocated treatment	No All randomised patients completed the study; there were no losses to follow-up or study withdrawals	No Primary and secondary outcomes were not explicitly specified, but the outcome measures defined appear to have been reported There were a few discrepancies between the full publication and the TRR in the outcomes assessed	Yes ITT analysis with all randomised patients included in the analysis. Methods to account for missing data were not described	Yes Smalll sample size with only 60 patients overall. There is a slight discrepancy between the full publication and the TRR in the eligibility criteria relating to BMI. The study was considered adequately powered to detect differences in primary outcomes, but the sample size was limited for drawing conclusions on secondary outcomes such as wound complications. In addition, although the 90-

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									day follow-up should capture most complications associated with this operation, it would miss those occurring outside of that time period
Sundaram 2020b, USA (Sundaram, Piuzzi et al, 2020b)	Unclear Computerised randomisation system used to randomise patients (1:1 ratio) at time of consent, but method of sequence generation (e.g., by computer) was not reported	Unclear Sealed envelopes in a random order were used to allocate patient treatment. Not stated whether the envelopes were opaque and sequentially numbered	No Table 1 shows variations in the demographics and baseline characteristics between the two groups, although none were statistically significant. The most notable of these was the presence of more males in the Stratafix Symmetric PDS Plus group (57%) than in the Vicryl group (37%), (p=0.598)	No Reported to be a single-blind trial. The patients were unaware of their assigned treatment as a random envelope, which dictated the suture to be used, was drawn at the start of each operation	Yes Research personnel who conducted outcome assessments were blinded to the treatment allocation	No All randomised patients completed the study; there were no losses to follow-up or study withdrawals	Yes Primary and secondary outcomes were not explicitly specified, and not all outcome measures defined were reported (e.g., readmission and reoperation). Wound complications were reported overall and for two specific complications, not all those monitored. There were few discrepancies between the full publication and the TRR in the outcomes assessed	Yes ITT analysis with all randomised patients included in the analysis. Methods to account for missing data were not described	Yes Smalll sample size with only 60 patients overall. the power calculation was based on duration of arthrotomy closure, i.e. an operative measure, rather than one of patient efficacy. There is a slight discrepancy between the full publication and the TRR in the eligibility criteria relating to BMI. The authors highlighted that a formal cost analysis was outside the scope of the study. However,

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									the TRR had pre-specified a cost comparison as a secondary endpoint. In addition, they had not used continuous locked suturing techniques in the comparator group as it was not the standard of care and there were safety concerns
Tabrizi, 2019, Iran (Tabrizi, Mohajerani et al, 2019)	Yes Patients were randomly divided into two groups using a computer-generated randomisation list	Unclear No details reported of methods of treatment allocation concealment	No Difference between arms in patients receiving fresh socket implant (Vicryl Plus 21.2% vs Vicryl 15%) may have led to bias in results	No Patients were blinded to the type of suture used.	No Trial record states that the trial was single (participant) blinded only	No All patients randomised are accounted for in reporting of the outcome	No Primary and secondary outcomes were not explicitly specified. However, the study did report appropriate data in relation to the study aims	Yes All patients completed the study and were included in the analysis. Methods to account for any missing data were not reported	Yes Difference between arms in patients receiving fresh socket implant (Vicryl Plus 21.2% v. Vicryl 15%) may have led to bias in results
Thimour-Bergström 2013, Sweden (Thimour-Bergstrom, Roman-Emanuel et al, 2013)	Unclear Randomised in blocks of 25, with stratification for diabetes, but method of sequence generation (e.g.,	Yes Treatment allocated using sealed envelopes. A nurse not involved in patient follow-up opened the randomisation envelope and	Yes Table 1 shows the groups were similar in terms of patient characteristics, with no statistically significant	Yes Surgeons and patients were unaware of the treatment assignment as a nurse not involved in the patients' follow-up	Yes All the research nurses involved in the follow-up of the patients were blinded to the treatment assignment.	No No unexpected imbalance in study discontinuations between groups, and reasons for dropout were similar	No All pre-specified primary and secondary endpoints were reported. A secondary analysis, based on the same	No Analysis conducted on the 'as treated' population	Yes The secondary analysis of sternal wound infections was potentially underpowered: the power analysis was

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	by computer) not reported	delivered the sutures to the operating room	differences between them	delivered and prepared the assigned treatment before the surgeon arrived at the operating room. Both the coated and non-coated sutures looked identical outside of their packages, and were placed on the assist table without any identification marks	All wound problems were classified by two independent observers, using the CDC definition, before the randomisation code was broken		patient cohort, aimed to investigate whether triclosan-coated sutures influenced the rate of sternal wound infections after CABG (Steingrimsson 2015). This also reported all pre-specified primary and secondary endpoints		performed for leg wound infections that have a somewhat higher incidence than in the sternotomy wound
Turtiainen 2012, Finland (Turtiainen, Saimanen et al, 2012)	Yes The coordinating centre performed block randomisation with a block size of four. The block randomisation was performed separately for each centre	Yes A research secretary placed pieces of paper containing the randomisation allocations into sealed envelopes. A nurse opened each randomisation envelope in the operating theatre before the surgery. Only the nurses in the operating theatre knew to which group each patient had been randomised.	Yes Baseline characteristics are tabulated and appear similar between arms	Yes Neither the vascular surgeons, the nurses in the surgical ward, nor the patients knew to which group a patient had been randomised	Yes Neither the vascular surgeons, the nurses in the surgical ward, nor the patients knew to which group a patient had been randomised.	No All patients randomised are accounted for in reporting of the outcome	No All stated outcomes are reported	Yes All patients completed the study and were included in the analysis. Methods to account for any missing data were not reported	NA

Study	Was randomisation carried out appropriately?	Was the concealment of treatment allocation adequate?	Were the groups similar at the outset of the study in terms of prognostic factors, for example, severity of disease?	Were the care providers and participants blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were the outcome assessors blind to treatment allocation? If any of these people were not blinded, what might be the likely impact on the risk of bias (for each outcome)	Were there any unexpected imbalances in dropouts between groups? If so, were they explained or adjusted for?	Is there any evidence to suggest that the authors measured more outcomes than they reported?	Did the analysis include an intention to-treat analysis? If so, was this appropriate and were appropriate methods used to account for missing data?	Additional info
Williams 2011, UK (Williams, Sweetland et al, 2011)	Yes Randomisation was undertaken in blocks of 50 using random computer numbers	Yes Randomisation was performed in the operating theatres using sequential sealed envelopes. Sutures used during the operations corresponded to the randomisation code	Yes The authors report that “None of the [baseline] parameters were significantly different.”	Yes Surgeon, patient, and the assessor at follow-up were blinded to which type of suture had been used.	Yes Surgeon, patient, and the assessor at follow-up were blinded to which type of suture had been used.	No Drop out rates were 14/75 (intervention) and 9/75 (comparator), so 19% and 12% per arm. Drop out rates due to a need for further surgery were also similar per arm (5/75 and 10/75)	No All specified outcomes are reported	No The study assessed outcomes using completers, with no description of any accounting for missing data	No
Zhang 2011, China (Zhang, Zhang et al, 2011)	Yes Computer-generated randomisation schedule used. To ensure equal distribution of treatments in each centre, block randomisation (block size of 4) was conducted on a site basis	Yes Patients allocated to treatment using sequentially numbered sealed envelopes, based on randomisation schedule	Yes The two groups were comparable in baseline characteristics	No Open label study in which the patients and surgeons were blinded up until the time of wound closure when the envelope was opened and the suture material revealed	No Blinded assessment of the primary outcome was conducted by a central assessor. Assessment of the secondary outcomes does not appear to have been blinded	No Droputs from the study were similar in both groups	Yes Numerical data only reported for cosmetic outcomes and adverse effects. Aside from a brief narrative description, the secondary outcomes of mean ASEPIS scores at various time points were not reported in the full publication despite numerical data being available from the TRR	Yes ITT analysis conducted but missing data for the primary endpoint were not imputed. Per protocol analysis was also conducted on evaluable patients	Since this was a pilot study, a formal sample size calculation was not performed. Thus the study might be underpowered. Small sample size (only 101 participants) The authors highlighted that the study was not stratified to separate out the effect of the antibacterial properties of the active suture or the suturing technique; they considered this a limitation

8 Summary and interpretation of clinical evidence

Summarise the main clinical evidence, highlighting the clinical benefit and any risks relating to adverse events from the technology.

Incidence of SSI

All analyses of incidence of SSI showed a statistically significant (between 25% and 48% depending on subgroup) reduction in incidence of SSI with the use of Plus Sutures compared to sutures that do not contain an antimicrobial agent, independent of type of surgery.

Results of the overall population meta-analysis incidence of SSI indicated that patients in the Plus Sutures group had a 28% reduction in the risk of developing an SSI compared to those in the control group. No outliers or publication bias were noted during the analysis of the available evidence. Results are based on 6775 and 6892 total patients in the Plus Sutures and control arm respectively.

Results for the adults only subgroup were similar, with a statistically significant 27% reduction in risk of an SSI for the Plus Sutures group.

Only two studies were conducted in children; a subgroup analysis of these studies indicated a 48% reduction in the risk of developing an SSI for patients in the Plus Sutures group compared to those in the control group.

For the wound type subgroup analyses, the meta-analysis of clean wounds indicated a 25% reduction in the risk of developing an SSI for patients in the Plus Sutures group, and for non-clean wounds the reduction in risk was indicated to be 34%.

Length of hospital stay, hospital readmissions and severity of SSIs

A qualitative assessment of these three outcomes was performed and were generally not well reported, with high heterogeneity between studies (different surgery types, different health care systems, different reporting of outcomes). The assessment found that the included studies showed little or no difference between arms for these outcomes, a finding that is in line with existing published systematic reviews and meta-analyses (Uchino, Mizuguchi et al, 2018, Sandini, Mattavelli et al, 2016).

For length of stay in hospital, SSI is only one of several contributing factors and, as we are reviewing inconsistently reported data across multiple surgical specialities and pathways, clinical experts advice that results should be interpreted with caution. In addition, it is likely that in a modern healthcare setting that drives reduction of complications and length of stay the majority of SSI are identified in primary settings or ambulatory settings. These infections do not affect length of stay but impact the use of resources. Only a minority of severe SSI require readmission.

SSIs are known to be associated with increased length of stay. Data from an English hospital showed that the median additional length of stay attributable to SSI was 10 days [95% confidence interval (CI): 7 -13 days] and a total of 4694 bed-days were lost over the two-year period.

Three studies reported rates of readmission; Sundaram 2020a reported no readmissions in either arm, Sprowson 2018 reported two (0.17%) readmissions in the intervention arm and none in the comparator arm, and Renko 2017 reported 5 (1%) readmissions in the intervention arm and 17 (2%) in the comparator arm. Due to the low incidence of readmission and limited number of trials reporting this outcome, it is difficult to draw robust conclusions.

Three studies ((Sukeik, George et al, 2019, Thimour-Bergstrom, Roman-Emanuel et al, 2013, Zhang, Zhang et al, 2011)) reported a mean ASEPSIS score by arm; Sukeik 2019 reported means of 2.54 and 1.41 for the intervention and comparator arms respectively, and Zhang 2011 reported means of 3.2 and 4.3 for the intervention and comparator (Chinese silk) arms. Thimour-Bergström 2013 reported data for leg wounds and sternum wounds separately. Mean score for leg wounds was 3.7 in the intervention and 5.4 in the control arms, and mean score for sternum wounds was 3.3 in both arms. None of the studies conducted a statistical comparison. Due to the small number of studies reporting ASEPSIS scores, and the lack of a consistent trend in favour of intervention or comparator, it is difficult to draw robust conclusions from the data identified by this systematic review.

Antibiotic use for SSI

A qualitative assessment of this outcome showed it was generally not well reported and the available studies did not show a difference between antibiotic use in the intervention and comparator arms. Use of antibiotics was not a primary outcome so treatment decisions and choice of antibiotic was not standardised in any of the studies. Furthermore, in the studies it was unclear if the decision to use antibiotics was only as a consequence of SSI or there there were other reasons, for example, pre-existing infection or infections of other organs. Clinical experts advised these factors constitute a significant limitation to the findings on post-operative antibiotic use, and the interpretation of these studies should be approached with caution.

Adverse events

The included studies reported minimal adverse events related to suture type. Three independent clinical experts were consulted and reported that in their experience, the use of Plus Sutures had not resulted in any significant or serious adverse events that required treatment or would impact on a patient's quality of life.

Briefly discuss the relevance of the evidence base to the scope. This should focus on the claimed benefits described in the scope and the quality and quantity of the included studies.

Incidence of SSI

The key outcome defined in the scope was incidence of SSI, which was reported by all but one (Sundaram, Piuzzi et al, 2020b) of the 31 studies. The evidence base was comprehensive and robust. The quality of the included studies was generally high, with all studies being randomized controlled trials in children and / or adults needing wound closure after a surgical procedure, as per the scope. A wide range of surgical procedures, including clean and non-clean surgery types, were represented in the included studies, meaning that the results of the analyses are generalisable to the population set out in the scope. The claim of a reduced risk of SSI when Plus Sutures were used, independently of the type of surgery, has been corroborated with a meta-analysis of studies that were found to be homogenous through quantitative and qualitative

assessments. The reduced risk of SSI has been confirmed in children and adults (although only two studies were conducted in children), clean and non-clean wounds.

Type of SSI

Thirteen studies reported type of SSI by treatment arm, but in the majority of cases only descriptive statistics were included. The evidence is sparse and inconsistent making it difficult to draw robust conclusions as to whether the triclosan coating influences the rate of SSI in superficial compared to deep wounds. Clinical experts further advised that attempting to distinguish the impact of Plus Sutures based on its use in superficial or deep wounds is not possible using published clinical evidence. At the same time, it is known that the presence of foreign material increases the risk of wound infections. It is also known that sutures in general behave like foreign bodies. The addition of triclosan coating reduces the risk of bacterial growth on the suture independently on where the suture is used (deep or superficial wounds).

Hospital length of stay

Data were also extracted and qualitatively analysed for length of hospital stay, with 12 studies reporting some information on this outcome (Diener, Knebel et al, 2014, Justinger, Slotta et al, 2013, Mattavelli, Rebora et al, 2015, Mingmalairak, Ungbhakorn et al, 2009, Nakamura, Kashimura et al, 2013, Olmez, Berkesoglu et al, 2019, Rasic, Schwarz et al, 2011, Ruiz-Tovar, Llavero et al, 2020, Ruiz-Tovar, Alonso et al, 2015, Sprowson, Jensen et al, 2018, Sukeik, George et al, 2019, Turtiainen, Saimanen et al, 2012). Overall the data were not well reported and heterogeneous. Included studies did not show a statistical difference in length of hospital stay, a finding that is in line with existing systematic reviews and meta-analyses (Uchino, Mizuguchi et al, 2018, Sandini, Mattavelli et al, 2016). Clinical experts advised that because SSI is only one of several elements effecting length of stay in hospital, and many different surgeries were reviewed combining different clinical pathways, this result should be interpreted with caution.

Readmission rate

Similarly to the length of stay, the readmission rate was only a secondary endpoint in many studies and only three studies reported it (Renko, Paalanne et al, 2017, Sprowson, Jensen et al, 2018, Sundaram K, Warren J et al, 2020a). This outcome was deemed to be at high risk of bias by clinical experts, and definitive conclusions cannot be drawn from the evidence identified.

Antibiotics use for SSI

Data were extracted and qualitatively analysed from six studies (Arslan, Atasoy et al, 2018, Diener, Knebel et al, 2014, Ford, Jones et al, 2005, Ichida, Noda et al, 2018, Lin, Chang et al, 2018, Thimour-Bergstrom, Roman-Emanuel et al, 2013) on the proportion of patients in each arm receiving post-operative antibiotics that were definitely or probably (studies did not always report the reason for administration of post-operative antbiotics) given for treatment of an SSI. Details of the prescription, duration and dose of antibiotics used to treat SSI were also not widely reported (only Lin 2018 reported names of antibiotics given, and no studies reported the number of prescriptions or dose of antibiotics used to treat SSIs).

Severity of SSI
Severity of SSI as graded using the ASPESIS scoring system was not widely reported, with only three studies using this system to compare SSIs between arms (Sukeik, George et al, 2019, Thimour-Bergstrom, Roman-Emanuel et al, 2013, Zhang, Zhang et al, 2011).

Incidence of wound dehiscence
Nine studies reported dehiscence by treatment arm (Arslan, Atasoy et al, 2018, Diener, Knebel et al, 2014, Karip, Celik et al, 2016, Rasic, Schwarz et al, 2011, Renko, Paalanne et al, 2017, Sukeik, George et al, 2019, Sundaram K, Warren J et al, 2020a, Tabrizi, Mohajerani et al, 2019, Thimour-Bergstrom, Roman-Emanuel et al, 2013), six of which made a statistical comparison of arms but three didn't report a p-value. Five of the six studies reporting a statistical comparison showed no significant difference in dehiscence rate between triclosan coated sutures and uncoated sutures. The sixth study did find triclosan to result in a significant reduction in dehiscence, although we note that this study assessed patients during the hospitalization period only (Rasic, Schwarz et al, 2011); the mean hospital stay for patients in the comparator arm was 21.4 days while the mean stay for patients in the intervention arm was 13.2 days. For this reason the conclusions of the Rasic study may be subject to bias. From the current literature review there is no evidence that triclosan coated sutures reduced dehiscence rate compared to uncoated sutures.

Patient reported pain
Seven studies (Diener, Knebel et al, 2014, Ford, Jones et al, 2005, Lin, Chang et al, 2018, Renko, Paalanne et al, 2017, Ruiz-Tovar, Llavero et al, 2020, Santos, Santos et al, 2019, Sukeik, George et al, 2019) reported pain by treatment arm. Of these three studies found no statistically significant difference between arms, and three studies reported statistically significant differences, but not all in the same direction. The final study, with no p value calculated, indicated that fewer patients in the triclosan arm experienced pain. The results of the seven studies do not provide clear indications that triclosan coated sutures reduced pain compared to uncoated sutures.

Adverse events
The included studies reported minimal adverse events related to suture type, and this was confirmed by clinical opinion. Since these adverse events are likely to emerge within the follow-up time of the RCTs identified, the evidence seems robust to exclude the possibility of significant adverse events related to the triclosan coated sutures.

Identify any factors which might be different between the patients in the submitted studies and patients having routine care in the UK NHS.

Fourteen of the 31 RCTs were conducted in Europe, of which three were conducted in the UK. A further eight studies were conducted in high income countries and two in middle-income countries, providing good generalisability to the UK context as the patient characterstics, incidence of co-morbidities, and/or clinical stage of disease of the patients included in the studies are clinically comparable with the characteristics of patients eligible for Plus Sutures in the UK NHS.

This conclusion was also confirmed by three independent clinicians who considered the evidence to be directly relevant across the NHS, and to accurately reflect the range of patients and procedures within the NHS.

Describe any criteria that would be used in clinical practice to select patients for whom the technology would be most appropriate.

Three NHS clinicians independently advised that Plus Sutures could be used widely within UK clinical practice. The meta-analysis showed that the relative risk of the incidence of SSI was reduced by 28% in the overall population, with a minimum risk reduction of 25% across all subgroups of patients (adults and children, patients with clean and non clean wound types). The included studies covered a wide range of surgical interventions, both emergency and planned, including abdominal, gastroenterological, colorectal, cardiac, breast, dental implants surgery, arthroplasty, appendicitis, sinus excision, implantation of cerebrofluid shunting device, and surgery for pilonidal disease. The majority of the studies included patients with comorbidities including diabetes, COPD, malignant diseases, chronic renal insufficiency, anaemia and people living with obesity or malnourished. The large heterogeneity in patient population in conjunction with the positive result of the meta-analysis suggests that the intervention can be recommended in a wide population of patients.

The conclusion by three independent NHS clinicians was that as Plus Sutures have the same handling characteristics and wound closure performance as sutures that do not contain an antibacterial agent, with no evidence reported of harms, Plus Sutures could be used as the default device as part of a series of pragmatic interventions to reduce the risk of SSI to as low as is reasonably possible. This is aligned with the NICE SSI Guidelines (National Institute for Health and Care Excellence, 2020), WHO Global guidelines (World Health Organization, 2018) and the 2017 CDC guidelines (Berrios-Torres, Umscheid et al, 2017) that recommend the use of triclosan-coated sutures for the purpose of reducing the risk of SSI, independent of the type of surgery. Patients with a known or suspected allergy to triclosan are not indicated for use of Plus Sutures.

Briefly summarise the strengths and limitations of the clinical evidence for the technology.

The clinical evidence is drawn from 31 RCTs across a wide range of surgery types. The evidence is therefore broad and generally of high quality. The definition of SSI incidence was informed by the CDC definition in the majority of studies and the majority of studies assessed incidence of SSI as a primary outcome using a clearly defined patient population (ITT, mITT, per-protocol, as-treated, or completers).

The size of the included studies varied 60 to 2437 patients analysed, with a total of 13,754 patients and a total of 1,211 SSI reported across studies.Three independent clinicians considered this evidence to be directly relevant across the NHS, and to accurately reflect the range of patients and procedures within the NHS. The studies are broadly homogeneous, as evidenced by the similarity assessment and the quantitative assessment of heterogeneity.

The large number of high quality studies (RCTs) and correspondingly high total number of patients and SSI observed are all strengths of the evidence.

Not all studies were blinded in the same way, with 15 of 31 studies being double blind, and the remaining 16 either single blind, open label, or not clearly reporting sufficient details of methods to

determine the level of blinding. In addition, the studies were conducted in a wide range of countries over a fifteen year date span (2005-2020), across which clinical pathways vary somewhat and are likely to have changed with time. While both these points represent a limitation of the evidence, the meta-analysis used to assess the key outcomes utilises within study comparisons, and thus should not be severely impacted by the lack of blinding in some studies.

All but two studies (Karip, Celik et al, 2016, Rasic, Schwarz et al, 2011) reported outcomes at a timepoint of one month or longer, meaning that all SSIs as described by the CDC definition should have been captured by the studies. Rasic 2011 and Karip 2016 were excluded from the quantitative meta-analysis due to the potential impact of their short follow up times.

9 References

Please include all references below using NICE's standard referencing style.

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Appendix A: Search strategy for clinical evidence

Describe the process and methods used to identify and select the studies relevant to the technology. Include searches for published studies, abstracts and ongoing studies in separate tables as appropriate. See section 2 of the user guide for full details of how to complete this section.

Date search conducted:	Searches were conducted between 01/02/21 and 09/02/21. See individual resource details below for the specific search date for each resource.
Date span of search:	Reflecting the eligibility criteria, only studies with a publication date of 2000 and onwards were included (as the first available Plus Suture (Vicryl Plus) was launched in 2003), and the search was restricted to studies published from 2000 to date. See individual resource details below for database coverage dates for each resource.
List the complete search strategies used, including all the search terms: textwords (free text), subject index headings (for example, MeSH) and the relationship between the search terms (for example, Boolean). List the databases that were searched.	
The results from the searches detailed below informed the systematic literature review of clinical effects and safety evidence for Plus Sutures. Searches of economic databases were included because search results were also considered for use in the cost-effectiveness model of Plus Sutures. All records retrieved by searches of all databases were assessed, but only studies fitting the eligibility criteria described in the review protocol and section 4 of this document were eligible for inclusion in the systematic literature review of clinical effects and safety evidence for Plus Sutures. A MEDLINE (OvidSP) search strategy was designed to identify studies reporting clinical effects and adverse effects for Plus Sutures for prevention of SSIs. The final MEDLINE strategy is presented below (source A.1). The main structure of the strategy comprised 2 concepts: • Sutures (search lines 1 to 13) • Triclosan (search lines 14 to 20) The concepts were combined as follows: sutures AND triclosan. In addition, the search included a set of search lines designed to retrieve records that explicitly referred to the device name (PDS Plus, MONOCRYL Plus, VICRYL Plus or STRATAFIX Plus) (search lines 21 to 32). Search concepts were captured using subject headings and textword searches in Title, Abstract, Keyword Heading Word, Name of Substance Word, and CAS Registry/EC Number/Name of Substance fields. The search terms were identified through discussion within the research team, scanning background literature, browsing database thesauri and use of the PubMed PubReminer tool (http://hgserver2.amc.nl/cgi-bin/miner/miner2.cgi). The strategy excluded animal studies from MEDLINE using a standard algorithm (search line 34). The strategy also excluded some publication types that were unlikely to yield relevant study reports (editorials and news items) (search line 35). Reflecting the eligibility criteria, the strategy was restricted to studies published in English from 2000 to date. The performance of terms in the strategy was tested by checking retrieval of records for 46 known, potentially relevant studies. The references were sourced from the selected studies table (Table 1) in the	

NICE Medtech innovation briefing (MIB) on Plus Sutures for preventing surgical site infection (National Institute for Health and Care Excellence, 2020) and the references included in 5 recent potentially relevant reviews (De Jonge, Atema et al, 2017, Leaper, Edmiston et al, 2017, Ahmed, Boulton et al, 2019, Onesti, Carella et al, 2018, Wu, Kubilay et al, 2017). Across the NICE MIB and the 5 reviews, 46 unique studies were identified for which records were available in MEDLINE. The suture-specific terms (search lines 1 to 6) successfully retrieved records for all 46 studies. The triclosan-specific terms (search lines 14 to 18) successfully retrieved records for all 46 studies. Of the 46 records, all those that included non-specific antimicrobial terms in any context (33 records) were successfully retrieved by search lines 19 or 22. Before language limits were applied, the strategy successfully retrieved records for all 46 studies.

Although the test suggested records for relevant studies would include suture-specific terms (search lines 1 to 6), the search terms for the sutures concept were enhanced by including terms to retrieve records which used variant descriptions in the context of wound closure (search lines 7 to 12). Although the test suggested records for relevant studies would include triclosan-specific terms (search lines 14 to 18), the terms for the triclosan concept were enhanced by including terms to retrieve records that only referred to non-specific antibacterial coatings in the database record (search line 19).

The search approach was discussed and agreed within the research team.

The final Ovid MEDLINE strategy was peer-reviewed by a second Information Specialist for errors in spelling, syntax and line combinations.

The searches were conducted using each database or resource listed below (sources A1 to A15). The resources included: databases covering biomedical healthcare and nursing journal literature; databases of controlled trials, systematic reviews and health technology assessments; databases containing conference abstracts; databases containing information on ongoing trials. The final agreed Ovid MEDLINE strategy was translated appropriately. Translation included consideration of differences in database interfaces and functionality, in addition to variation in indexing languages and thesauri.

In addition to the listed searches A1 to A15, reports of adverse events associated with the technology were sought via searches of the Manufacturer and User Facility Device Experience (MAUDE) database and Medicines and Healthcare products Regulatory Agency (MHRA) resources.

The research team also asked the manufacturer to supply details of any eligible published, unpublished and ongoing studies that they were aware of. The team also checked the reference lists of any relevant systematic reviews published in the last 5 years for any eligible studies that might have been missed by the database searches.

Where possible, the results of searches were downloaded in a tagged format and loaded into EndNote bibliographic software (Clarivate Analytics, 2018). The results were deduplicated using several algorithms and the duplicate references held in a separate EndNote database for checking if required. Results from resources that did not allow export in a format compatible with EndNote were saved in Word or Excel documents as appropriate and manually deduplicated.

A.1: Source: MEDLINE ALL
Interface / URL: OvidSP
Database coverage dates: 1946 to January 29, 2021
Search date: 01/02/21
Retrieved records: 422
Search strategy:

1 Sutures/ (17365)
2 Suture Techniques/ (43238)
3 sutur$.ti,ab,kf. (81242)
4 stitch$.ti,ab,kf. (5666)

5 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) and (ligat$ or loop$ or thread$)).ti,ab,kf. (81457)
6 or/1-5 (185804)
7 Surgical Fixation Devices/ (189)
8 Wound Closure Techniques/ (1628)
9 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kf. (103269)
10 (device$ adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kf. (14057)
11 ((fascia$ or skin or skins or tissue$ or wound$) adj6 device$).ti,ab,kf. (7848)
12 or/7-11 (122588)
13 6 or 12 (293804)
14 Triclosan/ (2951)
15 triclosan$.ti,ab,kf,rn,nm. (4315)
16 (cgp433$ or cgp-433$ or ch3565$ or ch-3565$ or cloxifenol$ or dndi1246774$ or dndi-1246774$ or dp300$ or dp-300$ or fat-80$ or fat80$ or gp41-353$ or gp41353$ or irgacare$ or irgacide$ or irgagard$ or irgasan$ or lexol-300$ or lexol300$ or ster-zac$ or sterzac$ or tcs or tricosan$).ti,ab,kf,rn,nm. (6302)
17 (222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5).ti,ab,kf,rn,nm. (2951)
18 or/14-17 (9767)
19 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj20 (coat$ or impregnat$)).ti,ab,kf. (6564)
20 13 and (18 or 19) (456)
21 plus$ suture$.ti,ab,kf. (38)
22 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj sutur$).ti,ab,kf. (102)
23 ((pds$ or pds-ii) adj plus$).ti,ab,kf. (19)
24 ((pds$ adj4 plus$) and sutur$).ti,ab,kf. (27)
25 (monocryl$ adj4 plus$).ti,ab,kf. (9)
26 (vicryl$ adj4 plus$).ti,ab,kf. (60)
27 (pds$ or monocryl$ or vicryl$).ti,ab,kf. and (18 or 19) (70)
28 stratafix$.ti,ab,kf. (39)
29 tissue control device$.ti,ab,kf. (8)
30 ((polydioxanon$ or poliglecapron$ or polyglactin$) adj3 plus$).ti,ab,kf. (28)
31 (polydioxanon$ or poliglecapron$ or polyglactin$).ti,ab,kf. and (18 or 19) (63)
32 or/21-31 (251)
33 20 or 32 (589)
34 exp animals/ not humans/ (4782208)
35 (news or editorial).pt. (761558)
36 33 not (34 or 35) (489)
37 limit 36 to english language (449)
38 limit 37 to yr="2000 -Current" (422)

A.2: Source: Embase
Interface / URL: OvidSP
Database coverage dates: 1974 to 2021 February 01
Search date: 02/02/21
Retrieved records: 671
Search strategy:

1 exp suture/ (64181)
2 suture technique/ or suturing method/ or suture material/ or absorbable suture material/ or nonabsorbable suture material/ (32258)
3 sutur$.ti,ab,kw,dq,dv,my. (114491)
4 stitch$.ti,ab,kw,dq,dv,my. (8765)

5 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) and (ligat$ or loop$ or thread$)).ti,ab,kw,dq,dv,my. (114523)
6 or/1-5 (254311)
7 orthopedic fixation device/ (1772)
8 wound closure/ (18286)
9 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kw,dq,dv,my. (135687)
10 (device$ adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).ti,ab,kw,dq,dv,my. (23491)
11 ((fascia$ or skin or skins or tissue$ or wound$) adj6 device$).ti,ab,kw,dq,dv,my. (11055)
12 or/7-11 (171475)
13 6 or 12 (402921)
14 triclosan/ (5498)
15 triclosan$.ti,ab,kw,rn,tn,dq,dy. (5944)
16 (cgp433$ or cgp-433$ or ch3565$ or ch-3565$ or cloxifenol$ or dndi1246774$ or dndi-1246774$ or dp300$ or dp-300$ or fat-80$ or fat80$ or gp41-353$ or gp41353$ or irgacare$ or irgacide$ or irgagard$ or irgasan$ or lexol-300$ or lexol300$ or ster-zac$ or sterzac$ or tcs or tricosan$).ti,ab,kw,rn,tn,dq,dy. (9065)
17 (222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5).ti,ab,kw,rn,tn,dq,dy. (5213)
18 or/14-17 (13921)
19 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj20 (coat$ or impregnat$)).ti,ab,kw,dq,dv,my. (7725)
20 13 and (18 or 19) (674)
21 plus$ suture$.ti,ab,kw,dq,dv,my,dm. (43)
22 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj sutur$).ti,ab,kw,dq,dv,my,dm. (136)
23 ((pds$ or pds-ii) adj plus$).ti,ab,kw,dq,dv,my,dm. (50)
24 ((pds$ adj4 plus$) and sutur$).ti,ab,kw,dq,dv,my,dm. (52)
25 (monocryl$ adj4 plus$).ti,ab,kw,dq,dv,my,dm. (24)
26 (vicryl$ adj4 plus$).ti,ab,kw,dq,dv,my,dm. (113)
27 (pds$ or monocryl$ or vicryl$).ti,ab,kw,dq,dv,my,dm. and (18 or 19) (114)
28 stratafix$.ti,ab,kw,dq,dv,my,dm. (115)
29 tissue control device$.ti,ab,kw,dq,dv,my,dm. (17)
30 ((polydioxanon$ or poliglecapron$ or polyglactin$) adj3 plus$).ti,ab,kw,dq,dv,my,dm. (34)
31 (polydioxanon$ or poliglecapron$ or polyglactin$).ti,ab,kw,dq,dv,my,dm. and (18 or 19) (102)
32 or/21-31 (453)
33 20 or 32 (944)
34 (animal/ or animal experiment/ or animal model/ or animal tissue/ or nonhuman/) not exp human/ (6187800)
35 editorial.pt. (683611)
36 33 not (34 or 35) (757)
37 limit 36 to english language (702)
38 limit 37 to yr="2000 -Current" (671)

A.3: Source: CINAHL Complete
Interface / URL: EBSCOhost
Database coverage dates: 1937 to date
Search date: 04/02/21
Retrieved records: 162
Search strategy:

All search lines – Limiters/Expanders:
"Expanders - Apply equivalent subjects
Search modes - Boolean/Phrase"

S34 S19 OR S31 Limiters - Published Date: 20000101-20211231; English Language 162
S33 S19 OR S31 Limiters - English Language 163
S32 S19 OR S31 164
S31 S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 77
S30 (TI(polydioxanon* or poliglecapron* or polyglactin*) or AB(polydioxanon* or poliglecapron* or polyglactin*)) AND (S17 OR S18) 17
S29 TI((polydioxanon* or poliglecapron* or polyglactin*) N3 plus*) or AB((polydioxanon* or poliglecapron* or polyglactin*) N3 plus*) 8
S28 TI("tissue control device*") or AB("tissue control device*") 5
S27 TI stratafix* or AB stratafix* 20
S26 (TI(pds* or monocryl* or vicryl*) or AB(pds* or monocryl* or vicryl*)) AND (S17 OR S18) 11
S25 TI(vicryl* N4 plus*) or AB(vicryl* N4 plus*) 5
S24 TI(monocryl* N4 plus*) or AB(monocryl* N4 plus*) 0
S23 TI((pds* N4 plus*) and sutur*) or AB((pds* N4 plus*) and sutur*) 9
S22 TI((pds* or pds-ii) N0 plus*) or AB((pds* or pds-ii) N0 plus*) 11
S21 TI((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N0 sutur*) or AB((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N0 sutur*) 27
S20 TI("plus* suture*") OR AB("plus* suture*") 8
S19 S12 AND (S17 OR S18) 119
S18 TI((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N20 (coat* or impregnat*)) or AB((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) N20 (coat* or impregnat*)) 929
S17 S13 OR S14 OR S15 OR S16 1,163
S16 TI(222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5) or AB(222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5) 0
S15 TI(cgp433* or cgp-433* or ch3565* or ch-3565* or cloxifenol* or dndi1246774* or dndi-1246774* or dp300* or dp-300* or fat-80* or fat80* or gp41-353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol-300* or lexol300* or ster-zac* or sterzac* or tcs or tricosan*) or AB(cgp433* or cgp-433* or ch3565* or ch-3565* or cloxifenol* or dndi1246774* or dndi-1246774* or dp300* or dp-300* or fat-80* or fat80* or gp41-353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol-300* or lexol300* or ster-zac* or sterzac* or tcs or tricosan*) 698
S14 TI triclosan* or AB triclosan* 396
S13 (MH "Triclosan") 271
S12 S6 OR S11 46,949
S11 S7 OR S8 OR S9 OR S10 26,296
S10 TI((fascia* or skin or skins or tissue* or wound*) N6 device*) or AB((fascia* or skin or skins or tissue* or wound*) N6 device*) 1,824
S9 TI(device* N6 (approximat* or clos* or fasten* or fixat* or secur*)) or AB(device* N6 (approximat* or clos* or fasten* or fixat* or secur*)) 4,076
S8 TI((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) N6 (approximat* or clos* or fasten* or fixat* or secur*)) or AB((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) N6 (approximat* or clos* or fasten* or fixat* or secur*)) 21,392
S7 (MH "Surgical Fixation Devices") 156

S6 S1 OR S2 OR S3 OR S4 OR S5 23,613
S5 TI((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*)) or AB((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*)) 8,022
S4 TI stitch* or AB stitch* 1,028
S3 TI sutur* or AB sutur* 12,048
S2 (MH "Suture Techniques") 6,190
S1 (MH "Sutures") 3,697

A.4: Source: Cochrane Central Register of Controlled Trials
Interface / URL: Cochrane Library / Wiley
Database coverage dates: Information not found. Issue searched: Issue 2 of 12, February 2021
Search date: 03/02/21
Retrieved records: 203
Search strategy:

#1 [mh ^Sutures] 919
#2 [mh ^"Suture Techniques"] 1786
#3 sutur* 9351
#4 stitch* 812
#5 ((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*)) 5758
#6 #1 or #2 or #3 or #4 or #5 14730
#7 [mh ^"Surgical Fixation Devices"] 11
#8 [mh ^"Wound Closure Techniques"] 155
#9 ((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) near/6 (approximat* or clos* or fasten* or fixat* or secur*)) 13625
#10 (device* near/6 (approximat* or clos* or fasten* or fixat* or secur*)) 1940
#11 ((fascia* or skin or skins or tissue* or wound*) near/6 device*) 1447
#12 #7 or #8 or #9 or #10 or #11 15964
#13 #6 or #12 27511
#14 [mh ^Triclosan] 410
#15 triclosan* 715
#16 (cgp433* or cgp next 433* or ch3565* or ch next 3565* or cloxifenol* or dndi1246774* or dndi next 1246774* or dp300* or dp next 300* or "fat-80" or "fat-80r" or "fat-80tm" or fat80* or gp41 next 353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol next 300* or lexol300* or ster next zac* or sterzac* or tcs or tricosan*) 485
#17 ("222-182-2" or "3380-34-5" or "4640-01-1" or 4nm5039y5x or 5174ur1dp5) 0
#18 #14 or #15 or #16 or #17 1170
#19 ((antibacterial* or anti next bacterial* or antibiotic* or anti next biotic* or antiinfective* or anti next infective* or antimicrobial* or anti next microbial* or antimicrobical* or anti next microbical* or antiseptic* or anti next septic* or biocid*) near/20 (coat* or impregnat*)) 593
#20 #13 and (#18 or #19) 198
#21 (plus* next suture*) 23
#22 ((antibacterial* or anti next bacterial* or antibiotic* or anti next biotic* or antiinfective* or anti next infective* or antimicrobial* or anti next microbial* or antimicrobical* or anti next microbical* or antiseptic* or anti next septic* or biocid*) next sutur*) 49
#23 ((pds* or "pds-ii") next plus*) 18
#24 ((pds* near/4 plus*) and sutur*) 20
#25 (monocryl* near/4 plus*) 9
#26 (vicryl* near/4 plus*) 41
#27 (pds* or monocryl* or vicryl*) and (#18 or #19) 50
#28 stratafix* 30

#29 (tissue next control next device*) 8
#30 ((polydioxanon* or poliglecapron* or polyglactin*) near/3 plus*) 13
#31 (polydioxanon* or poliglecapron* or polyglactin*) and (#18 or #19) 48
#32 #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 154
#33 #20 or #32 266
#34 #33 with Publication Year from 2000 to 2021, in Trials 203

A.5: Source: Cochrane Database of Systematic Reviews
Interface / URL: Cochrane Library / Wiley
Database coverage dates: Information not found. Issue searched: Issue 2 of 12, February 2021
Search date: 03/02/21
Retrieved records: 21
Search strategy:

#1 [mh ^Sutures] 919
#2 [mh ^"Suture Techniques"] 1786
#3 sutur*:ti,ab,kw 9004
#4 stitch*:ti,ab,kw 764
#5 ((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*)):ti,ab,kw 5028
#6 #1 or #2 or #3 or #4 or #5 13720
#7 [mh ^"Surgical Fixation Devices"] 11
#8 [mh ^"Wound Closure Techniques"] 155
#9 ((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) near/6 (approximat* or clos* or fasten* or fixat* or secur*)):ti,ab,kw 12286
#10 (device* near/6 (approximat* or clos* or fasten* or fixat* or secur*)):ti,ab,kw 1782
#11 ((fascia* or skin or skins or tissue* or wound*) near/6 device*):ti,ab,kw 1276
#12 #7 or #8 or #9 or #10 or #11 14512
#13 #6 or #12 25376
#14 [mh ^Triclosan] 410
#15 triclosan* 715
#16 (cgp433* or cgp next 433* or ch3565* or ch next 3565* or cloxifenol* or dndi1246774* or dndi next 1246774* or dp300* or dp next 300* or "fat-80" or "fat-80r" or "fat-80tm" or fat80* or gp41 next 353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol next 300* or lexol300* or ster next zac* or sterzac* or tcs or tricosan*) 485
#17 ("222-182-2" or "3380-34-5" or "4640-01-1" or 4nm5039y5x or 5174ur1dp5) 0
#18 #14 or #15 or #16 or #17 1170
#19 ((antibacterial* or anti next bacterial* or antibiotic* or anti next biotic* or antiinfective* or anti next infective* or antimicrobial* or anti next microbial* or antimicrobical* or anti next microbical* or antiseptic* or anti next septic* or biocid*) near/20 (coat* or impregnat*)) 593
#20 #13 and (#18 or #19) 156
#21 (plus* next suture*) 23
#22 ((antibacterial* or anti next bacterial* or antibiotic* or anti next biotic* or antiinfective* or anti next infective* or antimicrobial* or anti next microbial* or antimicrobical* or anti next microbical* or antiseptic* or anti next septic* or biocid*) next sutur*) 49
#23 ((pds* or "pds-ii") next plus*) 18
#24 ((pds* near/4 plus*) and sutur*) 20
#25 (monocryl* near/4 plus*) 9
#26 (vicryl* near/4 plus*) 41
#27 (pds* or monocryl* or vicryl*) and (#18 or #19) 50
#28 stratafix* 30
#29 (tissue next control next device*) 8
#30 ((polydioxanon* or poliglecapron* or polyglactin*) near/3 plus*) 13
#31 (polydioxanon* or poliglecapron* or polyglactin*) and (#18 or #19) 48
#32 #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 154

#33 #20 or #32 225
#34 #33 with Cochrane Library publication date Between Jan 2000 and Feb 2021, in Cochrane Reviews, Cochrane Protocols 21

A.6: Source: Database of Abstracts of Reviews of Effects (DARE)
Interface / URL: https://www.crd.york.ac.uk/CRDWeb
Database coverage dates: Information not found. Bibliographic records were published on DARE until 31st March 2015. Searches of MEDLINE, Embase, CINAHL, PsycINFO and PubMed were continued until the end of the 2014.
Search date: 03/02/21
Retrieved records: 21
Search strategy:

1 MeSH DESCRIPTOR Sutures 86
2 MeSH DESCRIPTOR Suture Techniques 187
3 (sutur*) 442
4 (stitch*) 27
5 (((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*))) 263
6 #1 OR #2 OR #3 OR #4 OR #5 687
7 MeSH DESCRIPTOR Surgical Fixation Devices 5
8 MeSH DESCRIPTOR Wound Closure Techniques 21
9 (((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (approximat* or clos* or fasten* or fixat* or secur*))) 2836
10 ((device* and (approximat* or clos* or fasten* or fixat* or secur*))) 462
11 (((fascia* or skin or skins or tissue* or wound*) and device*)) 329
12 #7 OR #8 OR #9 OR #10 OR #11 3247
13 (#6 OR #12) 3697
14 MeSH DESCRIPTOR Triclosan 12
15 (triclosan*) 23
16 ((cgp433* or cgp-433* or ch3565* or ch-3565* or cloxifenol* or dndi1246774* or dndi-1246774* or dp300* or dp-300* or fat-80* or fat80* or gp41-353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol-300* or lexol300* or ster-zac* or sterzac* or tcs or tricosan*)) 7
17 ((222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5)) 0
18 #14 OR #15 OR #16 OR #17 30
19 (((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) AND (coat* or impregnat*))) 138
20 (#13 and (#18 or #19)) 38
21 (plus* suture*) 1
22 (((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) adj0 sutur*)) 8
23 (((pds* or pds-ii) adj0 plus*)) 2
24 ((pds* and plus* and sutur*)) 2
25 ((monocryl* and plus*)) 1
26 ((vicryl* and plus*)) 1
27 ((pds* or monocryl* or vicryl*) and (#18 or #19)) 2
28 (stratafix*) 0
29 (tissue control device*) 0
30 (((polydioxanon* or poliglecapron* or polyglactin*) and plus*)) 2
31 ((polydioxanon* or poliglecapron* or polyglactin*) and (#18 or #19)) 2
32 #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 13
33 #20 OR #32 47
34 (#33) FROM 2000 TO 2021 44

35 (#33) IN DARE FROM 2000 TO 2021 21

A.7: Source: NHS Economic Evaluation Database (NHS EED)
Interface / URL: https://www.crd.york.ac.uk/CRDWeb
Database coverage dates: Information not found. Bibliographic records were published on NHS EED until 31st March 2015. Searches of MEDLINE, Embase, CINAHL, PsycINFO and PubMed were continued until the end of the 2014.
Search date: 03/02/21
Retrieved records: 9
Search strategy:

1 MeSH DESCRIPTOR Sutures 86
2 MeSH DESCRIPTOR Suture Techniques 187
3 (sutur*) 442
4 (stitch*) 27
5 (((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (ligat* or loop* or thread*))) 263
6 #1 OR #2 OR #3 OR #4 OR #5 687
7 MeSH DESCRIPTOR Surgical Fixation Devices 5
8 MeSH DESCRIPTOR Wound Closure Techniques 21
9 (((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or skin or skins or tissue* or wound*) and (approximat* or clos* or fasten* or fixat* or secur*))) 2836
10 ((device* and (approximat* or clos* or fasten* or fixat* or secur*))) 462
11 (((fascia* or skin or skins or tissue* or wound*) and device*)) 329
12 #7 OR #8 OR #9 OR #10 OR #11 3247
13 (#6 OR #12) 3697
14 MeSH DESCRIPTOR Triclosan 12
15 (triclosan*) 23
16 ((cgp433* or cgp-433* or ch3565* or ch-3565* or cloxifenol* or dndi1246774* or dndi-1246774* or dp300* or dp-300* or fat-80* or fat80* or gp41-353* or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or lexol-300* or lexol300* or ster-zac* or sterzac* or tcs or tricosan*)) 7
17 ((222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5)) 0
18 #14 OR #15 OR #16 OR #17 30
19 (((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) AND (coat* or impregnat*))) 138
20 (#13 and (#18 or #19)) 38
21 (plus* suture*) 1
22 (((antibacterial* or anti-bacterial* or antibiotic* or anti-biotic* or antiinfective* or anti-infective* or antimicrobial* or anti-microbial* or antimicrobical* or anti-microbical* or antiseptic* or anti-septic* or biocid*) adj0 sutur*)) 8
23 (((pds* or pds-ii) adj0 plus*)) 2
24 ((pds* and plus* and sutur*)) 2
25 ((monocryl* and plus*)) 1
26 ((vicryl* and plus*)) 1
27 ((pds* or monocryl* or vicryl*) and (#18 or #19)) 2
28 (stratafix*) 0
29 (tissue control device*) 0
30 (((polydioxanon* or poliglecapron* or polyglactin*) and plus*)) 2
31 ((polydioxanon* or poliglecapron* or polyglactin*) and (#18 or #19)) 2
32 #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 13
33 #20 OR #32 47
34 (#33) FROM 2000 TO 2021 44
35 (#33) IN DARE FROM 2000 TO 2021 21
36 (#33) IN NHSEED FROM 2000 TO 2021 9

A.8: Source: HTA Database

Interface / URL: https://www.inahta.org/hta-database/

Database coverage dates: Information not found. The former database was produced by the CRD until March 2018, at which time the addition of records was stopped as INAHTA was in the process of rebuilding the new database platform. In July 2019, the database records were exported from the CRD platform and imported into the new platform that was developed by INAHTA. The rebuild of the new platform was launched in June 2020.

Search date: 03/02/21

Retrieved records: 14

Search strategy:

32 #31 AND #30 14
31 * FROM 2000 TO 2021 16140
30 #29 OR #22 15
29 #28 OR #27 OR #26 OR #25 OR #24 OR #23 11
28 (polydioxanon* OR poliglecapron* OR polyglactin*) 0
27 "tissue control device" OR "tissue control devices" 0
26 stratafix* 0
25 (pds* OR monocryl* OR vicryl*) 4
24 ((antibacterial* OR "anti-bacterial" OR "anti-bacterials" OR antibiotic* OR "anti-biotic" OR "anti-biotics" OR antiinfective* OR "anti-infective" OR "anti-infectives" OR antimicrobial* OR "anti-microbial" OR "anti-microbials" OR antimicrobical* OR "anti-microbical" OR "anti-microbicals" OR antiseptic* OR "anti-septic" OR "anti-septics" OR biocid*) AND sutur*) 8
23 plus* AND suture* 2
22 #21 OR #20 7
21 #19 AND #13 6
20 #18 AND #13 3
19 ((antibacterial* OR "anti-bacterial" OR "anti-bacterials" OR antibiotic* OR "anti-biotic" OR "anti-biotics" OR antiinfective* OR "anti-infective" OR "anti-infectives" OR antimicrobial* OR "anti-microbial" OR "anti-microbials" OR antimicrobical* OR "anti-microbical" OR "anti-microbicals" OR antiseptic* OR "anti-septic" OR "anti-septics" OR biocid*) AND (coat* OR impregnat*)) 21
18 #17 OR #16 OR #15 OR #14 6
17 (4nm5039y5x OR 5174ur1dp5) 0
16 (cgp433* OR "cgp-433" OR "cgp-433r" OR "cgp-433tm" OR ch3565* OR cloxifenol* OR dndi1246774* OR "dndi-1246774" OR "dndi-1246774r" OR "dndi-1246774tm" OR dp300* OR "fat-80r" OR "fat-80tm" OR fat80* OR "gp41-353" OR "gp41-353r" OR "gp41-353tm" OR gp41353* OR irgacare* OR irgacide* OR irgagard* OR irgasan* OR "lexol-300" OR "lexol-300r" OR "lexol-300tm" OR lexol300* OR "ster-zac" OR "ster-zacr" OR "ster-zactm" OR sterzac* OR tcs OR tricosan*) 2
15 triclosan* 4
14 "Triclosan"[mh] 1
13 #12 OR #6 703
12 #11 OR #10 OR #9 OR #8 OR #7 648
11 ((fascia* OR skin OR skins OR tissue* OR wound*) AND device*) 97
10 (device* AND (approximat* OR clos* OR fasten* OR fixat* OR secur*)) 129
9 ((surg* OR dissect* OR excis* OR fascia* OR incis* OR intraoperat* OR operat* OR postdissect* OR postexcis* OR postincis* OR postoperat* OR postsurg* OR perioperat* OR skin OR skins OR tissue* OR wound*) AND (approximat* OR clos* OR fasten* OR fixat* OR secur*)) 508
8 "Wound Closure Techniques"[mh] 0
7 "Surgical Fixation Devices"[mh] 0
6 #5 OR #4 OR #3 OR #2 OR #1 81
5 ((surg* OR dissect* OR excis* OR fascia* OR incis* OR intraoperat* OR operat* OR postdissect* OR postexcis* OR postincis* OR postoperat* OR postsurg* OR perioperat* OR skin OR skins OR tissue* OR wound*) AND (ligat* OR loop* OR thread*)) 22
4 stitch* 1
3 sutur* 55
2 "Suture Techniques"[mh] 10

1 "Sutures"[mh] 15

Search note: It is not possible to search on terms containing less than three characters in the HTA Database. The following terms were therefore not included in the search strategy:

- "ch-3565"
- "ch-3565r"
- "ch-3565tm"
- "dp-300"
- "dp-300r"
- "dp-300tm"
- "fat-80"
- "222-182-2"
- "3380-34-5"
- "4640-01-1"
- "pds-ii"

A.9: Source: Econlit

Interface / URL: OvidSP
Database coverage dates: 1886 to January 21,2021
Search date: 03/02/21
Retrieved records: 0
Search strategy:

1 sutur$.af. (7)
2 stitch$.af. (45)
3 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) and (ligat$ or loop$ or thread$)).af. (303)
4 or/1-3 (354)
5 ((surg$ or dissect$ or excis$ or fascia$ or incis$ or intraoperat$ or operat$ or postdissect$ or postexcis$ or postincis$ or postoperat$ or postsurg$ or perioperat$ or skin or skins or tissue$ or wound$) adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).af. (955)
6 (device$ adj6 (approximat$ or clos$ or fasten$ or fixat$ or secur$)).af. (66)
7 ((fascia$ or skin or skins or tissue$ or wound$) adj6 device$).af. (3)
8 or/5-7 (1017)
9 4 or 8 (1357)
10 triclosan$.af. (0)
11 (cgp433$ or cgp-433$ or ch3565$ or ch-3565$ or cloxifenol$ or dndi1246774$ or dndi-1246774$ or dp300$ or dp-300$ or fat-80$ or fat80$ or gp41-353$ or gp41353$ or irgacare$ or irgacide$ or irgagard$ or irgasan$ or lexol-300$ or lexol300$ or ster-zac$ or sterzac$ or tcs or tricosan$).af. (86)
12 (222-182-2 or 3380-34-5 or 4640-01-1 or 4nm5039y5x or 5174ur1dp5).af. (0)
13 or/10-12 (86)
14 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj20 (coat$ or impregnat$)).af. (0)
15 9 and (13 or 14) (0)
16 plus$ suture$.af. (0)
17 ((antibacterial$ or anti-bacterial$ or antibiotic$ or anti-biotic$ or antiinfective$ or anti-infective$ or antimicrobial$ or anti-microbial$ or antimicrobical$ or anti-microbical$ or antiseptic$ or anti-septic$ or biocid$) adj sutur$).af. (0)
18 ((pds$ or pds-ii) adj plus$).af. (0)
19 ((pds$ adj4 plus$) and sutur$).af. (0)
20 (monocryl$ adj4 plus$).af. (0)
21 (vicryl$ adj4 plus$).af. (0)
22 (pds$ or monocryl$ or vicryl$).af. and (13 or 14) (0)
23 stratafix$.af. (0)

24 tissue control device$.af. (0)
25 ((polydioxanon$ or poliglecapron$ or polyglactin$) adj3 plus$).af. (0)
26 (polydioxanon$ or poliglecapron$ or polyglactin$).af. and (13 or 14) (0)
27 or/16-26 (0)
28 15 or 27 (0)
29 limit 28 to english (0)
30 limit 29 to yr="2000 -Current" (0)

A.10: Source: Conference Proceedings Citation Index – Science (CPCI-S)
Interface / URL: Web of Science
Database coverage dates: 1990 - present
Search date: 03/02/21
Retrieved records: 50
Search strategy:

All lines: Indexes=CPCI-S

29 50 (#28) AND LANGUAGE: (English) Timespan=2000-2021
28 60 #27 OR #15
27 16 #26 OR #25 OR #24 OR #23 OR #22 OR #21 OR #20 OR #19 OR #18 OR #17 OR #16
26 0 TS=(polydioxanon* or poliglecapron* or polyglactin*) and (#13 or #14)
25 2 TS=((polydioxanon* or poliglecapron* or polyglactin*) near/3 plus*)
24 0 TS="tissue control device*"
23 0 TS=stratafix*
22 4 TS=(pds* or monocryl* or vicryl*) and (#13 or #14)
21 6 TS=(vicryl* near/4 plus*)
20 1 TS=(monocryl* near/4 plus*)
19 0 TS=((pds* near/4 plus*) and sutur*)
18 0 TS=((pds* or "pds-ii") near/0 plus*)
17 10 TS=((antibacterial* or "anti-bacterial*" or antibiotic* or "anti-biotic*" or antiinfective* or "anti-infective*" or antimicrobial* or "anti-microbial*" or antimicrobical* or "anti-microbical*" or antiseptic* or "anti-septic*" or biocid*) near/0 sutur*)
16 1 TS="plus* suture*"
15 48 #9 and (#13 or #14)
14 956 TS=((antibacterial* or "anti-bacterial*" or antibiotic* or "anti-biotic*" or antiinfective* or "anti-infective*" or antimicrobial* or "anti-microbial*" or antimicrobical* or "anti-microbical*" or antiseptic* or "anti-septic*" or biocid*) near/20 (coat* or impregnat*))
13 1,639 #12 OR #11 OR #10
12 0 TS=("222-182-2" or "3380-34-5" or "4640-01-1" or "4nm5039y5x" or "5174ur1dp5")
11 1,323 TS=(cgp433* or "cgp-433*" or ch3565* or "ch-3565*" or cloxifenol* or dndi1246774* or "dndi-1246774*" or dp300* or "dp-300*" or "fat-80" or "fat-80r" or "fat-80tm" or fat80* or "gp41-353*" or gp41353* or irgacare* or irgacide* or irgagard* or irgasan* or "lexol-300*" or lexol300* or "ster-zac*" or sterzac* or tcs or tricosan*)
10 350 TS=triclosan*
9 77,194 #8 OR #4
8 36,418 #7 OR #6 OR #5
7 1,907 TS=((fascia* or "skin" or "skins" or tissue* or wound*) near/6 device*)
6 9,777 TS=(device* near/6 (approximat* or clos* or fasten* or fixat* or secur*))
5 25,592 TS=((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or "skin" or "skins" or tissue* or wound*) near/6 (approximat* or clos* or fasten* or fixat* or secur*))
4 43,920 #3 OR #2 OR #1
3 34,066 TS=((surg* or dissect* or excis* or fascia* or incis* or intraoperat* or operat* or postdissect* or postexcis* or postincis* or postoperat* or postsurg* or perioperat* or "skin" or "skins" or tissue* or wound*) and (ligat* or loop* or thread*))
2 3,982 TS=stitch*
1 6,380 TS=sutur*

A.11: Source: Epistemonikos
Interface / URL: https://www.epistemonikos.org/en/
Database coverage dates: Information not found
Search date: 03/02/21
Retrieved records: 193
Search strategy:

The following 10 searches were conducted separately. The searches were conducted using the Advanced search interface at https://www.epistemonikos.org/en/advanced_search.

Terms were entered into the main search box. No field tags were used. From the results screen the Filter options were used to limit the results. A custom year range of 2000-2021 was applied for "Publication Year". Results were limited by "Publication type" to systematic review.

The 10 sets of results (257 in total) were downloaded and imported into an empty ENL. Records were deduplicated using EndNote default settings. 64 records were removed as duplicates. The remaining 193 records were retrieved for assessment.

Search 1: ((sutur* OR stitch*) AND (triclosan* OR cgp433* OR "cgp-433" OR "cgp-433r" OR "cgp-433tm" OR ch3565* OR "ch-3565" OR "ch-3565r" OR "ch-3565tm" OR cloxifenol* OR dndi1246774* OR "dndi-1246774" OR "dndi-1246774r" OR "dndi-1246774tm" OR dp300* OR "dp-300" OR "dp-300r" OR "dp-300tm" OR "fat-80" OR "fat-80r" OR "fat-80tm" OR fat80* OR "gp41-353" OR "gp41-353r" OR "gp41-353tm" OR gp41353* OR irgacare* OR irgacide* OR irgagard* OR irgasan* OR "lexol-300" OR "lexol-300r" OR "lexol-300tm" OR lexol300* OR "ster-zac" OR "ster-zacr" OR "ster-zactm" OR sterzac* OR tcs OR tricosan* OR "222-182-2" OR "3380-34-5" OR "4640-01-1" OR 4nm5039y5x OR 5174ur1dp5)) = 27

Search 2: (stitch* AND (antibacterial* OR "anti-bacterial" OR "anti-bacterials" OR antibiotic* OR "anti-biotic" OR "anti-biotics" OR antiinfective* OR "anti-infective" OR "anti-infectives" OR antimicrobial* OR "anti-microbial" OR "anti-microbials" OR antimicrobical* OR "anti-microbical" OR "anti-microbicals" OR antiseptic* OR "anti-septic" OR "anti-septics" OR biocid*) AND (coat* OR impregnat*)) = 0

Search 3: ((surg* OR dissect* OR excis* OR fascia* OR incis* OR intraoperat* OR operat* OR postdissect* OR postexcis* OR postincis* OR postoperat* OR postsurg* OR perioperat* OR skin* OR tissue* OR wound*) AND (ligat* OR loop* OR thread* OR approximat* OR clos* OR fasten* OR fixat* OR secur*) AND (triclosan* OR cgp433* OR "cgp-433" OR "cgp-433r" OR "cgp-433tm" OR ch3565* OR "ch-3565" OR "ch-3565r" OR "ch-3565tm" OR cloxifenol* OR dndi1246774* OR "dndi-1246774" OR "dndi-1246774r" OR "dndi-1246774tm" OR dp300* OR "dp-300" OR "dp-300r" OR "dp-300tm" OR "fat-80" OR "fat-80r" OR "fat-80tm" OR fat80* OR "gp41-353" OR "gp41-353r" OR "gp41-353tm" OR gp41353* OR irgacare* OR irgacide* OR irgagard* OR irgasan* OR "lexol-300" OR "lexol-300r" OR "lexol-300tm" OR lexol300* OR "ster-zac" OR "ster-zacr" OR "ster-zactm" OR sterzac* OR tcs OR tricosan* OR "222-182-2" OR "3380-34-5" OR "4640-01-1" OR 4nm5039y5x OR 5174ur1dp5)) = 46

Search 4: ((surg* OR dissect* OR excis* OR fascia* OR incis* OR intraoperat* OR operat* OR postdissect* OR postexcis* OR postincis* OR postoperat* OR postsurg* OR perioperat* OR skin* OR tissue* OR wound*) AND (ligat* OR loop* OR thread* OR approximat* OR clos* OR fasten* OR fixat* OR secur*) AND (antibacterial* OR "anti-bacterial" OR "anti-bacterials" OR antibiotic* OR "anti-biotic" OR "anti-biotics" OR antiinfective* OR "anti-infective" OR "anti-infectives" OR antimicrobial* OR "anti-microbial" OR "anti-microbials" OR antimicrobical* OR "anti-microbical" OR "anti-microbicals" OR antiseptic* OR "anti-septic" OR "anti-septics" OR biocid*) AND (coat* OR impregnat*)) = 41

Search 5: (device* AND (approximat* OR clos* OR fasten* OR fixat* OR secur* OR fascia* OR skin* OR tissue* OR wound*) AND (triclosan* OR cgp433* OR "cgp-433" OR "cgp-433r" OR "cgp-433tm" OR ch3565* OR "ch-3565" OR "ch-3565r" OR "ch-3565tm" OR cloxifenol* OR dndi1246774* OR "dndi-1246774" OR "dndi-1246774r" OR "dndi-1246774tm" OR dp300* OR "dp-300" OR "dp-300r" OR "dp-300tm" OR "fat-80" OR "fat-80r" OR "fat-80tm" OR fat80* OR "gp41-353" OR "gp41-353r" OR "gp41-353tm" OR gp41353* OR irgacare* OR irgacide* OR irgagard* OR irgasan* OR "lexol-300" OR "lexol-300r"

OR "lexol-300tm" OR lexol300* OR "ster-zac" OR "ster-zacr" OR "ster-zactm" OR sterzac* OR tcs OR tricosan* OR "222-182-2" OR "3380-34-5" OR "4640-01-1" OR 4nm5039y5x OR 5174ur1dp5)) = 5

Search 6: (device* AND (approximat* OR clos* OR fasten* OR fixat* OR secur* OR fascia* OR skin* OR tissue* OR wound*) AND (antibacterial* OR "anti-bacterial" OR "anti-bacterials" OR antibiotic* OR "anti-biotic" OR "anti-biotics" OR antiinfective* OR "anti-infective" OR "anti-infectives" OR antimicrobial* OR "anti-microbial" OR "anti-microbials" OR antimicrobical* OR "anti-microbical" OR "anti-microbicals" OR antiseptic* OR "anti-septic" OR "anti-septics" OR biocid*) AND (coat* OR impregnat*)) = 15

Search 7: ("plus suture" OR "plus sutures" OR "pds plus" OR "pdsii plus" OR "pds-ii plus" OR (pds* AND plus* AND suture*) OR monocryl* OR vicryl* OR stratafix* OR "tissue control device" OR "tissue control devices" OR polydioxanon* OR poliglecapron* OR polyglactin*) = 34

Search 8: (pds* AND (triclosan* OR cgp433* OR "cgp-433" OR "cgp-433r" OR "cgp-433tm" OR ch3565* OR "ch-3565" OR "ch-3565r" OR "ch-3565tm" OR cloxifenol* OR dndi1246774* OR "dndi-1246774" OR "dndi-1246774r" OR "dndi-1246774tm" OR dp300* OR "dp-300" OR "dp-300r" OR "dp-300tm" OR "fat-80" OR "fat-80r" OR "fat-80tm" OR fat80* OR "gp41-353" OR "gp41-353r" OR "gp41-353tm" OR gp41353* OR irgacare* OR irgacide* OR irgagard* OR irgasan* OR "lexol-300" OR "lexol-300r" OR "lexol-300tm" OR lexol300* OR "ster-zac" OR "ster-zacr" OR "ster-zactm" OR sterzac* OR tcs OR tricosan* OR "222-182-2" OR "3380-34-5" OR "4640-01-1" OR 4nm5039y5x OR 5174ur1dp5)) = 31

Search 9: (pds* AND (antibacterial* OR "anti-bacterial" OR "anti-bacterials" OR antibiotic* OR "anti-biotic" OR "anti-biotics" OR antiinfective* OR "anti-infective" OR "anti-infectives" OR antimicrobial* OR "anti-microbial" OR "anti-microbials" OR antimicrobical* OR "anti-microbical" OR "anti-microbicals" OR antiseptic* OR "anti-septic" OR "anti-septics" OR biocid*) AND (coat* OR impregnat*)) = 1

Search 10: ((antibacterial* OR "anti-bacterial" OR "anti-bacterials" OR antibiotic* OR "anti-biotic" OR "anti-biotics" OR antiinfective* OR "anti-infective" OR "anti-infectives" OR antimicrobial* OR "anti-microbial" OR "anti-microbials" OR antimicrobical* OR "anti-microbical" OR "anti-microbicals" OR antiseptic* OR "anti-septic" OR "anti-septics" OR biocid*) AND sutur*) = 57

A.12: Source: ClinicalTrials.gov
Interface / URL: https://clinicaltrials.gov/ct2/home
Database coverage dates: Information not found. ClinicalTrials.gov was created as a result of the Food and Drug Administration Modernization Act of 1997 (FDAMA). The site was made available to the public in February 2000.
Search date: 05/02/21 (all searches apart from 2 and 6); 08/02/21 (searches 2 and 6)
Retrieved records: 138
Search strategy:

The following 15 searches were conducted separately. All search terms were entered using the Expert search interface.

12 of the searches retrieved results. The 12 sets of results were imported into an empty EndNote library (302 records) and deduplicated using EndNote default de-duplication settings. 164 records were identified as duplicates and removed from the EndNote library. The remaining 138 records were retrieved for assessment.

Search 1. (suture OR sutures OR suturing OR sutured OR stitch OR stitches OR stitching OR stitched) AND (triclosan OR cgp433 OR cgp-433 OR ch3565 OR ch-3565 OR cloxifenol OR dndi1246774 OR dndi-1246774 OR dp300 OR dp-300 OR fat-80 OR fat80 OR gp41-353 OR gp41353 OR irgacare OR irgacide OR irgagard OR irgasan OR lexol-300 OR lexol300 OR ster-zac OR sterzac OR tcs OR tricosan OR cgp433R OR cgp-433R OR ch3565R OR ch-3565R OR cloxifenolR OR dndi1246774R OR dndi-1246774R OR dp300R OR dp-300R OR fat-80R OR fat80R OR gp41-353R OR gp41353R OR irgacareR OR irgacideR OR irgagardR OR irgasanR OR lexol-300R OR lexol300R OR ster-zacR OR sterzacR OR tricosanR OR cgp433TM OR cgp-433TM OR ch3565TM OR ch-3565TM OR cloxifenolTM OR dndi1246774TM OR dndi-1246774TM OR dp300TM OR dp-300TM OR fat-80TM OR fat80TM OR gp41-

353TM OR gp41353TM OR irgacareTM OR irgacideTM OR irgagardTM OR irgasanTM OR lexol-300TM OR lexol300TM OR ster-zacTM OR sterzacTM OR tricosanTM OR 222-182-2 OR 3380-34-5 OR 4640-01-1 OR 4nm5039y5x OR 5174ur1dp5) = 28

Search 2. (ligate OR ligates OR ligating OR ligated OR ligature OR ligatures or loop OR loops OR looping OR looped OR thread OR threads OR threading OR threaded) AND (triclosan OR cgp433 OR cgp-433 OR ch3565 OR ch-3565 OR cloxifenol OR dndi1246774 OR dndi-1246774 OR dp300 OR dp-300 OR fat-80 OR fat80 OR gp41-353 OR gp41353 OR irgacare OR irgacide OR irgagard OR irgasan OR lexol-300 OR lexol300 OR ster-zac OR sterzac OR tcs OR tricosan OR cgp433R OR cgp-433R OR ch3565R OR ch-3565R OR cloxifenolR OR dndi1246774R OR dndi-1246774R OR dp300R OR dp-300R OR fat-80R OR fat80R OR gp41-353R OR gp41353R OR irgacareR OR irgacideR OR irgagardR OR irgasanR OR lexol-300R OR lexol300R OR ster-zacR OR sterzacR OR tricosanR OR cgp433TM OR cgp-433TM OR ch3565TM OR ch-3565TM OR cloxifenolTM OR dndi1246774TM OR dndi-1246774TM OR dp300TM OR dp-300TM OR fat-80TM OR fat80TM OR gp41-353TM OR gp41353TM OR irgacareTM OR irgacideTM OR irgagardTM OR irgasanTM OR lexol-300TM OR lexol300TM OR ster-zacTM OR sterzacTM OR tricosanTM OR 222-182-2 OR 3380-34-5 OR 4640-01-1 OR 4nm5039y5x OR 5174ur1dp5) = 7

Search 3. (approximate OR approximates OR approximating OR approximated or close OR closes OR closing OR closed OR closure OR closures OR fasten OR fastens OR fastening OR fastened or fixate OR fixates OR fixating OR fixated OR fixation OR fixations or secure OR secures OR securing OR secured) AND (triclosan OR cgp433 OR cgp-433 OR ch3565 OR ch-3565 OR cloxifenol OR dndi1246774 OR dndi-1246774 OR dp300 OR dp-300 OR fat-80 OR fat80 OR gp41-353 OR gp41353 OR irgacare OR irgacide OR irgagard OR irgasan OR lexol-300 OR lexol300 OR ster-zac OR sterzac OR tcs OR tricosan OR cgp433R OR cgp-433R OR ch3565R OR ch-3565R OR cloxifenolR OR dndi1246774R OR dndi-1246774R OR dp300R OR dp-300R OR fat-80R OR fat80R OR gp41-353R OR gp41353R OR irgacareR OR irgacideR OR irgagardR OR irgasanR OR lexol-300R OR lexol300R OR ster-zacR OR sterzacR OR tricosanR OR cgp433TM OR cgp-433TM OR ch3565TM OR ch-3565TM OR cloxifenolTM OR dndi1246774TM OR dndi-1246774TM OR dp300TM OR dp-300TM OR fat-80TM OR fat80TM OR gp41-353TM OR gp41353TM OR irgacareTM OR irgacideTM OR irgagardTM OR irgasanTM OR lexol-300TM OR lexol300TM OR ster-zacTM OR sterzacTM OR tricosanTM OR 222-182-2 OR 3380-34-5 OR 4640-01-1 OR 4nm5039y5x OR 5174ur1dp5) = 65

Search 4. (fascia OR fasciae OR fascial OR skin or skins or tissue OR tissues or wound OR wounds OR woundcare) AND (device OR devices) AND (triclosan OR cgp433 OR cgp-433 OR ch3565 OR ch-3565 OR cloxifenol OR dndi1246774 OR dndi-1246774 OR dp300 OR dp-300 OR fat-80 OR fat80 OR gp41-353 OR gp41353 OR irgacare OR irgacide OR irgagard OR irgasan OR lexol-300 OR lexol300 OR ster-zac OR sterzac OR tcs OR tricosan OR cgp433R OR cgp-433R OR ch3565R OR ch-3565R OR cloxifenolR OR dndi1246774R OR dndi-1246774R OR dp300R OR dp-300R OR fat-80R OR fat80R OR gp41-353R OR gp41353R OR irgacareR OR irgacideR OR irgagardR OR irgasanR OR lexol-300R OR lexol300R OR ster-zacR OR sterzacR OR tricosanR OR cgp433TM OR cgp-433TM OR ch3565TM OR ch-3565TM OR cloxifenolTM OR dndi1246774TM OR dndi-1246774TM OR dp300TM OR dp-300TM OR fat-80TM OR fat80TM OR gp41-353TM OR gp41353TM OR irgacareTM OR irgacideTM OR irgagardTM OR irgasanTM OR lexol-300TM OR lexol300TM OR ster-zacTM OR sterzacTM OR tricosanTM OR 222-182-2 OR 3380-34-5 OR 4640-01-1 OR 4nm5039y5x OR 5174ur1dp5) = 14

Search 5. (suture OR sutures OR suturing OR sutured OR stitch OR stitches OR stitching OR stitched) AND (antibacterial OR anti-bacterial OR antibiotic OR anti-biotic OR antiinfective OR anti-infective OR antimicrobial OR anti-microbial OR antimicrobical OR anti-microbical OR antiseptic OR anti-septic OR antibacterials OR anti-bacterials OR antibiotics OR anti-biotics OR antiinfectives OR anti-infectives OR antimicrobials OR anti-microbials OR antimicrobicals OR anti-microbicals OR antiseptics OR anti-septics OR biocide OR biocides OR biocidal) AND (coat OR coats OR coating OR coated OR impregnate OR impregnates OR impregnating OR impregnated) = 48

Search 6. (ligate OR ligates OR ligating OR ligated OR ligature OR ligatures or loop OR loops OR looping OR looped OR thread OR threads OR threading OR threaded) AND (antibacterial OR anti-bacterial OR antibiotic OR anti-biotic OR antiinfective OR anti-infective OR antimicrobial OR anti-

microbial OR antimicrobical OR anti-microbical OR antiseptic OR anti-septic OR antibacterials OR anti-bacterials OR antibiotics OR anti-biotics OR antiinfectives OR anti-infectives OR antimicrobials OR anti-microbials OR antimicrobicals OR anti-microbicals OR antiseptics OR anti-septics OR biocide OR biocides OR biocidal) AND (coat OR coats OR coating OR coated OR impregnate OR impregnates OR impregnating OR impregnated) = 8

Search 7. "antibacterial suture" OR "anti-bacterial suture" OR "antibiotic suture" OR "anti-biotic suture" OR "antiinfective suture" OR "anti-infective suture" OR "antimicrobial suture" OR "anti-microbial suture" OR "antimicrobical suture" OR "anti-microbical suture" OR "antiseptic suture" OR "anti-septic suture" OR "antibacterial sutures" OR "anti-bacterial sutures" OR "antibiotic sutures" OR "anti-biotic sutures" OR "antiinfective sutures" OR "anti-infective sutures" OR "antimicrobial sutures" OR "anti-microbial sutures" OR "antimicrobical sutures" OR "anti-microbical sutures" OR "antiseptic sutures" OR "anti-septic sutures" OR "antibacterial suturing" OR "anti-bacterial suturing" OR "antibiotic suturing" OR "anti-biotic suturing" OR "antiinfective suturing" OR "anti-infective suturing" OR "antimicrobial suturing" OR "anti-microbial suturing" OR "antimicrobical suturing" OR "anti-microbical suturing" OR "antiseptic suturing" OR "anti-septic suturing" OR "antibacterial sutured" OR "anti-bacterial sutured" OR "antibiotic sutured" OR "anti-biotic sutured" OR "antiinfective sutured" OR "anti-infective sutured" OR "antimicrobial sutured" OR "anti-microbial sutured" OR "antimicrobical sutured" OR "anti-microbical sutured" OR "antiseptic sutured" OR "anti-septic sutured" = 10

Search 8. ("biocide suture" OR "biocide sutures" OR "biocide suturing" OR "biocide sutured" OR "biocidal suture" OR "biocidal sutures" OR "biocidal suturing" OR "biocidal sutured") = 0

Search 9. "plus suture" OR plus sutures" OR "plusTM suture" OR plusTM sutures" OR "plusR suture" OR plusR sutures" OR "plus sutureTM" OR plus suturesTM" OR "plus sutureR" OR "plus suturesR" OR "pds plus" OR "pds plusTM" OR "pds plusR" OR "pdsii plus" OR "pdsii plusTM" OR "pdsii plusR" OR "pds-ii plus" OR "pds-ii plusTM" OR "pds-ii plusR" OR "monocryl plus" OR "monocryl plusTM" OR "monocryl plusR" OR "vicryl plus" OR "vicryl plusTM" OR "vicryl plusR" OR stratafix OR stratafixTM OR stratafixR OR "tissue control device" OR "tissue control devices" = 52

Search 10. (pds OR pdsii OR pds-ii OR pdsTM OR pdsiiTM OR pds-iiTM OR pdsR OR pdsiiR OR pds-iiR OR monocryl OR monocrylTM OR monocrylR OR vicryl OR vicrylTM OR vicrylR) AND (triclosan OR cgp433 OR cgp-433 OR ch3565 OR ch-3565 OR cloxifenol OR dndi1246774 OR dndi-1246774 OR dp300 OR dp-300 OR fat-80 OR fat80 OR gp41-353 OR gp41353 OR irgacare OR irgacide OR irgagard OR irgasan OR lexol-300 OR lexol300 OR ster-zac OR sterzac OR tcs OR tricosan OR cgp433R OR cgp-433R OR ch3565R OR ch-3565R OR cloxifenolR OR dndi1246774R OR dndi-1246774R OR dp300R OR dp-300R OR fat-80R OR fat80R OR gp41-353R OR gp41353R OR irgacareR OR irgacideR OR irgagardR OR irgasanR OR lexol-300R OR lexol300R OR ster-zacR OR sterzacR OR tricosanR OR cgp433TM OR cgp-433TM OR ch3565TM OR ch-3565TM OR cloxifenolTM OR dndi1246774TM OR dndi-1246774TM OR dp300TM OR dp-300TM OR fat-80TM OR fat80TM OR gp41-353TM OR gp41353TM OR irgacareTM OR irgacideTM OR irgagardTM OR irgasanTM OR lexol-300TM OR lexol300TM OR ster-zacTM OR sterzacTM OR tricosanTM OR 222-182-2 OR 3380-34-5 OR 4640-01-1 OR 4nm5039y5x OR 5174ur1dp5) = 21

Search 11. (pds OR pdsii OR pds-ii OR pdsTM OR pdsiiTM OR pds-iiTM OR pdsR OR pdsiiR OR pds-iiR OR monocryl OR monocrylTM OR monocrylR OR vicryl OR vicrylTM OR vicrylR) AND (antibacterial OR anti-bacterial OR antibiotic OR anti-biotic OR antiinfective OR anti-infective OR antimicrobial OR anti-microbial OR antimicrobical OR anti-microbical OR antiseptic OR anti-septic OR antibacterials OR anti-bacterials OR antibiotics OR anti-biotics OR antiinfectives OR anti-infectives OR antimicrobials OR anti-microbials OR antimicrobicals OR anti-microbicals OR antiseptics OR anti-septics OR biocide OR biocides OR biocidal) AND (coat OR coats OR coating OR coated OR impregnate OR impregnates OR impregnating OR impregnated) = 25

Search 12. ("polydioxanon plus" OR "polydioxanone plus" OR "poliglecapron plus" OR "poliglecaprone plus" OR "polyglactin plus" OR "polyglactine plus" OR "polydioxanon plusTM" OR "polydioxanone plusTM" OR "poliglecapron plusTM" OR "poliglecaprone plusTM" OR "polyglactin plusTM" OR

"polyglactine plusTM" OR "polydioxanon plusR" OR "polydioxanone plusR" OR "poliglecapron plusR" OR "poliglecaprone plusR" OR "polyglactin plusR" OR "polyglactine plusR") = 0

Search 13. ("poliglecapron 25 plus" OR "poliglecaprone 25 plus" OR "polyglactin 910 plus" OR "polyglactine 910 plus" OR "poliglecapron 25 plusTM" OR "poliglecaprone 25 plusTM" OR "polyglactin 910 plusTM" OR "polyglactine 910 plusTM" OR "poliglecapron 25 plusR" OR "poliglecaprone 25 plusR" OR "polyglactin 910 plusR" OR "polyglactine 910 plusR") = 0

Search 14. (polydioxanon OR polydioxanone OR poliglecapron OR poliglecaprone OR polyglactin OR polyglactine) AND (triclosan OR cgp433 OR cgp-433 OR ch3565 OR ch-3565 OR cloxifenol OR dndi1246774 OR dndi-1246774 OR dp300 OR dp-300 OR fat-80 OR fat80 OR gp41-353 OR gp41353 OR irgacare OR irgacide OR irgagard OR irgasan OR lexol-300 OR lexol300 OR ster-zac OR sterzac OR tcs OR tricosan OR cgp433R OR cgp-433R OR ch3565R OR ch-3565R OR cloxifenolR OR dndi1246774R OR dndi-1246774R OR dp300R OR dp-300R OR fat-80R OR fat80R OR gp41-353R OR gp41353R OR irgacareR OR irgacideR OR irgagardR OR irgasanR OR lexol-300R OR lexol300R OR ster-zacR OR sterzacR OR tricosanR OR cgp433TM OR cgp-433TM OR ch3565TM OR ch-3565TM OR cloxifenolTM OR dndi1246774TM OR dndi-1246774TM OR dp300TM OR dp-300TM OR fat-80TM OR fat80TM OR gp41-353TM OR gp41353TM OR irgacareTM OR irgacideTM OR irgagardTM OR irgasanTM OR lexol-300TM OR lexol300TM OR ster-zacTM OR sterzacTM OR tricosanTM OR 222-182-2 OR 3380-34-5 OR 4640-01-1 OR 4nm5039y5x OR 5174ur1dp5) = 12

Search 15. (polydioxanon OR polydioxanone OR poliglecapron OR poliglecaprone OR polyglactin OR polyglactine) AND (antibacterial OR anti-bacterial OR antibiotic OR anti-biotic OR antiinfective OR anti-infective OR antimicrobial OR anti-microbial OR antimicrobical OR anti-microbical OR antiseptic OR anti-septic OR antibacterials OR anti-bacterials OR antibiotics OR anti-biotics OR antiinfectives OR anti-infectives OR antimicrobials OR anti-microbials OR antimicrobicals OR anti-microbicals OR antiseptics OR anti-septics OR biocide OR biocides OR biocidal) AND (coat OR coats OR coating OR coated OR impregnate OR impregnates OR impregnating OR impregnated) = 12

Search note: ClinicalTrials.gov has relatively limited search functionality compared to Ovid MEDLINE. Basic and more advanced functionality such as truncation or proximity operators is not available. In the context of this functionality, attempting to translate the element of the MEDLINE strategy that combined non-specific wound closure terms with non-specific antibacterial coating terms for ClinicalTrials.gov was judged to be an inefficient search approach. In this context it was felt appropriate to focus the ClinicalTrials.gov search on retrieval of records that included terms known to be found in database records for relevant studies.

A.13: Source: WHO International Clinical Trials Registry Portal (ICTRP)
Interface / URL: http://apps.who.int/trialsearch/Default.aspx
Database coverage dates: Information not found. Data sets from data providers are updated every Friday evening according to a schedule. On the date of search, files had been imported from data providers between January 2021 and February 2021.
Search date: 05/02/21
Retrieved records: 84
Search strategy:

The following 31 searches were conducted separately using the search interface at: https://apps.who.int/trialsearch/

For all searches 'Without synonyms' was selected.

The search help page ('Search Tips') was not accessible on the day of search.

16 of the searches retrieved results. The 16 sets of results were imported into an empty EndNote Library (175 records) and deduplicated using Endnote default settings. 91 results were identified as duplicates and removed from the Endnote library. The remaining 84 results were retrieved for assessment.

Search 1. sutur* AND triclosan* OR stitch* AND triclosan* OR ligat* AND triclosan* OR loop* AND triclosan* OR thread* AND triclosan* OR sutur* AND tcs OR stitch* AND tcs OR ligat* AND tcs OR loop* AND tcs OR thread* AND tcs = 32 (33 records for 32 trials found)

Search 2. approximat* AND triclosan* OR clos* AND triclosan* OR fasten* AND triclosan* OR fixat* AND triclosan* OR secur* AND triclosan* OR approximat* AND tcs OR clos* AND tcs OR fasten* AND tcs OR fixat* AND tcs OR secur* AND tcs = 14 records for 14 trials found

Search 3. device* AND triclosan* OR device* AND tcs = 3 records for 3 trials found

Search 4. cgp433* OR cgp-433* OR ch3565* OR ch-3565* OR cloxifenol* OR dndi1246774* OR dndi-1246774* OR dp300* OR dp-300* OR fat-80* OR fat80* OR gp41-353* OR gp41353* OR irgacare* OR irgacide* OR irgagard* OR irgasan* OR lexol-300* OR lexol300* OR ster-zac* OR sterzac* OR tricosan* OR 222-182-2 OR 3380-34-5 OR 4640-01-1 OR 4nm5039y5x OR 5174ur1dp5 = 8 records for 8 trials found

Search 5. sutur* AND antibacterial* AND coat* OR sutur* AND anti-bacterial* AND coat* OR sutur* AND antibiotic* AND coat* OR sutur* AND anti-biotic* AND coat* OR sutur* AND antiinfective* AND coat* OR sutur* AND anti-infective* AND coat* OR sutur* AND antimicrobial* AND coat* OR sutur* AND anti-microbial* AND coat* OR sutur* AND antimicrobical* AND coat* OR sutur* AND anti-microbical* AND coat* OR sutur* AND antiseptic* AND coat* OR sutur* AND anti-septic* AND coat* OR sutur* AND biocid* AND coat* = 16 records for 16 trials found

Search 6. sutur* AND antibacterial* AND impregnat* OR sutur* AND anti-bacterial* AND impregnat* OR sutur* AND antibiotic* AND impregnat* OR sutur* AND anti-biotic* AND impregnat* OR sutur* AND antiinfective* AND impregnat* OR sutur* AND anti-infective* AND impregnat* OR sutur* AND antimicrobial* AND impregnat* OR sutur* AND anti-microbial* AND impregnat* OR sutur* AND antimicrobical* AND impregnat* OR sutur* AND anti-microbical* AND impregnat* OR sutur* AND antiseptic* AND impregnat* OR sutur* AND anti-septic* AND impregnat* OR sutur* AND biocid* AND impregnat* = 4 records for 4 trials found

Search 7. stitch* AND antibacterial* AND coat* OR stitch* AND anti-bacterial* AND coat* OR stitch* AND antibiotic* AND coat* OR stitch* AND anti-biotic* AND coat* OR stitch* AND antiinfective* AND coat* OR stitch* AND anti-infective* AND coat* OR stitch* AND antimicrobial* AND coat* OR stitch* AND anti-microbial* AND coat* OR stitch* AND antimicrobical* AND coat* OR stitch* AND anti-microbical* AND coat* OR stitch* AND antiseptic* AND coat* OR stitch* AND anti-septic* AND coat* OR stitch* AND biocid* AND coat* = 1 trial found

Search 8. stitch* AND antibacterial* AND impregnat* OR stitch* AND anti-bacterial* AND impregnat* OR stitch* AND antibiotic* AND impregnat* OR stitch* AND anti-biotic* AND impregnat* OR stitch* AND antiinfective* AND impregnat* OR stitch* AND anti-infective* AND impregnat* OR stitch* AND antimicrobial* AND impregnat* OR stitch* AND anti-microbial* AND impregnat* OR stitch* AND antimicrobical* AND impregnat* OR stitch* AND anti-microbical* AND impregnat* OR stitch* AND antiseptic* AND impregnat* OR stitch* AND anti-septic* AND impregnat* OR stitch* AND biocid* AND impregnat* = 0

Search 9. ligat* AND antibacterial* AND coat* OR ligat* AND anti-bacterial* AND coat* OR ligat* AND antibiotic* AND coat* OR ligat* AND anti-biotic* AND coat* OR ligat* AND antiinfective* AND coat* OR ligat* AND anti-infective* AND coat* OR ligat* AND antimicrobial* AND coat* OR ligat* AND anti-microbial* AND coat* OR ligat* AND antimicrobical* AND coat* OR ligat* AND anti-microbical* AND coat* OR ligat* AND antiseptic* AND coat* OR ligat* AND anti-septic* AND coat* OR ligat* AND biocid* AND coat* = 0

Search 10. ligat* AND antibacterial* AND impregnat* OR ligat* AND anti-bacterial* AND impregnat* OR ligat* AND antibiotic* AND impregnat* OR ligat* AND anti-biotic* AND impregnat* OR ligat* AND antiinfective* AND impregnat* OR ligat* AND anti-infective* AND impregnat* OR ligat* AND antimicrobial* AND impregnat* OR ligat* AND anti-microbial* AND impregnat* OR ligat* AND antimicrobical* AND impregnat* OR ligat* AND anti-microbical* AND impregnat* OR ligat* AND antiseptic* AND impregnat* OR ligat* AND anti-septic* AND impregnat* OR ligat* AND biocid* AND impregnat* = 0

Search 11. loop* AND antibacterial* AND coat* OR loop* AND anti-bacterial* AND coat* OR loop* AND antibiotic* AND coat* OR loop* AND anti-biotic* AND coat* OR loop* AND antiinfective* AND coat* OR loop* AND anti-infective* AND coat* OR loop* AND antimicrobial* AND coat* OR loop* AND anti-microbial* AND coat* OR loop* AND antimicrobical* AND coat* OR loop* AND anti-microbical* AND coat* OR loop* AND antiseptic* AND coat* OR loop* AND anti-septic* AND coat* OR loop* AND biocid* AND coat* = 0

Search 12. loop* AND antibacterial* AND impregnat* OR loop* AND anti-bacterial* AND impregnat* OR loop* AND antibiotic* AND impregnat* OR loop* AND anti-biotic* AND impregnat* OR loop* AND antiinfective* AND impregnat* OR loop* AND anti-infective* AND impregnat* OR loop* AND antimicrobial* AND impregnat* OR loop* AND anti-microbial* AND impregnat* OR loop* AND antimicrobical* AND impregnat* OR loop* AND anti-microbical* AND impregnat* OR loop* AND antiseptic* AND impregnat* OR loop* AND anti-septic* AND impregnat* OR loop* AND biocid* AND impregnat* = 0

Search 13. thread* AND antibacterial* AND coat* OR thread* AND anti-bacterial* AND coat* OR thread* AND antibiotic* AND coat* OR thread* AND anti-biotic* AND coat* OR thread* AND antiinfective* AND coat* OR thread* AND anti-infective* AND coat* OR thread* AND antimicrobial* AND coat* OR thread* AND anti-microbial* AND coat* OR thread* AND antimicrobical* AND coat* OR thread* AND anti-microbical* AND coat* OR thread* AND antiseptic* AND coat* OR thread* AND anti-septic* AND coat* OR thread* AND biocid* AND coat* = 0

Search 14. thread* AND antibacterial* AND impregnat* OR thread* AND anti-bacterial* AND impregnat* OR thread* AND antibiotic* AND impregnat* OR thread* AND anti-biotic* AND impregnat* OR thread* AND antiinfective* AND impregnat* OR thread* AND anti-infective* AND impregnat* OR thread* AND antimicrobial* AND impregnat* OR thread* AND anti-microbial* AND impregnat* OR thread* AND antimicrobical* AND impregnat* OR thread* AND anti-microbical* AND impregnat* OR thread* AND antiseptic* AND impregnat* OR thread* AND anti-septic* AND impregnat* OR thread* AND biocid* AND impregnat* = 1 trial found

Search 15. antibacterial sutur* OR anti-bacterial sutur* OR antibiotic sutur* OR anti-biotic sutur* OR antiinfective sutur* OR anti-infective sutur* OR antimicrobial sutur* OR anti-microbial sutur* OR antimicrobical sutur* OR anti-microbical sutur* OR antiseptic sutur* OR anti-septic sutur* OR biocide sutur* OR biocidal sutur* = 14 records for 14 trials found

Search 16. plus suture* OR plusTM suture* OR plusR suture* OR pds plus* OR pdsii plus* OR pds-ii plus* OR monocryl plus* OR vicryl plus* OR stratafix* OR tissue control device* = 47 records for 46 trials found

Search 17. pds* AND triclosan* OR pds* AND tcs OR monocryl* AND triclosan* OR monocryl* AND tcs OR vicryl* AND triclosan* OR vicryl* AND tcs = 19 records for 18 trials found

Search 18. pds* AND antibacterial* AND coat* OR pds* AND anti-bacterial* AND coat* OR pds* AND antibiotic* AND coat* OR pds* AND anti-biotic* AND coat* OR pds* AND antiinfective* AND coat* OR pds* AND anti-infective* AND coat* OR pds* AND antimicrobial* AND coat* OR pds* AND anti-microbial* AND coat* OR pds* AND antimicrobical* AND coat* OR pds* AND anti-microbical* AND coat* OR pds* AND antiseptic* AND coat* OR pds* AND anti-septic* AND coat* OR pds* AND biocid* AND coat* = 2 records for 2 trials found

Search 19. monocryl* AND antibacterial* AND coat* OR monocryl* AND anti-bacterial* AND coat* OR monocryl* AND antibiotic* AND coat* OR monocryl* AND anti-biotic* AND coat* OR monocryl* AND antiinfective* AND coat* OR monocryl* AND anti-infective* AND coat* OR monocryl* AND antimicrobial* AND coat* OR monocryl* AND anti-microbial* AND coat* OR monocryl* AND antimicrobical* AND coat* OR monocryl* AND anti-microbical* AND coat* OR monocryl* AND antiseptic* AND coat* OR monocryl* AND anti-septic* AND coat* OR monocryl* AND biocid* AND coat* = 2 records for 2 trials found

Search 20. vicryl* AND antibacterial* AND coat* OR vicryl* AND anti-bacterial* AND coat* OR vicryl* AND antibiotic* AND coat* OR vicryl* AND anti-biotic* AND coat* OR vicryl* AND antiinfective* AND coat* OR vicryl* AND anti-infective* AND coat* OR vicryl* AND antimicrobial* AND coat* OR vicryl* AND anti-

microbial* AND coat* OR vicryl* AND antimicrobical* AND coat* OR vicryl* AND anti-microbical* AND coat* OR vicryl* AND antiseptic* AND coat* OR vicryl* AND anti-septic* AND coat* OR vicryl* AND biocid* AND coat* = 9 records for 9 trials found

Search 21. pds* AND antibacterial* AND impregnat* OR pds* AND anti-bacterial* AND impregnat* OR pds* AND antibiotic* AND impregnat* OR pds* AND anti-biotic* AND impregnat* OR pds* AND antiinfective* AND impregnat* OR pds* AND anti-infective* AND impregnat* OR pds* AND antimicrobial* AND impregnat* OR pds* AND anti-microbial* AND impregnat* OR pds* AND antimicrobical* AND impregnat* OR pds* AND anti-microbical* AND impregnat* OR pds* AND antiseptic* AND impregnat* OR pds* AND anti-septic* AND impregnat* OR pds* AND biocid* AND impregnat* = 0

Search 22. monocryl* AND antibacterial* AND impregnat* OR monocryl* AND anti-bacterial* AND impregnat* OR monocryl* AND antibiotic* AND impregnat* OR monocryl* AND anti-biotic* AND impregnat* OR monocryl* AND antiinfective* AND impregnat* OR monocryl* AND anti-infective* AND impregnat* OR monocryl* AND antimicrobial* AND impregnat* OR monocryl* AND anti-microbial* AND impregnat* OR monocryl* AND antimicrobical* AND impregnat* OR monocryl* AND anti-microbical* AND impregnat* OR monocryl* AND antiseptic* AND impregnat* OR monocryl* AND anti-septic* AND impregnat* OR monocryl* AND biocid* AND impregnat* = 0

Search 23. vicryl* AND antibacterial* AND impregnat* OR vicryl* AND anti-bacterial* AND impregnat* OR vicryl* AND antibiotic* AND impregnat* OR vicryl* AND anti-biotic* AND impregnat* OR vicryl* AND antiinfective* AND impregnat* OR vicryl* AND anti-infective* AND impregnat* OR vicryl* AND antimicrobial* AND impregnat* OR vicryl* AND anti-microbial* AND impregnat* OR vicryl* AND antimicrobical* AND impregnat* OR vicryl* AND anti-microbical* AND impregnat* OR vicryl* AND antiseptic* AND impregnat* OR vicryl* AND anti-septic* AND impregnat* OR vicryl* AND biocid* AND impregnat* = 0

Search 24. polydioxanon plus* OR polydioxanone plus* OR poliglecapron plus* OR poliglecaprone plus* OR polyglactin plus* OR polyglactine plus* OR poliglecapron 25 plus* OR poliglecaprone 25 plus* OR polyglactin 910 plus* OR polyglactine 910 plus* = 0

Search 25. polydioxanon* AND triclosan* OR polydioxanon* AND tcs OR poliglecapron* AND triclosan* OR poliglecapron* AND tcs OR poliglecapron* AND triclosan* OR poliglecapron* AND tcs = 1 trial found

Search 26. polydioxanon* AND antibacterial* AND coat* OR polydioxanon* AND anti-bacterial* AND coat* OR polydioxanon* AND antibiotic* AND coat* OR polydioxanon* AND anti-biotic* AND coat* OR polydioxanon* AND antiinfective* AND coat* OR polydioxanon* AND anti-infective* AND coat* OR polydioxanon* AND antimicrobial* AND coat* OR polydioxanon* AND anti-microbial* AND coat* OR polydioxanon* AND antimicrobical* AND coat* OR polydioxanon* AND anti-microbical* AND coat* OR polydioxanon* AND antiseptic* AND coat* OR polydioxanon* AND anti-septic* AND coat* OR polydioxanon* AND biocid* AND coat* = 0

Search 27. poliglecapron* AND antibacterial* AND coat* OR poliglecapron* AND anti-bacterial* AND coat* OR poliglecapron* AND antibiotic* AND coat* OR poliglecapron* AND anti-biotic* AND coat* OR poliglecapron* AND antiinfective* AND coat* OR poliglecapron* AND anti-infective* AND coat* OR poliglecapron* AND antimicrobial* AND coat* OR poliglecapron* AND anti-microbial* AND coat* OR poliglecapron* AND antimicrobical* AND coat* OR poliglecapron* AND anti-microbical* AND coat* OR poliglecapron* AND antiseptic* AND coat* OR poliglecapron* AND anti-septic* AND coat* OR poliglecapron* AND biocid* AND coat* = 0

Search 28. polyglactin* AND antibacterial* AND coat* OR polyglactin* AND anti-bacterial* AND coat* OR polyglactin* AND antibiotic* AND coat* OR polyglactin* AND anti-biotic* AND coat* OR polyglactin* AND antiinfective* AND coat* OR polyglactin* AND anti-infective* AND coat* OR polyglactin* AND antimicrobial* AND coat* OR polyglactin* AND anti-microbial* AND coat* OR polyglactin* AND antimicrobical* AND coat* OR polyglactin* AND anti-microbical* AND coat* OR polyglactin* AND antiseptic* AND coat* OR polyglactin* AND anti-septic* AND coat* OR polyglactin* AND biocid* AND coat* = 4 records for 4 trials found

Search 29. polydioxanon* AND antibacterial* AND impregnat* OR polydioxanon* AND anti-bacterial* AND impregnat* OR polydioxanon* AND antibiotic* AND impregnat* OR polydioxanon* AND anti-biotic* AND impregnat* OR polydioxanon* AND antiinfective* AND impregnat* OR polydioxanon* AND anti-infective* AND impregnat* OR polydioxanon* AND antimicrobial* AND impregnat* OR polydioxanon* AND anti-microbial* AND impregnat* OR polydioxanon* AND antimicrobical* AND impregnat* OR polydioxanon* AND anti-microbical* AND impregnat* OR polydioxanon* AND antiseptic* AND impregnat* OR polydioxanon* AND anti-septic* AND impregnat* OR polydioxanon* AND biocid* AND impregnat* = 0

Search 30. poliglecapron* AND antibacterial* AND impregnat* OR poliglecapron* AND anti-bacterial* AND impregnat* OR poliglecapron* AND antibiotic* AND impregnat* OR poliglecapron* AND anti-biotic* AND impregnat* OR poliglecapron* AND antiinfective* AND impregnat* OR poliglecapron* AND anti-infective* AND impregnat* OR poliglecapron* AND antimicrobial* AND impregnat* OR poliglecapron* AND anti-microbial* AND impregnat* OR poliglecapron* AND antimicrobical* AND impregnat* OR poliglecapron* AND anti-microbical* AND impregnat* OR poliglecapron* AND antiseptic* AND impregnat* OR poliglecapron* AND anti-septic* AND impregnat* OR poliglecapron* AND biocid* AND impregnat* = 0

Search 31. polyglactin* AND antibacterial* AND impregnat* OR polyglactin* AND anti-bacterial* AND impregnat* OR polyglactin* AND antibiotic* AND impregnat* OR polyglactin* AND anti-biotic* AND impregnat* OR polyglactin* AND antiinfective* AND impregnat* OR polyglactin* AND anti-infective* AND impregnat* OR polyglactin* AND antimicrobial* AND impregnat* OR polyglactin* AND anti-microbial* AND impregnat* OR polyglactin* AND antimicrobical* AND impregnat* OR polyglactin* AND anti-microbical* AND impregnat* OR polyglactin* AND antiseptic* AND impregnat* OR polyglactin* AND anti-septic* AND impregnat* OR polyglactin* AND biocid* AND impregnat* = 0

Search note: ICTRP has relatively limited search functionality compared to Ovid MEDLINE. Basic and more advanced functionality such as proximity operators or grouping sets of terms using parentheses is not available. In the context of this functionality, attempting to translate the element of the MEDLINE strategy that combined non-specific wound closure terms with non-specific antibacterial coating terms for ICTRP was judged to be an inefficient search approach. In this context it was felt appropriate to focus the ICTRP search on retrieval of records that included terms known to be found in database records for relevant studies.

A.14: Source: National Institute for Health Research (NIHR) Be Part of Research
Interface / URL: https://bepartofresearch.nihr.ac.uk/
Database coverage dates: Information not found
Search date: 05/02/21
Retrieved records: 0
Search strategy:

No search help pages were identified. Test searches indicated that:
- Boolean OR is supported
- Boolean AND is supported
- Truncation using * is supported

The following 16 searches were conducted separately. Returned results were screening by the Information Specialist for relevance to the eligible interventions. Potentially relevant studies were retrieved for further consideration.

Search 1. triclosan* = 0 returned

Search 2. cgp433* OR cgp-433* OR ch3565* OR ch-3565* = 0 returned

Search 3. cloxifenol* OR dndi1246774* OR dndi-1246774* = 0 returned

Search 4. dp300* OR dp-300* OR fat-80* OR fat80* OR gp41-353* OR gp41353* = 0 returned

Search 5. irgacare* OR irgacide* OR irgagard* OR irgasan* = 0 returned

Search 6. lexol-300* OR lexol300* OR ster-zac* OR sterzac* = 0 returned

Search 7. tcs OR tricosan* = 0 returned

Search 8. 222-182-2 OR 3380-34-5 OR 4640-01-1 = 0 returned

Search 9. 4nm5039y5x OR 5174ur1dp5 = 0 returned

Search 10. coat* = 22 returned, 0 retrieved

Search 11. impregnat* = 1 returned, 0 retrieved

Search 12. sutur* = 11 returned, 0 retrieved

Search 13. pds* = 2 returned, 0 retrieved

Search 14. monocryl* OR vicryl* OR stratafix* = 0 returned

Search 15. tissue control device* = 2 returned, 0 retrieved

Search 16. polydioxanon* OR poliglecapron* OR polyglactin* = 0 returned

0 records were retrieved for further consideration

A.15: Source: IDEAS
Interface / URL: https://ideas.repec.org/
Database coverage dates: Information not found
Search date: 08/02/21
Retrieved records: 0
Search strategy:

No help pages were found with detailed information on search functionality. Test searches indicated that:

- truncation and Boolean OR are not supported
- Boolean AND is automatically inserted between search terms
- phrase searches using "" are supported

The following searches were conducted separately. Returned results were screening by the Information Specialist for relevance to the eligible interventions. Potentially relevant studies were checked against results retrieved already via other search sources – duplicates were excluded. Remaining relevant results were retrieved for further consideration.

triclosan = 0 retrieved (12 returned)
cgp433 = 0 returned
"cgp-433" = 0 returned
ch3565 = 0 returned
"ch-3565" = 0 returned
cloxifenol = 0 returned
dndi1246774 = 0 returned
"dndi-1246774" = 0 returned
dp300 = 0 returned
"dp-300" = 0 returned
"fat-80" = 0 returned
fat80 = 0 returned
"gp41-353" = 0 returned
gp41353 = 0 returned

irgacare = 0 returned
irgacide = 0 returned
irgagard = 0 returned
irgasan = 0 returned
"lexol-300" = 0 returned
lexol300 = 0 returned
"ster-zac" = 0 returned
sterzac = 0 returned
tricosan = 0 returned
cgp433r = 0 returned
"cgp-433r" = 0 returned
ch3565r = 0 returned
"ch-3565r" = 0 returned
cloxifenolr = 0 returned
dndi1246774r = 0 returned
"dndi-1246774r" = 0 returned
dp300r = 0 returned
"dp-300r" = 0 returned
"fat-80r" = 0 returned
fat80r = 0 returned
"gp41-353r" = 0 returned
gp41353r = 0 returned
irgacarer = 0 returned
irgacider = 0 returned
irgagardr = 0 returned
irgasanr = 0 returned
"lexol-300r" = 0 returned
lexol300r = 0 returned
"ster-zacr" = 0 returned
sterzacr = 0 returned
tricosanr = 0 returned
cgp433tm = 0 returned
"cgp-433tm" = 0 returned
ch3565tm = 0 returned
"ch-3565tm" = 0 returned
cloxifenoltm = 0 returned
dndi1246774tm = 0 returned
"dndi-1246774tm" = 0 returned
dp300tm = 0 returned
"dp-300tm" = 0 returned
"fat-80tm" = 0 returned
fat80tm = 0 returned
"gp41-353tm" = 0 returned
gp41353tm = 0 returned
irgacaretm = 0 returned
irgacidetm = 0 returned
irgagardtm = 0 returned
irgasantm = 0 returned
"lexol-300tm" = 0 returned
lexol300tm = 0 returned
"ster-zactm" = 0 returned
sterzactm = 0 returned
tricosantm = 0 returned
"222-182-2" = 0 returned
"3380-34-5" = 0 returned
"4640-01-1" = 0 returned
4nm5039y5x = 0 returned

5174ur1dp5 = 0 returned
tcs suture = 0 returned
tcs sutures = 0 returned
tcs suturing = 0 returned
tcs stitch = 0 returned
tcs stitches = 0 returned
tcs stitching = 0 returned
tcs loop = 0 retrieved (3 returned)
tcs loops = 0 retrieved (1 returned)
tcs looping = 0 retrieved (2 returned)
tcs looped = 0 returned
tcs thread = 0 returned
tcs threads = 0 returned
tcs threading = 0 returned
tcs threaded = 0 returned
suture coat = 0 returned
suture coats = 0 returned
suture coating = 0 retrieved (1 returned)
suture coated = 0 retrieved (1 returned)
suture impregnate = 0 returned
suture impregnates = 0 returned
suture impregnating = 0 returned
suture impregnated = 0 returned
sutures coat = 0 returned
sutures coats = 0 returned
sutures coating = 0 returned
sutures coated = 0 returned
sutures impregnate = 0 returned
sutures impregnates = 0 returned
sutures impregnating = 0 returned
sutures impregnated = 0 returned
suturing coat = 0 returned
suturing coats = 0 returned
suturing coating = 0 returned
suturing coated = 0 returned
suturing impregnate = 0 returned
suturing impregnates = 0 returned
suturing impregnating = 0 returned
suturing impregnated = 0 returned
sutured = 0 retrieved (7 returned)
stitch coat = 0 returned
stitch coats = 0 returned
stitch coating = 0 retrieved (2 returned)
stitch coated = 0 returned
stitch impregnate = 0 returned
stitch impregnates = 0 returned
stitch impregnating = 0 returned
stitch impregnated = 0 returned
stitches coat = 0 returned
stitches coats = 0 returned
stitches coating = 0 returned
stitches coated = 0 returned
stitches impregnate = 0 returned
stitches impregnates = 0 returned
stitches impregnating = 0 returned
stitches impregnated = 0 returned
stitching coat = 0 returned

stitching coats = 0 returned
stitching coating = 0 returned
stitching coated = 0 returned
stitching impregnate = 0 returned
stitching impregnates = 0 returned
stitching impregnating = 0 returned
stitching impregnated = 0 returned
stitched = 0 retrieved (36 returned)
ligate = 0 returned
ligates = 0 returned
ligating = 0 retrieved (3 returned)
ligated = 0 retrieved (5 returned)
ligature = 0 retrieved (4 returned)
ligatures = 0 retrieved (5 returned)
loop coat = 0 retrieved (1 returned)
loop coats = 0 returned
loop coating = 0 retrieved (4 returned)
loop coated = 0 retrieved (2 returned)
loop impregnate = 0 returned
loop impregnates = 0 returned
loop impregnating = 0 returned
loop impregnated = 0 returned
loops coat = 0 returned
loops coats = 0 returned
loops coating = 0 retrieved (2 returned)
loops coated = 0 retrieved (1 returned)
loops impregnate = 0 returned
loops impregnates = 0 returned
loops impregnating = 0 returned
loops impregnated = 0 returned
looping coat = 0 returned
looping coats = 0 returned
looping coating = 0 retrieved (3 returned)
looping coated = 0 retrieved (2 returned)
looping impregnate = 0 returned
looping impregnates = 0 returned
looping impregnating = 0 returned
looping impregnated = 0 retrieved (6 returned)
looped coat = 0 returned
looped coats = 0 returned
looped coating = 0 returned
looped coated = 0 returned
looped impregnate = 0 returned
looped impregnates = 0 returned
looped impregnating = 0 returned
looped impregnated = = 0 returned
thread coat = 0 returned
thread coats = 0 retrieved (5 returned)
thread coating = 0 retrieved (2 returned)
thread coated = 0 returned
thread impregnate = 0 returned
thread impregnates = 0 returned
thread impregnating = 0 returned
thread impregnated = 0 retrieved (1 returned)
threads coat = 0 returned
threads coats = 0 returned
threads coating = 0 returned

threads coated = 0 returned
threads impregnate = 0 returned
threads impregnates = 0 returned
threads impregnating = 0 returned
threads impregnated = 0 returned
threading coat = 0 returned
threading coats = 0 returned
threading coating = 0 returned
threading coated = 0 returned
threading impregnate = 0 returned
threading impregnates = 0 returned
threading impregnating = 0 returned
threading impregnated = 0 returned
threaded coat = 0 returned
threaded coats = 0 returned
threaded coating = 0 retrieved (1 returned)
threaded coated = 0 returned
threaded impregnate = 0 returned
threaded impregnates = 0 returned
threaded impregnating = 0 returned
threaded impregnated = 0 returned
plus suture = 0 returned
plus sutures = 0 returned
plusR = 0 returned
plusTM = 0 returned
sutureR = 0 returned
sutureTM = 0 returned
"antibacterial suture"= 0 returned
"anti-bacterial suture" = 0 returned
"antibiotic suture" = 0 returned
"anti-biotic suture" = 0 returned
"antiinfective suture" = 0 returned
"anti-infective suture" = 0 returned
"antimicrobial suture" = 0 returned
"anti-microbial suture" = 0 returned
"antimicrobical suture" = 0 returned
"anti-microbical suture" = 0 returned
"antiseptic suture" = 0 returned
"anti-septic suture" = 0 returned
"antibacterial sutures"= 0 returned
"anti-bacterial sutures" = 0 returned
"antibiotic sutures" = 0 returned
"anti-biotic sutures" = 0 returned
"antiinfective sutures" = 0 returned
"anti-infective sutures" = 0 returned
"antimicrobial sutures" = 0 returned
"anti-microbial sutures" = 0 returned
"antimicrobical sutures" = 0 returned
"anti-microbical sutures" = 0 returned
"antiseptic sutures" = 0 returned
"anti-septic sutures"= 0 returned
"antibacterial suturing"= 0 returned
"anti-bacterial suturing" = 0 returned
"antibiotic suturing" = 0 returned
"anti-biotic suturing" = 0 returned
"antiinfective suturing" = 0 returned
"anti-infective suturing" = 0 returned

"antimicrobial suturing" = 0 returned
"anti-microbial suturing" = 0 returned
"antimicrobical suturing" = 0 returned
"anti-microbical suturing" = 0 returned
"antiseptic suturing" = 0 returned
"anti-septic suturing" = 0 retrieved
"biocide suture"= 0 returned
"biocide sutures"= 0 returned
"biocide suturing"= 0 returned
"biocidal suture"= 0 returned
"biocidal sutures"= 0 returned
"biocidal suturing" = 0 returned
pds plus = 0 retrieved (1 returned)
pdsR = 0 retrieved (1 returned)
pdsTM = 0 returned
"pds-ii" = 0 returned
"pds-iiR" = 0 returned
"pds-iiTM" = 0 returned
"pdsii" = 0 returned
"pdsiiR" = 0 returned
"pdsiiTM" = 0 returned
monocryl = 0 returned
monocrylR = 0 returned
monocrylTM = 0 returned
vicryl = 0 retrieved (2 returned)
vicrylR = 0 returned
vicrylTM = 0 returned
stratafix = 0 returned
stratafixR = 0 returned
stratafixTM = 0 returned
"tissue control device" = 0 returned
"tissue control devices" = 0 returned
polydioxanon = 0 returned
polydioxanone = 0 returned
poliglecapron = 0 returned
poliglecaprone = 0 returned
polyglactin = 0 returned
polyglactine = 0 returned

0 results were retrieved

Search note: IDEAS has relatively limited search functionality compared to Ovid MEDLINE. Basic and more advanced functionality such as Boolean OR, proximity operators or grouping sets of terms using parentheses is not available. In the context of this functionality, attempting to translate the element of the MEDLINE strategy that combined non-specific wound closure terms with non-specific antibacterial coating terms for IDEAS was judged to be an inefficient search approach. In this context it was felt appropriate to focus the IDEAS search on retrieval of records that included terms known to be found in database records for relevant studies.

Brief details of any additional searches, such as searches of company or professional organisation databases (include a description of each database):
J&J Ethicon provided details of any ongoing or unpublished trials either sponsored by or in any way associated with J&J Ethicon.

Enter text.

Inclusion and exclusion criteria:
Enter text.
Data abstraction strategy:
Enter text.

Included studies

The following table details the include studies and the eligible documents retrieved by the searches that reported on these studies.

Trial name	Document reference
Arslan 2018, RBR-4gfk87	Arslan NC, Atasoy G, Altintas T, Terzi C. Effect of triclosan-coated sutures on surgical site infections in pilonidal disease: prospective randomized study. Int J Colorectal Dis. 2018;33(10):1445-52.
Baracs 2011, NCT01123616	Baracs J, Huszar O, Sajjadi SG, Horvath OP. Surgical site infections after abdominal closure in colorectal surgery using triclosan-coated absorbable suture (PDS Plus) vs. uncoated sutures (PDS II): a randomized multicenter study. Surg Infect (Larchmt). 2011;12(6):483-9.
	University of Pecs. Abdominal Wall Closure With Triclosan-coated Suture (TCS09-10). In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2010. Available from https://clinicaltrials.gov/show/NCT01123616. Identifier: NCT01123616
Ford 2005	Ford HR, Jones P, Gaines B, Reblock K, Simpkins DL. Intraoperative handling and wound healing: controlled clinical trial comparing coated VICRYL plus antibacterial suture (coated polyglactin 910 suture with triclosan) with coated VICRYL suture (coated polyglactin 910 suture). Surg Infect (Larchmt). 2005;6(3):313-21.
Galal 2011	Galal I, El-Hindawy K. Impact of using triclosan-antibacterial sutures on incidence of surgical site infection. Am J Surg. 2011;202(2):133-8.
Ichida 2018, UMIN000013054	Ichida K, Noda H, Kikugawa R, Hasegawa F, Obitsu T, Ishioka D, et al. Effect of triclosan-coated sutures on the incidence of surgical site infection after abdominal wall closure in gastroenterological surgery: a double-blind, randomized controlled trial in a single center. Surgery. 2018;164(1):91-95.
	Department of Surgery Saitama Medical Center Jichi Medical University. Study of the efficacy of antibacterial suture for reducing the surgical site infection. In: UMIN Clinical Trials Registry [internet]. Tokyo. University of Tokyo Hospital. 2014. Available from https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000015230. Identifier: JPRN-UMIN000013054
Isik 2011	Isik I, Selimen D, Senay S, Alhan C. Efficiency of antibacterial suture material in cardiac surgery: a double-blind randomized prospective study. Heart Surg Forum. 2012;15(1):E40-45.
Justinger 2013, NCT00998907	Justinger C, Slotta JE, Ningel S, Graber S, Kollmar O, Schilling MK. Surgical-site infection after abdominal wall closure with triclosan-impregnated polydioxanone sutures: results of a randomized clinical pathway facilitated trial (NCT00998907). Surgery. 2013;154(3):589-95.
	University Hospital S. PDS*Plus and Wound Infections After Laparotomy. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2009. Available from https://clinicaltrials.gov/show/NCT00998907. Identifier: NCT00998907
Karip 2016	Karip AB, Celik K, Aydin T, Yazicilar H, Iscan Y, Agalar C, et al. Effect of Triclosan-Coated Suture and Antibiotic Prophylaxis on Infection and Recurrence after Karydakis Flap Repair for Pilonidal Disease: A Randomized Parallel-Arm Double-Blinded Clinical Trial. Surg Infect (Larchmt). 2016;17(5):583-8.
Lin 2018, NCT02533492	Lin S-J, Chang F-C, Huang T-W, Peng K-T, Shih HN, Lee MS. Temporal Change of Interleukin-6, C-Reactive Protein, and Skin Temperature after Total Knee Arthroplasty Using Triclosan-Coated Sutures. Biomed Res Int. 2018: 9136208. Available from: https://www.hindawi.com/journals/bmri/2018/9136208/

Trial name	Document reference
	Mel Shiuann-Sheng Lee. Compare Antimicrobial to Conventional Suture in Patients Receiving Primary Total Knee Replacement. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2015. Available from https://clinicaltrials.gov/show/NCT02533492. Identifier: NCT02533492
Mattavelli 2015, NCT01869257	Mattavelli I, Rebora P, Doglietto G, Dionigi P, Dominioni L, Luperto M, et al. Multi-Center Randomized Controlled Trial on the Effect of Triclosan-Coated Sutures on Surgical Site Infection after Colorectal Surgery. Surg Infect (Larchmt). 2015;16(3):226-35.
	University of Milano Bicocca. Impact of Triclosan-coated Suture on Surgical Site Infection After Colorectal Surgery. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2013. Available from https://clinicaltrials.gov/show/NCT01869257. Identifier: NCT01869257
Mingmalairak 2009	Mingmalairak C, Ungbhakorn P, Paocharoen V. Efficacy of antimicrobial coating suture coated polyglactin 910 with tricosan (Vicryl plus) compared with polyglactin 910 (Vicryl) in reduced surgical site infection of appendicitis, double blind randomized control trial, preliminary safety report. J Med Assoc Thai. 2009;92(6):770-5.
Nakamura 2013, UMIN000003322	Nakamura T, Kashimura N, Noji T, Suzuki O, Ambo Y, Nakamura F, et al. Triclosan-coated sutures reduce the incidence of wound infections and the costs after colorectal surgery: a randomized controlled trial. Surgery. 2013;153(4):576-83.
	Teine Keijinkai Hospital. Triclosan Coated Sutures for the Reduction of Abdominal Wound Infections and Economic Considerations : single institutional prospective randomized control trial. In: UMIN Clinical Trials Registry [internet]. Tokyo. University of Tokyo Hospital. 2010. Available from https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000004032. Identifier: JPRN-UMIN000003322
Olmez 2019	Olmez T, Berkesoglu M, Turkmenoglu O, Colak T. Effect of Triclosan-Coated Suture on Surgical Site Infection of Abdominal Fascial Closures. Surg Infect (Larchmt). 2019;20(8):658-64.
PROUD, DRKS00000390	Diener MK, Knebel P, Kieser M, Schuler P, Schiergens TS, Atanassov V, et al. Effectiveness of triclosan-coated PDS Plus versus uncoated PDS II sutures for prevention of surgical site infection after abdominal wall closure: the randomised controlled PROUD trial. Lancet. 2014;384(9938):142-52.
	Heger U, Voss S, Knebel P, Doerr-Harim C, Neudecker J, Schuhmacher C, et al. Prevention of abdominal wound infection (PROUD trial, DRKS00000390): study protocol for a randomized controlled trial. Trials. 2011; 12: 245. Available from: https://trialsjournal.biomedcentral.com/articles/10.1186/1745-6215-12-245
	Universitätsklinik Heidelberg. Prevention of abdominal wound infection. In: German Clinical Trials Register [internet]. Freiburg. Institute for Medical Biometry and Statistics - University of Freiburg. 2010. Available from http://www.drks.de/DRKS00000390. Identifier: DRKS00000390
	Diener MK, Knebel P, Kieser M, Probst P, Buchler MW. Antibiotic sutures against surgical site infections - Authors' reply. The Lancet. 2014;384(9952):1425-26.
	Fujita T. Correspondence: Antibiotic sutures against surgical site infections. Lancet. 2014;384(9952):1424-25.
Rasic 2011	Rasic Z, Schwarz D, Adam VN, Sever M, Lojo N, Rasic D, et al. Efficacy of antimicrobial triclosan-coated polyglactin 910 (Vicryl* Plus) suture for

Trial name	Document reference
	closure of the abdominal wall after colorectal surgery. Coll Antropol. 2011;35(2):439-43.
Renko 2017, NCT01220700	Renko M, Paalanne N, Tapiainen T, Hinkkainen M, Pokka T, Kinnula S, et al. Triclosan-containing sutures versus ordinary sutures for reducing surgical site infections in children: a double-blind, randomised controlled trial. Lancet Infect Dis. 2017;17(1):50-57.
	University of Oulu. Antimicrobial Coated Sutures in Paediatric Surgery. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2010. Available from https://clinicaltrials.gov/show/NCT01220700. Identifier: NCT01220700
Rozzelle 2008	Rozzelle CJ, Leonardo J, Li V. Antimicrobial suture wound closure for cerebrospinal fluid shunt surgery: a prospective, double-blinded, randomized controlled trial. J Neurosurg Pediatrics. 2008;2(2):111-7.
Ruiz-Tovar 2020, NCT03763279	Ruiz-Tovar J, Llavero C, Jimenez-Fuertes M, Duran M, Perez-Lopez M, Garcia-Marin A. Incisional Surgical Site Infection after Abdominal Fascial Closure with Triclosan-Coated Barbed Suture vs Triclosan-Coated Polydioxanone Loop Suture vs Polydioxanone Loop Suture in Emergent Abdominal Surgery: A Randomized Clinical Trial. J Am Coll Surg. 2020;230(5):766-74.
	Hospital General Universitario Elche. Effect of Barbed Suture and Triclosan-coated Monofilament in Emergency Surgery. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2018. Available from https://clinicaltrials.gov/show/NCT03763279. Identifier: NCT03763279
Ruiz-Tovar 2015	Ruiz-Tovar J, Alonso N, Morales V, Llavero C. Association between Triclosan-Coated Sutures for Abdominal Wall Closure and Incisional Surgical Site Infection after Open Surgery in Patients Presenting with Fecal Peritonitis: A Randomized Clinical Trial. Surg Infect (Larchmt). 2015;16(5):588-94.
Santos 2019, RBR-4gfk87	Santos PSF, Santos M, Colafranceschi AS, Pragana ANdS, Correia MG, Simoes HH, et al. Effect of Using Triclosan-Impregnated Polyglactin Suture to Prevent Infection of Saphenectomy Wounds in CABG: A Prospective, Double-Blind, Randomized Clinical Trial. Braz. 2019;34(5):588-95.
	Instituto Nacional de Cardiologia. Impact of Vicryl Plus to prevent infection of leg in the operations of Safena Bypasses. In: Brazilian Clinical Trials Registry [internet]. Rio De Janeiro Instituto de Informação Científica e Tecnológica em Saúde. 2019. Available from https://ensaiosclinicos.gov.br/rg/RBR-4gfk87. Identifier: RBR-4gfk87
Seim 2012	Seim BE, Tonnessen T, Woldbaek PR. Triclosan-coated sutures do not reduce leg wound infections after coronary artery bypass grafting. Interactive Cardiovascular & Thoracic Surgery. 2012;15(3):411-5.
Soomro 2017	Soomro R, Khurshaidi N, Rahman SSU, Hassan R. Does antibiotic coated polyglactin helps in reducing surgical site infection in clean surgery? Medical Forum Monthly. 2017;28(2):23-26.
Sprowson 2018, ISRCTN17807356	Sprowson AP, Jensen C, Parsons N, Partington P, Emmerson K, Carluke I, et al. The effect of triclosan-coated sutures on the rate of surgical site infection after hip and knee arthroplasty: a double-blind randomized controlled trial of 2546 patients. Bone Joint J. 2018;100-B(3):296-302.
	Sprowson AP, Jensen CD, Parsons N, Partington P, Emmerson K, Carluke I, et al. The effect of triclosan coated sutures on rate of surgical site infection after hip and knee replacement: a protocol for a double-blind randomised controlled trial. BMC Musculoskelet Disord. 2014; 15: 237. Available from:

Trial name	Document reference
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Sukeik 2019, ISRCTN21430045	Sukeik M, George D, Gabr A, Kallala R, Wilson P, Haddad FS. Randomised controlled trial of triclosan coated vs uncoated sutures in primary hip and knee arthroplasty. World J Orthop. 2019;10(7):268-77.
	University College London. A randomised controlled trial of triclosan coated sutures in primary total hip and total knee arthroplasty. 2013. Available from https://www.isrctn.com/ISRCTN21430045. Identifier: ISRCTN21430045
Sundaram 2020a, NCT03285529	Sundaram K, Warren J, Klika A, Piuzzi N, Mont M, Krebs V. Barbed sutures reduce arthrotomy closure duration compared to interrupted conventional sutures for total knee arthroplasty: a randomized controlled trial. Musculoskelet Surg. 2020: Available from: https://link.springer.com/article/10.1007/s12306-020-00654-y
	The Cleveland Clinic. The Use of STRATAFIX Suture Device Compared to Standard-of-care for Deep Tissue Closure in Total Knee Arthroplasty. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2017. Available from https://clinicaltrials.gov/show/NCT03285529. Identifier: NCT03285529
Sundaram 2020b, NCT03285555	Sundaram K, Piuzzi NS, Klika AK, Molloy RM, Higuera-Rueda CA, Krebs VE, Mont MA. Barbed sutures reduce arthrotomy closure duration and suture utilisation compared to interrupted conventional sutures for primary total hip arthroplasty: a randomised controlled trial. Hip Int. 2020 Mar 19:1120700020911891. doi: 10.1177/1120700020911891. [Epub ahead of print]
	The Cleveland Clinic. Prospective Randomized Trial of Stratafix vs. Vicryl in Total Hip Arthroplasty. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2017. Available from https://clinicaltrials.gov/show/NCT03285555. Identifier: NCT03285555
Tabrizi 2019, NCT03659344	Tabrizi R, Mohajerani H, Bozorgmehr F. Polyglactin 910 suture compared with polyglactin 910 coated with triclosan in dental implant surgery: randomized clinical trial. Int J Oral Maxillofac Surg. 2019;48(10):1367-71.
	Shiraz University of Medical Sciences. Efficacy of Antimicrobial Coating Suture Coated Vicryl Plus Compared With Vicryl in Reduced Surgical Site Infection of Dental Implant Surgeries: a Uni-Blind Randomized Clinical Trial Study. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2018. Available from https://clinicaltrials.gov/show/NCT03659344. Identifier: NCT03659344
Thimour-Bergstrom 2013, NCT01212315	Thimour-Bergstrom L, Roman-Emanuel C, Schersten H, Friberg O, Gudbjartsson T, Jeppsson A. Triclosan-coated sutures reduce surgical site infection after open vein harvesting in coronary artery bypass grafting patients: a randomized controlled trial. Eur J Cardiothorac Surg. 2013;44(5):931-8.
	Steingrimsson S, Thimour-Bergstrom L, Roman-Emanuel C, Schersten H, Friberg O, Gudbjartsson T, et al. Triclosan-coated sutures and sternal wound infections: a prospective randomized clinical trial. Eur J Clin Microbiol Infect Dis. 2015;34(12):2331-8.
	Turtiainen J, Hakala T. Does the use of triclosan-coated sutures really reduce surgical site infection after open vein bypass grafting patients? Eur J Cardiothorac Surg. 2014;45(5):956.
	Jeppsson A, Thimour-Bergstrom L, Friberg O, Gudbjartsson T. Reply to Turtiainen and Hakala. Eur J Cardiothorac Surg. 2014;45(5):957.
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Trial name	Document reference
	Library of Medicine. 2010. Available from https://clinicaltrials.gov/show/NCT01212315. Identifier: NCT01212315
Turtiainen 2012	Turtiainen J, Saimanen EIT, Makinen KT, Nykanen AI, Venermo MA, Uurto IT, et al. Effect of triclosan-coated sutures on the incidence of surgical wound infection after lower limb revascularization surgery: a randomized controlled trial. World J Surg. 2012;36(10):2528-34.
Williams 2011	Williams N, Sweetland H, Goyal S, Ivins N, Leaper DJ. Randomized trial of antimicrobial-coated sutures to prevent surgical site infection after breast cancer surgery. Surg Infect (Larchmt). 2011;12(6):469-74.
Zhang 2011, NCT00768222	Zhang Z-T, Zhang H-W, Fang X-D, Wang L-M, Li X-X, Li Y-F, et al. Cosmetic outcome and surgical site infection rates of antibacterial absorbable (Polyglactin 910) suture compared to Chinese silk suture in breast cancer surgery: a randomized pilot research. Chin Med J. 2011;124(5):719-24.
	Ethicon Inc. Coated VICRYL* Plus Suture Compared to Chinese Silk in Scheduled Breast Cancer Surgery. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2008. Available from https://clinicaltrials.gov/show/NCT00768222. Identifier: NCT00768222

Excluded studies

List any excluded studies below. These are studies that were initially considered for inclusion at the level of full text review, but were later excluded for specific reasons.

Reference	Exclusion reason
Ahmed I, Boulton AJ, Rizvi S, Carlos W, Dickenson E, Smith NA, et al. The use of triclosan-coated sutures to prevent surgical site infections: a systematic review and meta-analysis of the literature. BMJ Open. 2019;9(9):e029727.	SR or MA for reference checking
Allen G. Evidence appraisal of de Jonge SW, Atema JJ, Solomkin JS, Boermeester MA. Meta-analysis and trial sequential analysis of triclosan-coated sutures for the prevention of surgical-site infection.: Br J Surg. 2017;104(2):e118-e133. Aorn J. 2017;106(1):77-82.	Ineligible document type
Allen G. Evidence appraisal of Sandini M, Mattavelli I, Nespoli L, Uggeri F, Gianotti L. Systematic review and meta-analysis of sutures coated with triclosan for the prevention of surgical site infection after elective colorectal surgery according to the PRISMA statement.: Medicine. 2016;95(35):e4057. doi:10.1097/MD.0000000000004057. Aorn J. 2017;105(5):518-22.	Ineligible document type
Allen G. Evidence for practice. Antimicrobial suture wound closure. Aorn J. 2008;88(6):1014-15.	Ineligible document type
Arslan N, Terzi C, Atasoy G, Altintas T, Sirin A, Haciyanli M, et al. Effect of triclosan coated sutures on surgical site infection rate in pilonidal sinus disease: single-blinded randomized trial. Dis Colon Rectum. 2014; (5): e255. Available from: https://www.cochranelibrary.com/central/doi/10.1002/central/CN-01060926/full	Conference abstract
Assadian O, Below H, Kramer A. The effect of triclosan-coated sutures in wound healing and triclosan degradation in the environment. Journal of Plastic, Reconstructive & Aesthetic Surgery: JPRAS. 2009;62(2):264-5; author reply 64-5.	Ineligible study design
Australian College of Operating Room Nurses. Triclosan-coated sutures and abdominal surgical site infection rate. J Perioper Nurs Aust. 2014;27(3):33.	Ineligible document type
AZ St.-Dimpna Geel. Comparison of Laparoscopic Traditional and Knotless Sutures. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2016. Available from https://clinicaltrials.gov/show/NCT02720718. Identifier: NCT02720718	Ineligible intervention
Barzilai Medical Center. Closing Uterine Incision During C-section Using Barbed Suture (Stratafix) or Vicryl Suture. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2017. Available from https://clinicaltrials.gov/show/NCT03159871. Identifier: NCT03159871	Ineligible intervention
Brett K, Argaez C. Triclosan in Single Use Medical Devices for Preventing Infections: A Review of Clinical Effectiveness, Safety and Guidelines. Ottawa: CADTH; 2019. Available from: https://cadth.ca/triclosan-single-use-medical-devices-preventing-infections-review-clinical-effectiveness-safety-and.	SR or MA for reference checking
Cairo University. Barbed Versus Conventional Sutures for Vaginal Cuff Closure During Total Laparoscopic Hysterectomy. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2017. Available from https://ClinicalTrials.gov/show/NCT02998658. Identifier: NCT02998658	Ineligible intervention
Cairo University. Comparison of Barbed and Conventional Sutures in Adhesion Formation Following Cesarean Section. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2017. Available from https://ClinicalTrials.gov/show/NCT03183362. Identifier: NCT03183362	Ineligible intervention
Cairo University. Ultrasound Evaluation of Cesarean Scar After Uterotomy Closure With Barbed and Conventional Sutures. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2017. Available from https://ClinicalTrials.gov/show/NCT03182010. Identifier: NCT03182010	Ineligible intervention

Reference	Exclusion reason
Chan VWK, Chan P-K, Chiu K-Y, Yan C-H, Ng F-Y. Does Barbed Suture Lower Cost and Improve Outcome in Total Knee Arthroplasty? A Randomized Controlled Trial. J Arthroplasty. 2017;32(5):1474-77.	Ineligible intervention
Chosun University Hospital. Prospective Randomized Control Study of Stratafix Vs. Standard-of-care for Deep Tissue Closure in Orthopaedic Surgery. In: Clinical Research Information Service (CRIS) [internet]. Cheongju. Korea Centers for Disease Control and Prevention (KCDC). 2019. Available from https://cris.nih.go.kr/cris/mobile/mobile_view_en.jsp?btype=2&seq=14253. Identifier: KCT0004190	Ineligible intervention
Cozar Lozano C, Garcia-Botello S, Marti-Arevalo J, Bauza Collado M, Pla Marti V, Moro Valdezate D, et al. Use of triclosan-coated barbed monofilament suture (TCBMS) to reduce surgical site infection (SSI) in elective colorectal surgery. Dis Colon Rectum. 2020;63(6):e441.	Conference abstract
De Jonge SW, Atema JJ, Solomkin JS, Boermeester MA. Meta-analysis and trial sequential analysis of triclosan-coated sutures for the prevention of surgical-site infection. Br J Surg. 2017;104(2):e118-e33.	SR or MA for reference checking
De Jonge SW, Atema JJ, Solomkin JS, Boermeester MA. A meta-analysis using grade and trial sequential analysis of triclosan-coated sutures for the prevention of surgical site infection: Is the evidence final? J Am Coll Surg. 2016;223(4 suppl 1):e103.	Conference abstract
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Deliaert AE, Van den Kerckhove E, Tuinder S, Fieuws S, Sawor JH, Meesters-Caberg MA, et al. The effect of triclosan-coated sutures in wound healing. A double blind randomised prospective pilot study. J Plast Reconstr Aesthet Surg. 2009;62(6):771-3.	Ineligible study design
Diener MK, Knebel P, Kieser M, Probst P, Buchler MW. Antibiotic sutures against surgical site infections--Authors' reply. Lancet. 2014;384(9952):1425-6.	Duplicate
Dinis P, Nunes P, Mota A. Comparison between the use of barbed and polyglactin sutures in urologic laparoscopic surgery - a systematic review. Acta Urologica Portuguesa. 2016;33(2):51-56.	Ineligible study design
Dr Prerna Karde. Comparative evaluation antimicrobial sutures versus plain sutures in periodontal flap surgery. In: Clinical Trials Registry - India (CTRI) [internet]. New Delhi. National Institute of Medical Statistics. 2017. Available from http://ctri.nic.in/Clinicaltrials/pmaindet2.php?trialid=20418&EncHid=&userName=2017/09/009940. Identifier: CTRI/2017/09/009940	Reports no eligible outcomes
Elsolh B, Zhang L, Patel SV. The Effect of Antibiotic-Coated Sutures on the Incidence of Surgical Site Infections in Abdominal Closures: a Meta-Analysis. J Gastrointest Surg. 2017;21(5):896-903.	SR or MA for reference checking
Ethicon Inc. A Study of Two Types of Absorbable Surgical Sutures in the Suturing of Thyroid Surgery Incision. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2019. Available from https://clinicaltrials.gov/show/NCT03792737. Identifier: NCT03792737	Ineligible comparator
Ethicon Inc. A Study of Two Types of Absorbable Surgical Sutures in the Suturing of Thyroid Surgery Incision. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. Available from https://ClinicalTrials.gov/show/NCT03792737. Identifier: NCT03792737	Ineligible comparator
Evangelical Community Hospital Lewisburg. Study to Compare Suture Material in Closure of Uterine Incision in Cesarian Section. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2014. Available from https://clinicaltrials.gov/show/NCT02517710. Identifier: NCT02517710	Reports no eligible outcomes

Reference	Exclusion reason
Giampaolino P, De Rosa N, Tommaselli GA, Santangelo F, Nappi C, Sansone A, et al. Comparison of bidirectional barbed suture Stratafix and conventional suture with intracorporeal knots in laparoscopic myomectomy by office transvaginal hydrolaparoscopic follow-up: a preliminary report. Eur J Obstet Gynecol Reprod Biol. 2015;195:146-50.	Ineligible intervention
Giampaolino P, Santangelo F, De Rosa N, Pellicano M, Nappi C. Comparison of bidirectional barbed suture stratafix and conventional suture with intracorporeal knots in laparoscopic myomectomy. Gynecol Surg. 2015; 12(suppl 1): S318. Available from: https://link.springer.com/article/10.1007%2Fs10397-015-0918-0	Ineligible intervention
Grin L, Ivshin A, Rabinovich M, Namazov A, Shochat V, Shperberg A, et al. Barbed suture versus vicryl suture for uterine incision repair during a C-section: a randomised, controlled, assessor-blind trial. BJOG. 2018; 125(suppl 1): 70-71. Available from: https://obgyn.onlinelibrary.wiley.com/doi/10.1111/1471-0528.7_15132	Ineligible intervention
Guo J, Pan L-H, Li Y-X, Yang X-D, Li L-Q, Zhang C-Y, et al. Efficacy of triclosan-coated sutures for reducing risk of surgical site infection in adults: a meta-analysis of randomized clinical trials. J Surg Res. 2016;201(1):105-17.	SR or MA for reference checking
Gupta M. Antimicrobial coated sutures in Indian Market: A literature review of efficacy and safety in patients to prevent surgical site infections. J Indian Med Assoc. 2019;117(6):19-23.	Ineligible study design
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Gys B, Gys T, Lafullarde T. The Use of Unidirectional Knotless Barbed Suture for Enterotomy Closure in Roux-en-Y Gastric Bypass: a Randomized Comparative Study. Obes Surg. 2017;27(8):2159-63.	Ineligible intervention
Gys B, Gys T, Lafullarde T. The use of unidirectional knotless barbed suture for enterotomy closure in Roux-en-y gastric bypass: a randomized comparative studyudy new (non standard) surgical techniques. Obes Surg. 2017; 27(1): 692. Available from: https://link.springer.com/content/pdf/10.1007/s11695-017-2774-7.pdf	Ineligible intervention
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Hayes Inc. Antibacterial suture for prevention of infection. Lansdale PA: Hayes Inc; 2009. Available from: This report has been updated. The current report can be purchased from: http://www.hayesinc.com/hayes/crd/?crd=12022.	Duplicate
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Hayes Inc. Comparative effectiveness review of antimicrobial versus conventional sutures. Lansdale PA: Hayes Inc; 2017. Available from: The report may be purchased from:http://www.hayesinc.com/hayes/crd/?crd=13609.	Document unobtainable
Heger P, Pianka F, Diener MK, Mihaljevic AL. [Current standards of abdominal wall closure techniques : Conventional suture techniques]. Chirurg. 2016;87(9):737-43.	Non-English publication
Henriksen NA, Deerenberg EB, Venclauskas L, Fortelny RH, Garcia-Alamino JM, Miserez M, et al. Triclosan-coated sutures and surgical site infection in abdominal surgery: the TRISTAN review, meta-analysis and trial sequential analysis. Hernia. 2017;21(6):833-41.	SR or MA for reference checking
Henriksen N, Deerenberg E, Venclauskas L, Fortelny R, Miserez M, Muysoms F. Triclosan-coated sutures and surgical site infection in abdominal surgery. A meta-analysis. Hernia. 2017;21(2 suppl 1):S166.	Conference abstract

Reference	Exclusion reason
Hughes J, Ballard DH, Macieski F, Ho MTT, Caldito G, Valiulis J. Wound Breakdown with Stratafix versus Monocryl Suture in Aesthetic and Reconstructive Plastic Surgery: Data from a Single Surgeon. Am Surg. 2017;83(1):e4-5.	Ineligible study design
Hunger R, Mantke A, Herrmann C, Mantke R. [Triclosan-coated sutures in colorectal surgery : Assessment and meta-analysis of the recommendations of the WHO guideline]. Chirurg. 2019;90(1):37-46.	Non-English publication
Huszár O, Baracs J, Tóth M, Damjanovich L, Kotán R, Lázár G, et al. Comparison of wound infection rates after colon and rectal surgeries using triclosan-coated or bare sutures -- a multi-center, randomized clinical study. Magyar sebeszet. 2012; 65(3): 83-91. Available from: https://akjournals.com/view/journals/1046/65/3/article-p83.xml	Non-English publication
Icahn School of Medicine at Mount Sinai. Barbed Suture for Hysterotomy Closure During Cesarean Section. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2020. Available from https://clinicaltrials.gov/show/NCT04622267. Identifier: NCT04622267	Ineligible comparator
Islamic Azad University. Accumulation of oral microorganisms around the suture materials in implant surgery. In: Iranian Registry of Clinical Trials [internet]. Tehran. Ministry of Health and Medical Education (MOHME), Iran University of Medical Sciences (IUMS). 2019. Available from http://en.irct.ir/trial/36296. Identifier: IRCT20180617040117N	Ineligible study design
Islamic Azad University. Accumulation of oral microorganisms around the suture materials in implant surgery. In: Iranian Registry of Clinical Trials [internet]. Tehran. Ministry of Health and Medical Education (MOHME), Iran University of Medical Sciences (IUMS). 2019. Available from http://en.irct.ir/trial/35214. Identifier: IRCT20180714040460N	Ineligible study design
Islamic Azad University. To investigate the effect of vicryl and vicryl plus sutures on wound situation after lower jaw impacted third molars surgery. In: Iranian Registry of Clinical Trials [internet]. Tehran. Ministry of Health and Medical Education (MOHME), Iran University of Medical Sciences (IUMS). 2017. Available from https://en.irct.ir/trial/20475. Identifier: IRCT2015092424167N	Ineligible study design
Jiang C, Huang D-G, Yan L, Hao D-J. The efficacy of triclosan coated sutures for preventing surgical site infections in orthopedic surgery: A systematic review and meta-analysis. Asian J Surg. 2020; 44(2): 506-07. Available from: https://www.sciencedirect.com/science/article/pii/S101595842030378X?via%3Dihub	SR or MA for reference checking
Johnson & Johnson Medical China. Symmetric on Total Knee Arthoplasty (TKA). In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2017. Available from https://clinicaltrials.gov/show/NCT03305887. Identifier: NCT03305887	Ineligible intervention
Jeppsson A, Thimour-Bergstrom L, Gudbjartsson T, Aneman C, Friberg O. Triclosan-coated sutures reduce surgical site infections after open vein harvesting in coronary artery bypass graft patients: A prospective randomized controlled trial. Interact Cardiovasc Thorac Surg. 2012;15(suppl 2):S134.	Conference abstract
Karde PA, Sethi KS, Mahale SA, Mamajiwala AS, Kale AM, Joshi CP. Comparative evaluation of two antibacterial-coated resorbable sutures versus noncoated resorbable sutures in periodontal flap surgery: A clinico-microbiological study. J Indian Soc Periodontol. 2019;23(3):220-25.	Reports no eligible outcomes
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Knaebel HP, Kirschner MH, Reidel MA, Büchler MW, Seiler CM. Operative standardization in randomized controlled surgical trials. Meeting of the INSECT trial. Chirurg. 2006; 77(3): 267-72. Available from: https://link.springer.com/content/pdf/10.1007/s00104-005-1149-0.pdf	Non-English publication

Reference	Exclusion reason
Konstantelias AA, Andriakopoulou CSI, Mourgela S. Triclosan-coated sutures for the prevention of surgical-site infections: a meta-analysis. Acta Chir Belg. 2017;117(3):137-48.	SR or MA for reference checking
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Leaper DJ, Edmiston CE, Jr., Holy CE. Meta-analysis of the potential economic impact following introduction of absorbable antimicrobial sutures. Br J Surg. 2017;104(2):e134-e44.	SR or MA for reference checking
Leonardo J, Rozzelle CJ. Antimicrobial suture use associated with a decreased incidence of cerebrospinal fluid shunt infections. Neurosurgery. 2006;59(2):478-78.	Conference abstract
Li D, Zhuang J, Liu YG, Zhou H, Chen KX, Cheng K, et al. Full fascia closure with interrupted absorbable suture and layered closure with interrupted silk suture in abdominal incision: comparison of curative effects and biocompatibility. CJTER. 2014; 18(43): 6996-7000. Available from: https://www.cochranelibrary.com/central/doi/10.1002/central/CN-01096367/full	Non-English publication
Mahajan N, Pillai R, Chopra H, Grover A, Kohli A. An economic model to assess the value of triclosan-coated sutures in reducing the risk of surgical-site infection in coronary artery bypass graft in India. J Indian Coll Cardiol. 2020;10(2):79-84.	Ineligible study design
Mattavelli I, Nespoli L, Alfieri S, Cantore F, Cobianchi L, Luperto M, et al. Effect of triclosan-coated suture on surgical site infection after colorectal surgery: Final results of a multicenter, prospective, randomized trial. Surg Infect (Larchmt). 2013;14(2):A9.	Duplicate
Mattavelli I, Nespoli L, Alfieri S, Cantore F, Sebastian-Douglas S, Cobianchi L. Triclosan-coated suture to reduce surgical site infection after colorectal surgery. Surg Infect (Larchmt). 2011; 12(2): A14-A15.	Conference abstract
Meyer R, Sivan E, Sharon N, Fishel-Bartal M, Kalter A, Derazne E, et al. Infectious morbidity following cesarean deliveries: A comparison of barbed to standard suture for myometrial closure. Am J Obstet Gynecol. 2018;218(1 suppl 1):S335-S36.	Ineligible intervention
Mitchell MD, Betesh J, Umscheid C. Antimicrobial sutures for prevention of surgical infections. Pennsylvania: Penn Medicine Center for Evidence-based Practice (CEP); 2010.	Ineligible document type
Mohamed Zayed. Uterine Closure at C-section by Stratafix Tissue Control Device: randomized Case-Control Study. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2014. Available from https://clinicaltrials.gov/show/NCT02288013. Identifier: NCT02288013	Ineligible intervention
Morioka Municipal Hospital. Does antimicrobial triclosan-coated PDS PLUS for skin closure reduce surgical site infections? A controlled clinical trial of class II abdominal surgeries. In: UMIN Clinical Trials Registry [internet]. Tokyo. University of Tokyo Hospital. 2016. Available from https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000025218. Identifier: JPRN-UMIN000021892	Non-English publication
Mulder T, Abbas M, Harbarth S, Kluytmans J. Triclosan-coated sutures reduce the risk of surgical site infections: A systematic review and meta-analysis. Antimicrob Resist Infect Control. 2019;8(suppl 1):P21.	Conference abstract
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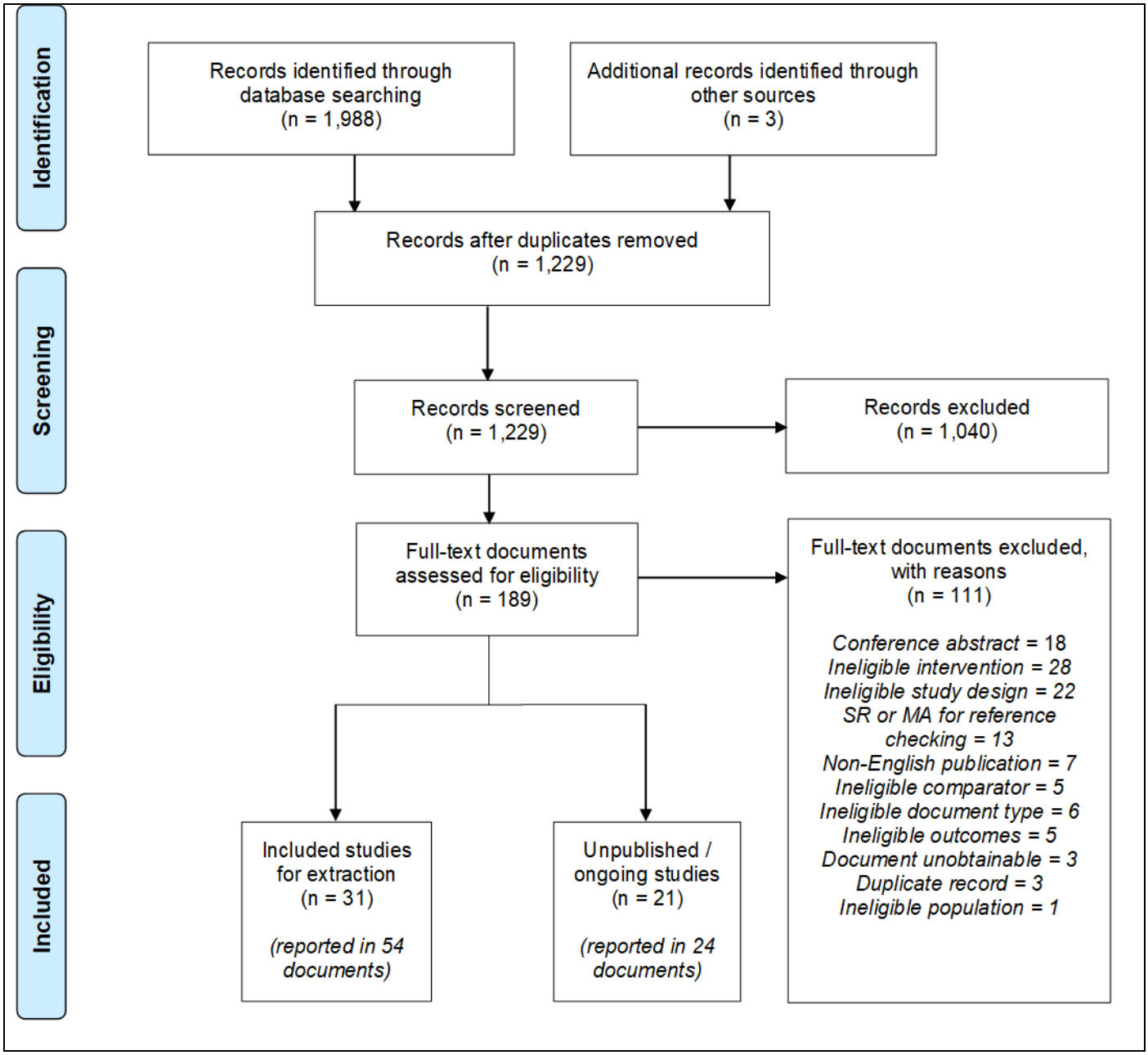
O'Neal PB, Itani KMF. Antimicrobial Formulation and Delivery in the Prevention of Surgical Site Infection. Surg Infect (Larchmt). 2016;17(3):275-85.	Ineligible study design

Reference	Exclusion reason
Onesti MG, Carella S, Scuderi N. Effectiveness of antimicrobial-coated sutures for the prevention of surgical site infection: a review of the literature. Eur Rev Med Pharmacol Sci. 2018;22(17):5729-39.	Ineligible study design
Osaka Prefectural Adult Disease Center. A randomized controlled trial of preventative effect on wound complication after gastrointestinal surgery by coated antibacterial suture. In: UMIN Clinical Trials Registry [internet]. Tokyo. University of Tokyo Hospital. 2009. Available from https://upload.umin.ac.jp/cgi-open-bin/ctr/ctr_view.cgi?recptno=R000003117. Identifier: JPRN-UMIN000002550	Ineligible intervention
Otani N, Tomita K, Taminato M, Yano K, Hosokawa K. Efficacy of STRATAFIX in Inframammary Fold Recreation in Autologous Breast Reconstruction. Plast. 2018;6(4):e1702.	Ineligible study design
Peleg D, Ahmad RS, Warsof SL, Marcus-Braun N, Sciaky-Tamir Y, Ben Shachar I. A randomized clinical trial of knotless barbed suture vs conventional suture for closure of the uterine incision at cesarean delivery. Am J Obstet Gynecol. 2018;218(3):343.	Ineligible intervention
Pelz K, Todtmann N, Otten J-E. Comparison of antibacterial-coated and non-coated suture material in intraoral surgery by isolation of adherent bacteria. Ann Agric Environ Med. 2015;22(3):551-5.	Ineligible study design
Region Skane. Comparison of VicrylPlus® Versus Vicryl® for Repair of Perineal Tears. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2016. Available from https://clinicaltrials.gov/show/NCT02863874. Identifier: NCT02863874	Ineligible population
Room H, Roberts G, Parwaiz H, Gergely S. Antibacterial coated sutures reduce laparoscopic post-operative surgical site infections. Br J Surg. 2013;100(suppl 7):212-13.	Ineligible study design
Roy PK, Kalita P, Lalhlenmawia H, Dutta RS, Thanzami K, Zothanmawia C, et al. Comparison of surgical site infection rate between antibacterial coated surgical suture and conventional suture: A randomized controlled single centre study for preventive measure of postoperative infection. IJPSR. 2019;10(5):2385-91.	Ineligible intervention
Sakaguchi H, Singh H, Klima U, Lee CN, Kofidis T. Antibacterial suture reduces surgical site infections in coronary artery bypass grafting. In: 17th Annual Meeting of the Asian society for Cardiovascular and Thoracic Surgery (ASCVTS); March 5-8 2009: Taipei: Asian Society for Cardiovascular & Thoracic Surgery; 111-14.	Conference abstract
Sakdinakiattikoon M, Tanavalee A. Continuous barbed suture versus knotted interrupted suture for wound closure in total knee arthroplasty: A prospective randomized study. J Med Assoc Thai. 2019;102(3):361-67.	Ineligible intervention
Sala-Perez S, Lopez-Ramirez M, Quinteros-Borgarello M, Valmaseda-Castellon E, Gay-Escoda C. Antibacterial suture vs silk for the surgical removal of impacted lower third molars. A randomized clinical study. Med Oral Patol Oral Cir Bucal. 2016;21(1):e95-102.	Ineligible study design
Samsung Medical Center. Effects of Triclosan coated suture on the surgical site infection in gastric cancer surgery patients. In: Clinical Research Information Service (CRIS). 2011. Available from http://cris.nih.go.kr/cris/en/search/search_result_st01.jsp?seq=1421. Identifier: KCT0000209	Ineligible study design
Sandini M, Mattavelli I, Nespoli L, Uggeri F, Gianotti L. Systematic review and meta-analysis of sutures coated with triclosan for the prevention of surgical site infection after elective colorectal surgery according to the PRISMA statement. Medicine. 2016;95(35):e4057.	SR or MA for reference checking
Sawada K, Nakayama K, Ishibashi T, Nakamura A, Yoshimura Y, Ono R, et al. A comparison of bidirectional stratafix bardcd suture with conventional suture for laparoscopic myomectomy. J Obstet Gynaecol Res. 2019;45(8):1744.	Ineligible intervention
Sedrakyan A. Precarious innovation of anti-infective coated devices. Lancet. 2014;384(9938):111-3.	Ineligible document type

Reference	Exclusion reason
Seoul National University Hospital. Effect of Barbed Suture Fascia Closure on Incisional Hernia in Midline Laparotomy for Gynecological Diseases (BARBHER). In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2020. Available from https://ClinicalTrials.gov/show/NCT04643197. Identifier: NCT04643197	Ineligible comparator
Serlo W, Renko M, Paalanne N, Tapaiainen T, Hinkanen M, Pokka T, et al. Triclosan-coated sutures in preventing surgical site infection in children: a randomized controlled series. Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery. 2016; 32(suppl): 1983. Available from: https://link.springer.com/content/pdf/10.1007/s00381-016-3209-9.pdf	Conference abstract
Singh H, Emmert MY, Sakaguchi H, Neng Lee C, Kofidis T. Antibacterial suture reduces surgical site infections in coronary artery bypass grafting. Heart surgery forum. 2010; 13(suppl 2): S85. Available from: https://journal.hsforum.com/index.php/HSF/article/view/508	Conference abstract
Spital Limmattal Schlieren. Vaginal Stump Infection After Laparoscopic Hysterectomy. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2018. Available from https://ClinicalTrials.gov/show/NCT04725981. Identifier: NCT04725981	Ineligible intervention
Sprowson AP, Jensen C, Ahmed I, Parsons N, Partington P, Emmerson K, et al. Infographic: Triclosan-coated sutures and surgical site infections after hip and knee arthroplasty. Bone Joint J. 2018;100-B(3):294-95.	Conference abstract
St. Franziskus Hospital. Stratafix vs. Vicryl OAGB / MGB Suture Study. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2020. Available from https://clinicaltrials.gov/show/NCT04613635. Identifier: NCT04613635	Ineligible intervention
Surgical Infection Society Europe. 26th European Congress on Surgical Infection. In: 26th European Congress on Surgical Infection 2013: Prague: Mary Ann Liebert Inc.; Surg Infect (Larchmt). 2013;14(2):A1-A17. Available from: https://www.liebertpub.com/doi/full/10.1089/sur.2013.9994	Conference abstract
Tseng CH. Evidence-based effects of triclosan-coated sutures for the prevention of surgical-site infection. Int J Antimicrob Agents. 2017;50(suppl 2):S237.	Ineligible study design
Uchino M, Mizuguchi T, Ohge H, Haji S, Shimizu J, Mohri Y, et al. The Efficacy of Antimicrobial-Coated Sutures for Preventing Incisional Surgical Site Infections in Digestive Surgery: a Systematic Review and Meta-analysis. J Gastrointest Surg. 2018;22(10):1832-41.	SR or MA for reference checking
University Hospital Basel. Clinical Outcome in View of Surgical Site Infection (SSI) With Antibacterial Skin Sutures. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2012. Available from https://clinicaltrials.gov/show/NCT01540279. Identifier: NCT01540279	Ineligible study design
University Hospital Freiburg. Oral Bacteria on Suture Materials - Clinical Comparison of an Antibacterial-coated and a Non-coated Suture Material. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2009. Available from https://clinicaltrials.gov/show/NCT00946049. Identifier: NCT00946049	Ineligible study design
University Hospital Maastricht Department of Plastic Surgery. The effect of triclosan coated sutures in wound healing. A double blind randomized prospective pilot study. In: Nederlands Trial Register [internet]. Amsterdam. The Dutch Cochrane Centre. 2007. Available from https://www.trialregister.nl/trial/957. Identifier: NTR983	Ineligible study design
University of Pecs. Abdominal Wall Closure With Triclosan-coated Suture. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2010. Available from https://clinicaltrials.gov/show/NCT01620294. Identifier: NCT01620294	Reports no eligible outcomes
Won HS, Lee SW, Kim YM, Kim A. Clinical usefulness and safety of the anti-bacterial coated multifilament suture (Vicryl Plus) and monofilament suture (Monosyn) in hysterectomy. BJOG. 2012;119(suppl 1):44.	Reports no eligible outcomes

Reference	Exclusion reason
Wu X, Kubilay NZ, Ren J, Allegranzi B, Bischoff P, Zayed B, et al. Antimicrobial-coated sutures to decrease surgical site infections: a systematic review and meta-analysis. Eur J Clin Microbiol Infect Dis. 2017;36(1):19-32.	SR or MA for reference checking
Wu X, Kubilay NZ, Ren J, Allegranzi B, Bischoff P, Zayed B, et al. Correction to: Antimicrobial-coated sutures to decrease surgical site infections: a systematic review and meta-analysis. Eur J Clin Microbiol Infect Dis. 2018;37(10):2031-34.	SR or MA for reference checking
Yasuda S, Tomita K, Kiya K, Hosokawa K. STRATAFIX for Abdominal Wall Repair following Abdominal Flap Harvest. Plast. 2017;5(11):e1572.	Ineligible study design
Yam JM, Orlina EA. Effectiveness of antimicrobial sutures in preventing surgical site infection in clean-contaminated wounds-a preliminary study. Surgical infections. 2013; 14(suppl 1): S29. Available from: https://www.liebertpub.com/doi/pdfplus/10.1089/sur.2013.9996	Conference abstract
Yanazume S, Togami S, Fukuda M, Kawamura T, Kamio M, Ota S, et al. New Continuous Barbed Suture Device with Stratafix for the Vaginal Stump in Laparoscopic Hysterectomy. Gynecol Minim Invasive Ther. 2018;7(4):167-71.	Ineligible study design
Yanazume S, Togami S, Fukuda M, Kamio M, Karakida N, Ota S. Utility of continuous sutures by STRATAFIX for closing vaginal stump in total laparoscopic hysterectomy. J Obstet Gynaecol Res. 2018;44(8):1590.	Conference abstract
Ye Z, Zhu W, Xi X, Wu Q. The efficacy of bidirectional barbed sutures for incision closure in total knee replacement: A protocol of randomized controlled trial. Medicine. 2020;99(34):e21867.	Ineligible intervention
Zayed MA, Fouda UM, Elsetohy KA, Zayed SM, Hashem AT, Youssef MA. Barbed sutures versus conventional sutures for uterine closure at cesarean section; a randomized controlled trial. J Matern Fetal Neonatal Med. 2019;32(5):710-17.	Ineligible intervention
Zhuang CP, Cai GY, Wang YQ. Comparison of two absorbable sutures in abdominal wall incision. CRTER. 2009; 13(21): 4045-48.	Non-English publication
Ziv Hospital. Trial Comparing Barbed and Non-barbed Suture for Uterine Incision Closure at Cesarean Section. In: ClinicalTrials.gov [internet]. Bethesda. US National Library of Medicine. 2016. Available from https://clinicaltrials.gov/show/NCT02962011. Identifier: NCT02962011	Ineligible intervention

Report the numbers of published studies included and excluded at each stage in an appropriate format (e.g. PRISMA flow diagram).



Structured abstracts for unpublished studies

No unpublished studies contributed data to the qualitative analyses or the meta-analysis. No structured abstracts were therefore required.

Study title and authors
Introduction
Objectives
Methods
Results
Conclusion
Article status and expected publication: Provide details of journal and anticipated publication date

Appendix B: Search strategy for adverse events

Date search conducted:	*Dates are as detailed in Appendix A; clinical search strategy*
Date span of search:	*Dates limits are as detailed in Appendix A; clinical search strategy*
List the complete search strategies used, including all the search terms: textwords (free text), subject index headings (for example, MeSH) and the relationship between the search terms (for example, Boolean). List the databases that were searched.	
The search for the clinical evidence, as reported in Appendix A, was designed to identify any studies of PLUS Suture in invasive surgeries. A study outcome filter was not used and therefore the search would retrieve studies reporting any outcomes, and with or without a comparator. This includes studies reporting adverse events associated with the PLUS Suture. The study design was limited to RCTs but in this situation (sutures for surgery) we did not expect adverse events emerging significantly after the follow up time of an average RCT. As a result, a separate search of bibliographic databases for this evidence was not required. This assumption was informed by the [redacted] and it was also validated by clinical experts.	
Brief details of any additional searches, such as searches of company or professional organisation databases (include a description of each database): *Adverse events were identified as part of the wider search strategy*	
Inclusion and exclusion criteria: *Studies reporting adverse events data were subject to the same inclusion and exclusion criteria as the wider review*	
Data abstraction strategy: *Adverse events data were identified and extracted as part of the wider review*	

Adverse events evidence

List any relevant studies below. If appropriate, further details on relevant evidence can be added to the adverse events section.

Study	Design and intervention(s)	Details of adverse events	Company comments
Text	Text	Text	Text
Text	Text	Text	Text
Text	Text	Text	Text
Text	Text	Text	Text
Text	Text	Text	Text
Text	Text	Text	Text
Text	Text	Text	Text

Appendix C: Checklist of confidential information

Please see section 1 of the user guide for instructions on how to complete this section.

Does your submission of evidence contain any confidential information? (please check appropriate box):

No ☐ If no, please proceed to declaration (below)

Yes ☒ If yes, please complete the table below (insert or delete rows as necessary). Ensure that all relevant sections of your submission of evidence are clearly highlighted and underlined in your submission document, and match the information in the table. Please add the referenced confidential content (text, graphs, figures, illustrations, etc.) to which this applies.

Page	Nature of confidential information	Rationale for confidential status	Timeframe of confidentiality restriction
#	☒ Commercial in confidence ☐ Academic in confidence	J&J request that these IFU's are not published by NICE.	Indefinite
Details	IFU documents provided with this clinical evidence submission dossier		
#	☒ Commercial in confidence ☐ Academic in confidence	History of changes as presented commercially sensitive.	Indefinite
Details	IFU table of changes (section 2, **pages 6-15**)		
#	☒ Commercial in confidence ☐ Academic in confidence	Commercially sensitive data provided.	Indefinite
Details	Section 6 Adverse Events, sales data included to provide context to MAUDE search result, **page 120-121**		

#	☒ Commercial in confidence ☐ Academic in confidence	Commercially sensitive sales data provided (repeated from section 6)	Indefinite
Details	Appendix B Search Strategy for Adverse events, **page 222-223**		
#	☐ Commercial in confidence ☒ Academic in confidence	Ongoing clinical trial protocol IIS 14-213 (Korea, 2020) sponsored by J&J. Permission from PI not gained to share publically.	Indefinite
Details	Ongoing clinical trial protocol, uploaded as part of reference pack [IIS 14-213] (Korea, 2020)		
#	☐ Commercial in confidence ☒ Academic in confidence	Academically sensitive data provided.	Indefinite
Details	Ongoing clinical trial details provided IIS 14-213, **pages 78-79**		
#	☐ Commercial in confidence ☒ Academic in confidence	Academically sensitive data provided.	Indefinite
Details	Ongoing clinical trial detail, reference list citation confidential **page 177**		
#	☐ Commercial in confidence ☒ Academic in confidence	Unpublished analysis provided, request to remain confidential until publication.	Pending independent verification
Details	Unpublished analysis on sustainability reported within the claims table at section 2, **page 16-17**		

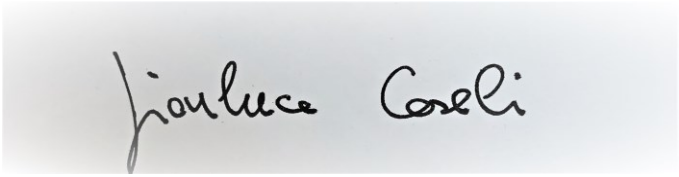
#	☐ Commercial in confidence ☒ Academic in confidence	Unpublished analysis provided, request to remain confidential until publication.	Pending independent verification
Details	Unpublished analysis on sustainability reported in response to question on impact on sustainability, **page 20-21**		
#	☒ Commercial in confidence ☐ Academic in confidence	Commercially sensitive data provided.	Pending independent verification
Details	Within the question “Describe any training and system changes needed if the NHS were to adopt this technology” commercially sensitive data provided, **page 24**.		

Confidential information declaration

I confirm that:

- all relevant data pertinent to the development of medical technology guidance (MTG) has been disclosed to NICE
- all confidential sections in the submission have been marked correctly
- if I have attached any publication or other information in support of this notification, I have obtained the appropriate permission or paid the appropriate copyright fee to enable my organisation to share this publication or information with NICE.

Please note that NICE does not accept any responsibility for the disclosure of confidential information through publication of documentation on our website that has not been correctly marked. If a completed checklist is not included then NICE will consider all information contained in your submission of evidence as not confidential.

Signed*: ** Must be Medical Director or equivalent*		**Date:**	02.03.21
Print:	Gianluca Casali	**Role / organisation:**	Medical Director UK/IRE Johnson & Johnson Medical Ltd

Contact email: [redacted]

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Medical technologies guidance

MT507 Plus Sutures for preventing surgical site infection
Company evidence submission

Part 2: Economic evidence

Company name	Ethicon, Johnson & Johnson Medical Ltd.
Submission date	Tuesday 30th March 2021 (economic evidence submission)
Contains confidential information	Yes

Contents

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1 Published and unpublished economic evidence

Identification and selection of studies

Complete the following information about the number of studies identified.

Please provide a detailed description of the search strategy used, and a detailed list of any excluded studies, in appendix A.

Number of studies identified in a systematic search.		1,992*
Number of studies identified as being relevant to the decision problem.		8
Of the relevant studies identified:	Number of published studies.	8
	Number of abstracts.	0
	Number of ongoing studies.	0

*figure stated reports the total number of records retrieved by searches

List of relevant studies

In table 1, provide brief details of any published or unpublished economic studies or abstracts identified as being relevant to the decision problem.

For any unpublished studies, please provide a structured abstract in appendix A. If a structured abstract is not available, you must provide a statement from the authors to verify the data provided.

Any data that is submitted in confidence must be correctly highlighted. Please see section 1 of the user guide for how to highlight confidential information. Include any confidential information in appendix C.

Table 1 Summary of all relevant studies (published and unpublished)

Data source	Author, year and location	Patient population and setting	Intervention and comparator*	Unit costs	Outcomes and results	Sensitivity analysis and conclusion
(Ceresoli, Carissimi et al, 2020)	Ceresoli, 2020 Italy	Budget impact analysis from Italian hospital perspective Population undergoing abdominal surgery	Intervention: Plus Sutures Comparator: Conventional absorbable sutures	Cost of SSI (€4,838) and additional cost of Plus Sutures (€1)	Cost saving (per 100 patients) = €14,785 Minimal SSI reduction to be cost neutral = 1.2%	Baseline SSI rate and reduction in SSI rate had biggest impact on results PSA estimated 98% likelihood of Plus Sutures being cost-saving
(Fleck, Moidl et al, 2007)	Fleck, 2007 Austria	Retrospective cost analysis from Austrian hospital perspective (costs presented in US$) Population undergoing cardiac surgical procedures	Intervention: Plus Sutures Comparator: Conventional absorbable sutures	Cost of SSI ($11,200), cost of conventional suture ($21) and cost of Plus Sutures ($30)	Cost saving per 1,100 patients = $214,100 Assuming 50% infection reduction	None reported
(Leaper, Edmiston et al, 2017)	Leaper, 2017 UK	Model based cost analysis from NHS perspective Population undergoing any surgery requiring sutures	Intervention: Plus Sutures Comparator: Conventional absorbable sutures	Cost of SSI – value NR Cost of sutures – values NR	Overall mean cost saving per operation = £91·25 (90% CI: 49·62 to 142·76) Clean wound procedures: Overall mean cost savings per operation = £56·59 (17·20 to 104·93) Contaminated/dirty wound operations: Overall mean cost savings per operation = £248·23 (62·71 to 470·45)	PSA demonstrated cost savings to be significant (based on 90% CI) Changes in individual parameters did not change direction of results
(Leaper, Holy et al, 2020)	Leaper, 2020 US	Model based cost analysis from US commercial payer and Medicare perspective	Intervention: Plus Sutures	Cost of SSI varied by payer, time horizon and type of SSI from $16,026 to $164,471	Superficial and deep incisional SSIs at 12 months: Median costs avoided per patient for commercial payers was	Probabilistic analysis presented using confidence intervals in previous column

		Population undergoing colorectal surgery	Comparator: Conventional absorbable sutures	Cost of sutures – values NR	$1170 (95% CI, $146–$4884) and Medicare was $1036 (95% CI, $111–$4823) per patient Deep incisional SSIs only: Incremental costs avoided per patient were $809 (95% CI, $26–$4481) for commercial payers and Medicare $870 (95% CI, $33–$4624) per patient (note the terminology of median and incremental costs avoided is as reported in the paper. These are not defined, but incremental costs are assumed to report means rather than medians).	
(Mahajan, Pillai et al, 2020)	Mahajan, 2020 India	Model based cost analysis from Indian hospital (private and public) perspective Population undergoing any obstetrics and gynecology surgery	Intervention: Plus Sutures Comparator: Conventional absorbable sutures	Cost of SSI – value NR Cost of sutures – values NR	Cost-savings per patient: C-section at private hospital = Indian Rupee (INR) 5513 at public hospital = INR 791 Laparoscopic hysterectomy at private hospital = INR 4924 at public hospital = INR 999.	Model was most sensitive to the baseline incidence of SSI; however, changing this value did not change the direction of results. Model also reported to be sensitive to the efficacy of the triclosan-coated dressings
(Nakamura, Kashimura et al, 2013)	Nakamura, 2013 Japan	Trial based cost analysis from Japanese hospital (cost reported as US$) Population undergoing elective colorectal surgery	Intervention: Plus Sutures Comparator: Conventional absorbable sutures (Ethicon)	Cost of wound infection ($2,310) and additional cost of Plus Sutures ($10.80)	Cost saving of $40,219 ($42,444 to $2,225) in study based on 206 patients in intervention group and 204 in control group	None reported

(Singh, Bartsch et al, 2014)	Singh 2014 US	Model based cost analysis from US hospital, third-party payer and societal perspective Population adults undergoing abdominal surgery	Intervention: Plus Sutures Comparator: Conventional absorbable sutures	Cost of SSI is broken down by component and perspective. Unclear which overall cost was inputted into the model. Plus Sutures ($9.93), regular absorbable suture ($7.32)	Cost savings are presented in table 2 (of the publication) as part of a two-way sensitivity analysis. From hospital and third-party perspective savings occur provided there is a 10% risk of SSI and this is reduced by at least 10%. Cost savings always occur from a societal perspective.	Sensitivity analysis conducted on risk of SSI and efficacy of Plus Sutures as described in previous column. The model is sensitive to these parameters. All results are probabilistic.
(Stone, Gruber et al, 2010)	Stone, 2010 US	Cost analysis based on hospital billing records and RCT from US hospital perspective Population undergoing wound closure during cerebrospinal fluid shunting procedures	Intervention: Plus Sutures Comparator: Conventional absorbable sutures (Ethicon)	Cost of shunt infection is $88,132. Other procedure related costs are also included, but it is unclear if suture costs are captured.	Reduction in mean total cost per procedure can be calculated as $36,839 (total cost in placebo group) minus $19,412 (total cost in intervention group) = $17,427	No sensitivity analyses were reported.

NR: Not reported

CI: Confidence interval

INR: Indian rupee

SSI: Surgical site infections

PSA: Probabilistic sensitivity analysis

*All comparator sutures reported across these studies do not contain an antibacterial agent

2 Details of relevant studies

Please give details of all relevant studies (all studies in table 1). Copy and paste a new table into the document for each study. Please use 1 table per study.

Ceresoli, 2020	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: 30% reduction (RR of 0.70 with 95%CI 0.49 – 0.98) in incidence of SSI with Plus Sutures based on a meta-analysis. Resource use: fewer SSIs leading to lower medical health care use.
How are the findings relevant to the decision problem?	The study is partially aligned with the scope given the subset of scope population and Italian hospital perspective. The Italian Healthcare system (Sistema Sanitario Nazionale) is financed in a similar way to the UK NHS. The incentives to increase quality and efficiency of care (including infection prevention bundles and length of stay) are similar in the two systems. The relative decrease in LOS and costs associated with SSI should generalise to the NHS.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, reduced SSI, reduced SSI associated bed days and cost savings as a result of reduced treatment of SSIs with Plus Sutures versus conventional absorbable sutures.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Cost saving (per 100 patients) of €14,785. An additional cost of €600 required for sutures (per 100 patients), offset by savings from reduced SSIs €15,385 (€13,230 for additional LOS and €2,155 for additional resource use).
What are the limitations of this evidence?	The authors report that not all clinical studies used Plus Sutures in addition to application of all WHO recommendations for SSI prevention; however, sensitivity analysis estimates cost savings with a reduced effect size.
How was the study funded?	Johnson and Johnson funded medical writing services for this research. The authors received no financial support for the research, authorship, and publication of this article.

Fleck, 2007	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: assumed 50% reduction in incidence of SSI with Plus Sutures. No supporting evidence was provided for this assumption. Resource use: fewer SSIs leading to lower health care resource use.
How are the findings relevant to the decision problem?	The study compares Plus Sutures with conventional absorbable sutures as per the scope. The population are those undergoing cardiac surgery (a subset of the NICE scoped population). The analysis is undertaken from an Austrian hospital perspective, rather than NHS and PSS, so is only partially aligned with the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, cost savings as a result of reduced treatment of SSIs.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Cost saving per 1,100 patients = $214,100. This is equal to $195 per patient.
What are the limitations of this evidence?	The impact on SSI is assumed (and noted to be optimistic) and no sensitivity analyses were conducted. This reduction is higher than reported in the Part 1 submission and in other published sources.
How was the study funded?	Not reported

Leaper, 2017	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: odds ratio for SSI of 0.61 (95% CI 0.52 to 0.73) based on meta-analysis. Resource use: fewer SSIs leading to lower health care resource use.
How are the findings relevant to the decision problem?	The study compares Plus Sutures with conventional absorbable sutures as per the NICE MTG scope. The population is aligned with the scope and the study was from a UK NHS perspective. Additional information on clean and contaminated/dirty wound types is also provided.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, cost savings as a result of reduced treatment of SSIs leading to lower healthcare resources used.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Overall mean cost saving per operation related to use of Plus Sutures versus conventional sutures = £91.25 (90% CI: 49.62 to 142.76) A tornado diagram based on 95% CI showed no single input changed the direction of results. The cost of SSI was the key driver of the analysis. Clean wound procedures: Overall mean cost savings per operation = £56.59 (90% CI: 17.20 to 104.93) Contaminated/dirty wound operations: Overall mean cost savings per operation = £248.23 (90% CI: 62.71 to 470.45)
What are the limitations of this evidence?	Limitations were reported by the authors in relation to the definition of SSI and compliance with agreed care bundles for reducing SSIs. The direction of bias for both were unreported.
How was the study funded?	Funding not reported. One author is an employee of Johnson & Johnson. The authors declare no other conflict of interest.

Leaper, 2020	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: odds ratio reported to be the same as Leaper, 2017. Resource use: fewer SSIs leading to lower health care resource use.
How are the findings relevant to the decision problem?	The study compares Plus Sutures with Ethicon conventional absorbable sutures as per the NICE MTG scope. The population are those undergoing colorectal surgery (a subset of the scoped population). The analysis is undertaken from an US payer perspective. It is, therefore, partially aligned with the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, cost savings as a result of reduced treatment of SSIs.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Superficial and deep incisional SSIs at 12 months: Median costs avoided per patient for commercial payers was $1170 (95% CI, $146–$4884 and Medicare was $1036 (95% CI, $111–$4823) per patient Deep incisional SSIs only: Incremental costs avoided per patient were $809 (95% CI, $26–$4481) for commercial payers and Medicare $870 (95% CI, $33–$4624) per patient
What are the limitations of this evidence?	Limitations were reported in relation to the retrospective nature of the underlying database data collection.
How was the study funded?	Funding was provided by Ethicon, Inc (a Johnson and Johnson company).

Mahajan, 2020	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: efficacy rate reported as 51% (median value). No further detail is reported by the authors, but interpreted to mean a 51% reduction in SSI. Resource use: fewer SSIs leading to lower health care resource use.
How are the findings relevant to the decision problem?	The study compares Plus Sutures with Ethicon conventional absorbable sutures as per the scope. The population are a subset of the scoped population. The analysis is undertaken from an Indian hospital perspective. Therefore, the study is partially aligned with the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, cost savings as a result of reduced treatment of SSIs.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Cost-savings (per patient): C-section at private hospital = INR 5513 at public hospital = INR 791 Laparoscopic hysterectomy at private hospital = INR 4924 at public hospital = INR 999.
What are the limitations of this evidence?	The authors report that the impact on SSI is not fully established and the model is sensitive to this parameter.
How was the study funded?	No funding or conflicts are reported within the paper [sic]. However, all authors are employed by Johnson and Johnson.

Nakamura, 2012	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: 4.3% SSI with Plus Sutures and 9.3% SSI with conventional closure within 30 days post-discharge. Relative risk was NR, but calculated as 0.46. Resource use: fewer SSIs leading to lower health care resource use.
How are the findings relevant to the decision problem?	The study compares Plus Sutures with conventional absorbable sutures as per the scope. The population are those undergoing elective colorectal surgery (a subset of the scoped population). The analysis is undertaken from a Japanese hospital perspective. Therefore, the study is partially aligned with the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, cost savings as a result of reduced treatment of SSIs.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Cost saving of $40,219 (range of $42,444 to $2,225 reported) in study based on 206 patients in intervention group and 204 in control group
What are the limitations of this evidence?	The cost considerations are a minor part of this study.
How was the study funded?	Not reported

Singh, 2014	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: Varied over a range of 5 to 20% reduction in SSI risk with no base case value selected Resource use: fewer SSIs leading to lower health care resource use.
How are the findings relevant to the decision problem?	The study compares Plus Sutures with conventional absorbable sutures as per the scope. The population are adults undergoing abdominal surgery (a subset of the scoped population). The analysis is undertaken from US hospital, payer and societal perspective and is therefore partially aligned with the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, cost savings as a result of reduced treatment of SSIs are estimated provided sufficient baseline risk of SSI and efficacy of Plus Sutures.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Cost savings are presented in table 2 of the paper as part of a two-way sensitivity analysis. From hospital and third-party perspective savings occur provided there is a 10% baseline risk of SSI and this is reduced by at least 10% with Plus Sutures.
What are the limitations of this evidence?	None are reported within the study.
How was the study funded?	This study was supported by the National Institute of General Medical Sciences Models of Infectious Disease Agent Study and the Pennsylvania Department of Health.

Stone, 2010	
What are main differences in resource use and clinical outcomes between the technologies?	Clinical outcomes: 2 SSIs (4.3%) with Plus Sutures and 8 SSIs (21%) with conventional sutures. Relative risk NR but calculated as 0.20. Resource use: fewer SSIs leading to lower health care resource use.
How are the findings relevant to the decision problem?	The study compares Plus Sutures with conventional absorbable sutures as per the scope. The population are a subset of the scoped population (those undergoing cerebrospinal fluid shunting procedures). The analysis is undertaken from an US hospital perspective. The study is partially aligned with the scope.
Does this evidence support any of the claimed benefits for the technology? If so, which?	Yes, cost savings as a result of reduced frequency and therefore treatment of SSIs.
Will any information from this study be used in the economic model?	The underlying model structure has been used to inform the economic model.
What cost analysis was done in the study? Please explain the results.	Cost-savings per procedure of $17,427
What are the limitations of this evidence?	The authors report cost data from the database analysis is subject to limitations relating to its retrospective nature and the allocation of charge data to specific procedures.
How was the study funded?	No funding reported.

3 Economic model

This section refers to the de novo economic model that you have submitted.

Description

Patients

Describe which patient groups are included in the model.

The model includes adults and children that need wound closure after a surgical procedure and in whom absorbable sutures are an appropriate option.

The following subgroups are included in the model:

- Adults (18 years and above)
- Children (under 18)
- Clean wound procedures
- Non-clean wound procedures

Clean and non-clean wound classes were defined as per the clinical submission dossier with input from independent clinical experts (see Table 7a in the clinical submission dossier). For elements of the model (baseline infection risk with comparator sutures, cost of SSI, mortality) where surgical categories from the published literature could be mapped to clean and non-clean, a paper by Troughton et al was used to classify surgeries (Troughton, Birgand et al, 2018), and then validated by independent clinical experts.

Technology and comparator(s)

State the technology and comparators used in the model. Provide a justification if the comparator used in the model is different to that in the scope.

The technology, 'Plus Sutures' (Ethicon, Johnson & Johnson Medical Ltd), are a range of synthetic, absorbable sutures. The four variations of sutures are:

- PDS™ Plus Antibacterial (polydioxanone) Suture
- MONOCRYL™ Plus Antibacterial (poliglecaprone 25) Suture
- Coated VICRYL™ Plus Antibacterial (polyglactin 910) Suture
- STRATAFIX™ Plus Suture

STRATAFIX is not included explicitly within the decision problem table of the final scope. However, Plus technology is inclusive of the STRATAFIX range, and is described within the main section of the NICE scope. Therefore, it is included within the model.

The comparator used in the model is:

- Sutures that do not contain an antibacterial agent

This aligns with the scope. Of note, most of the studies presented in this economic submission used Ethicon sutures as both intervention and comparator in the models. The comparator is referred to as 'comparator sutures' throughout the rest of the submission.

Model structure

Provide a diagram of the model structure you have chosen in Appendix B.

Justify the chosen structure of the model by referring to the clinical care pathway outlined in part 1, section 3 (Clinical context) of your submission.

The model structure selected is based on the structures used in previous SSI models, such as the NICE health economic report for the NICE SSI Guideline and the recent NICE Medical Technology Guidance (MTG55) for Leukomed Sorbact for preventing surgical site infection (National Institute for Health and Care Excellence, 2019, National Institute for Health and Care Excellence, 2021).

Plus Sutures are intended to replace comparator sutures without antimicrobial coating. The model comprises a decision-analytic framework where patients enter a decision tree at the end of a surgical procedure, in which they have had closure with either Plus Sutures or comparator sutures. They then follow the pathway of SSI or no SSI, followed by survival or death. Patients who contract an SSI accrue additional mortality risk and additional costs, which incorporates hospital readmission, increased length of stay as well as other resource use that is required for the treatment of an SSI. As well as being aligned with models used in previous NICE guidance, the structure is also aligned with that used in previous published economic evaluations of Plus Sutures (described in full in Section 2) where by the risk of SSI in both arms was captured and the cost of this applied (Ceresoli, Carissimi et al, 2020, Fleck, Moidl et al, 2007, Leaper, Edmiston et al, 2017, Leaper, Holy et al, 2020, Mahajan, Pillai et al, 2020, Nakamura, Kashimura et al, 2013, Singh, Bartsch et al, 2014, Stone, Gruber et al, 2010). The input parameters were not aligned with these studies, rather the best available evidence relevant to the NICE scope and the NHS today was used.

As detailed in the Part 1 submission, Section 3, it is not anticipated that any system changes would be required to implement the technology, and no additional training is required for a health care professional to use Plus Sutures. Therefore, no additional resource costs were included in the model.

Adverse events were also not included in the model because no events were identified from the clinical review that were judged to have a substantial impact on quality of life or health care resource use. Those reported were considered unlikely to be related to the Plus technology, which was corroborated by independent clinical experts in Section 6 of the Part 1 submission. This is discussed further in the section on adverse event costs.

The primary endpoint of the model is the incremental per patient cost for a patient receiving Plus Sutures compared to a patient receiving conventional sutures over a one-year time-horizon. The per patient cost per SSI averted, the per patient cost per death avoided are also reported.

Table 2 Assumptions in the model

In this table, list the main assumptions in the model and justify why each has been used.

Assumption	Justification	Source
Risk of SSI relate only to those detected and treated during the initial inpatient episode or on readmission (SSIs detected and treated in the community not included)	In line with PHE data published for SSI incidence. The PHE report states that **"**The results in this national report include inpatient and readmission data only". This assumption was judged to be a conservative because Plus Sutures could also reduce SSIs in the community and therefore the baseline risk of SSI with comparator sutures would be understated in the model. Newton et al reports that 66.7% of patients with SSI presented in the community in their study of 1,559 colorectal surgery patients (Newton, Dewi et al, 2020).	(Public Health England, 2020) and validated by independent clinical experts
The average SSI episode cost does not include the cost of treatment for SSIs treated in the community.	This is based on the data regarding the cost of SSI from Jenks et al and aligns with the baseline data used for SSI risk. This was judged to be a conservative assumption because if there are follow up costs after hospital treatment for SSI that occur in the community or primary care then the cost of SSI from an NHS and PSS perspective used in the model may be understated.	(Jenks, Laurent et al, 2014) and validated by independent clinical experts
The relative risk reduction in infection with Plus Sutures derived from the meta-analysis is assumed to apply to baseline risk of infection with comparator sutures based on UK data (e.g. from PHE or Jenks et al. (Public Health England, 2020, Jenks, Laurent et al, 2014))	The studies used in the meta-analysis to derive the relative risk reduction were not used to inform the baseline risk of infection with comparator sutures because many were conducted outside of a UK setting and it was judged a UK source would be more appropriate	Assumption validated by independent clinical experts

Adverse events were not included in the model	No adverse events relating to use of Plus Sutures that were judged to have a substantial impact on quality of life or healthcare related resource use were identified in the clinical review and clinical expert input also confirmed this.	See section on adverse event costs for further explanation (follows Table 5). Validated by independent clinical experts.

Table 3 Clinical parameters, patient and carer outcomes and system outcomes used in the model

In this table, describe the clinical parameters, patient and carer outcomes and system outcomes used in the model.

Parameter/outcomes	Source	Relevant results	Range or distribution	How are these values used in the model?
Baseline risk of infection with comparator sutures				
Base case (all surgeries)	(Public Health England, 2020)	1.04% SSI incidence for inpatient and readmission displayed in table 2 (of the publication) for all surgeries – weighted average calculated based on the number of SSIs for each surgical category resulting in incidence of 1.0% for all surgeries. This was also applied in adults and children subgroups.	Lower and upper bound 0.5% to 9.1% (based on hip/knee replacement at the lower end to bile duct, liver or pancreatic surgery at the upper end) Distribution Beta (Alpha: 7040, Beta 670303)	Baseline risk of infection with comparator sutures is used in the base case and adult and children subgroups to estimate the proportion of patients experiencing an SSI with comparator sutures. The lower and upper bound are used for deterministic sensitivity analyses (DSA) and are based on the lowest and highest reported incidence in the Public Health England data. The input is varied in probabilistic sensitivity (PSA) in line with the distribution reported which is also based on the Public Health England data. The PSA was parameterized based on all surgeries and therefore it does not vary as widely as the range used in the DSA.
Adults (subgroup)				The data used in the base case was primarily from adults and therefore judged applicable for this subgroup.
Children (subgroup)				The data used in the base case was primarily from adults. The applicability of this is discussed after Table 4.
Clean (subgroup)	(Troughton, Birgand et al, 2018, Public Health England, 2020)	0.8% SSI incidence for inpatient and readmission displayed in table 2 (of the publication) for clean surgeries as assessed by Troughton et al. – weighted average calculated based on the number of SSIs for each surgical category resulting in incidence of 0.8% for surgeries likely to result in clean wounds.	Lower and upper bound 0.5% to 3.0% (based on hip/knee replacement at the lower end to coronary artery bypass graft at the upper end) Distribution Beta (Alpha: 5186, Beta 645042)	0.8% is used for the clean subgroup to estimate the proportion of patients experiencing an SSI with comparator sutures for surgeries likely to result in clean wounds based on Troughton et al. The lower and upper bound are used for DSA and are based on the lowest and highest reported incidence in the Public Health England data for clean surgeries only. The input is varied in PSA in line with the distribution reported which is also based on the Public Health England data. The PSA was parameterized based on all

Parameter/outcomes	Source	Relevant results	Range or distribution	How are these values used in the model?
				surgeries and therefore it does not vary as widely as the range used in the DSA.
Non-clean (subgroup)		6.8% SSI incidence for inpatient and readmission displayed in table 2 (of the publication) for non-clean surgeries as assessed by Troughton et al. – weighted average calculated based on the number of SSIs for each surgical category resulting in incidence of 6.8% for surgeries likely to result in non-clean wounds.	Lower and upper bound 1.8% to 9.1% (based on abdominal hysterectomy at the lower end to bile duct, liver or pancreatic surgery at the upper end) Distribution Beta (Alpha: 1854, Beta 25261)	6.8% is used for the non-clean subgroup to estimate the proportion of patients experiencing an SSI with comparator sutures for surgeries likely to result in non-clean wounds based on Troughton et al. The lower and upper bound are used for DSA and are based on the lowest and highest reported incidence in the Public Health England data for non-clean surgeries only. The input is varied in PSA in line with the distribution reported which is also based on the Public Health England data. The PSA was parameterized based on all surgeries and therefore it does not vary as widely as the range used in the DSA.
Relative risk of infection with Plus Sutures				
Base case (all surgeries and all Plus Suture types including STRATAFIX)	Meta-analyses result as reported in Clinical submission dossier, Section 7, figure 7h	0.71	Lower and upper confidence interval 0.64 to 0.79 Distribution Lognormal (ln mean: -0.342, ln SE: 0.0537)	This is used in the model to calculate the proportion of patients experiencing an SSI with Plus Sutures by multiplying the baseline risk with comparator sutures (for the relevant subgroup) by the relative risk with Plus Sutures. The lower and upper confidence interval is used in DSA and the input is varied in PSA. Both range and distribution are from the meta-analysis results reported in the clinical submission dossier (Section 7) for the fixed effects model. We used the meta-analysis result with STRATAFIX to ensure that all Plus Sutures were captured.
Adults (subgroup)	Meta-analyses result as reported in Clinical submission dossier, Section 7, figure 7d	0.73	Lower and upper confidence interval 0.65 to 0.82	As above, but meta-analysis results based on adult subgroup analyses.

Parameter/outcomes	Source	Relevant results	Range or distribution	How are these values used in the model?
			Distribution Lognormal (ln mean: -0.315, SE: 0.0893)	
Children (subgroup)	Meta-analyses result as reported in Clinical submission dossier, Section 7, figure 7e	0.52	Lower and upper confidence interval 0.32 to 0.87 Distribution Lognormal (ln mean: -0.654, SE: 0.2551)	As above, but meta-analysis results based on children subgroup analyses.
Clean (subgroup)	Meta-analyses result as reported in Clinical submission dossier, Section 7, figure 7f	0.75	Lower and upper confidence interval 0.62 to 0.9 Distribution Lognormal (ln mean: -0.288, SE: 0.0951)	As above, but meta-analysis results based on clean subgroup analyses.
Non-clean (subgroup)	Meta-analyses result as reported in Clinical submission dossier, Section 7, figure 7g	0.66	Lower and upper confidence interval 0.54 to 0.8 Distribution Lognormal (ln mean: -0.416, SE: 0.1003)	As above, but meta-analysis results based on non-clean subgroup analyses.
Mortality associated with SSI				
Base case (all surgeries) Adults (subgroup) Children (subgroup)	(National Institute for Health and Care Excellence, 2019, Public Health England, 2017)	1.87% Mortality with SSI for 'All surgery' presented in table HE08 in the NICE economic report: 1.87%. This was also used for adult and children subgroups.	Lower and upper confidence interval 1.6% to 2.2% Distribution Beta (Alpha: 157, Beta 8225)	This value was used in the model to estimate the proportion of patients dying after contracting an SSI. It was used in the base case for all surgeries as well as for the Adult and Children subgroups. The lower and upper values were calculated using the mean and the number of SSIs reported in the data from the PHE 2017 report and used for DSA. This input was varied in PSA in line with the distribution presented (based on PHE 2017

Parameter/outcomes	Source	Relevant results	Range or distribution	How are these values used in the model?
				data combined with the mean value from the NICE economic report).
Clean (subgroup)		Clean = 2.55% Non-clean = 2.54% Mortality with SSI for each surgical category from the NICE economic report was weighted by the number of SSI by surgery from the Public Health England 2017 data. The 2017 PHE report was used because the mortality reported in the NICE SSI guideline is based on this dataset. This approach was taken for clean and non-clean surgical groups respectively as per Troughton et al. (Troughton, Birgand et al, 2018). This resulted in values of 2.55% and 2.54% for clean and non-clean subgroups. It is noted that the value for all surgeries reported in the NICE economic report could not be replicated so values for clean and non-clean are both higher than that used for the all surgery, adult and children subgroups.	Lower and upper bound 2.1% to 3.0% Distribution Beta (Alpha: 125, Beta 4781)	These values were used in the model to estimate the proportion of patients dying after contracting an SSI for the clean and non-clean subgroups. The lower and upper values were calculated using the calculated mean mortality value and the number of SSIs for clean and non-clean wounds (as per Troughton et al) reported in the data from the PHE 2017 report and used for DSA. This input was also varied in PSA in line with the distribution presented (based on PHE 2017 data for clean and non-clean surgeries combined with the mean values from the NICE economic report by surgery type). It is noted that the overall mean value reported in the NICE economic report for all surgeries (1.87%) could not be replicated and so the values calculated for clean and non-clean subgroups are both higher than that reported for all surgeries in the NICE economic report.
Non-clean (subgroup)			Lower and upper bound 2.0% to 3.1% Distribution Beta (Alpha: 88, Beta 3388)	
Mortality for those without an SSI				
Base case (all surgeries)	(National Institute for Health and Care Excellence, 2019, Public Health England, 2017)	1.30% Mortality without SSI for 'All surgery' presented in table HE08 in the NICE economic report: 1.30%. This was also used for adult and children subgroups.	Lower and upper confidence interval 1.27% to 1.33% Distribution Beta (Alpha: 8507, Beta 645854)	This value was used in the model to estimate the proportion of patients dying for those who did not experience an SSI. It was used in the base case for all surgeries as well as for the Adult and Children subgroups. The lower and upper values were calculated using the mean and the number of surgeries that did not result in SSIs reported in the data from the PHE 2017 report and used for DSA. This input was varied in PSA in line with the distribution presented (based on PHE 2017 data combined with the mean value from the NICE economic report).

Parameter/outcomes	Source	Relevant results	Range or distribution	How are these values used in the model?
Adults (subgroup)	As above	As above	As above	As above
Children (subgroup)	As above	As above	As above	As above
Clean (subgroup)	As above	Clean = 1.30% Non-clean = 2.45% Mortality without an SSI for each surgical category was weighted by the number of SSI by surgery from the Public Health England 2017 data. The 2017 report was used because the mortality reported in the NICE report is based on this dataset. This approach was taken for clean and non-clean surgical groups respectively as per Troughton et al. (Troughton, Birgand et al, 2018). This resulted in values of 1.30% and 2.45% for clean and non-clean subgroups. It is noted that the value for all surgeries reported in the NICE economic report could not be replicated so values for clean and non-clean are both higher than that used for the all surgery, adult and children subgroups.	Lower and upper confidence interval 1.27% to 1.33% Distribution Beta (Alpha: 7758, Beta 586101)	These values were used in the model to estimate the proportion of patients dying for those who did not experience an SSI for the clean and non-clean subgroups. The lower and upper values were calculated using the calculated mean mortality value and the number of surgeries without SSIs for clean and non-clean wounds (as per Troughton et al) reported in the data from the PHE 2017 report and used for DSA. This input was also varied in PSA in line with the distribution presented (based on PHE 2017 data for clean and non-clean surgeries combined with the mean values from the NICE economic report by surgery type). It is noted that the overall mean value reported in the NICE economic report for all surgeries (1.3%) could not be replicated and so the values calculated for clean and non-clean subgroups are both higher than that reported for all surgeries in the NICE economic report.
Non-clean (subgroup)	As above		Lower and upper confidence interval 2.33% to 2.58% Distribution Beta (Alpha: 1414, Beta 58300)	

If any outcomes listed in table 3 are extrapolated beyond the study follow-up periods, explain the assumptions that underpin this extrapolation.

No extrapolation of outcomes beyond the study period took place. Mortality with and without SSI was not assessed within the clinical evidence identified on Plus Sutures, however, it was included within the model. This was based on whether a patient contracted an SSI or not using data from the NICE clinical guideline on prevention and treatment of SSIs (National Institute for Health and Care Excellence, 2019). This was calculated as described in Table 3, using the data presented in the NICE economic report. To summarise, the mortality data from the NICE report was combined with the number of surgeries and infections reported in the PHE 2017 data to calculate a weighted average mortality with and without SSI for the clean and non-clean subgroups (Public Health England, 2017). Mortality has no impact on the results of the model in terms of the incremental cost savings and is presented as an additional clinical outcome and to determine the cost per death averted.

Table 4 Other parameters in the model

Describe any other parameters in the model. Examples are provided in the table. You can adapt the parameters as needed.

Parameter	Description	Justification	Source
Time horizon	1 year	Incidence and treatment of SSI is likely to occur within a short time frame i.e. less than 1 year. This is aligned with the published economic evaluations on Plus Sutures (described in Section 2). The NICE SSI guideline model captured events and costs of SSI occurring within 30 days, but captured quality-adjusted life years (QALYs) over a lifetime. As QALYs are not included within this model a short timeframe is sufficient.	Jenks 2014 (Jenks, Laurent et al, 2014), expert clinical opinion
Discount rate	Not applicable	The time horizon is 1 year and so it is not necessary as per NICE methods guide.	NICE methods guide (National Institute for Health and Care Excellence (NICE), 2017)
Perspective (NHS/PSS)	NHS/PSS	In line with the NICE scope.	Not applicable
Cycle length	Not applicable	The model has no time-dependent probabilities.	Not applicable

Explain the transition matrix used in the model and the transformation of clinical outcomes, health states or other details.

A transition matrix was not used in the model given that a Markov approach was not used.

Clinical outcomes were based on sources stated in Table 3, i.e. the probability of following each arm within the decision tree. The values used are replicated here with further detail is provided.

Baseline infection risk when using sutures without antimicrobial coating (value = 1.04%)

Baseline infection risk of 1.04% with comparator sutures were derived from Public Health England surveillance data on SSI. However, Plus Sutures are currently sold in the UK and therefore could have partially influenced this baseline incidence. It was recognised that this is likely to under-report the occurrence of SSI in the NHS, and therefore this was judged to be a conservative estimate in the model. The NICE guideline committee advised, when developing the NICE guidelines on the prevention and treatment of SSIs, that the PHE registry is likely to be subject to important selection biases that may produce lower estimates of SSI incidence than are observed in practice (National Institute for Health and Care Excellence, 2019). They noted that infection rates in the Jenks 2014 study may be more representative of SSI incidence observed in practice as it counted all surgical procedures. Independent clinical experts consulted for this submission also confirmed that PHE data is likely to under-report the incidence of SSI and provided additional references (Tanner, Padley et al, 2013, Singh, Davies et al, 2015). For the purposes of the base case model; however, independent clinical experts consulted advised that there have been multiple measures introduced over the last 10 years to reduce SSI and so it was judged that the PHE data may be a more conservative estimate to use. The impact of using the Jenks data was explored in scenario analyses (Public Health England, 2020, Jenks, Laurent et al, 2014). The SSI incidence for all surgeries was calculated for the base case by taking the total number of SSI reported in all surgical categories for inpatient and readmission and dividing by the total number of operations. This gave an incidence of 1.04%.

The baseline infection risk of 1.04% was also used for the adult and children subgroups as no data were identified that was judged to be more representative of these subgroups. The majority of surgical procedures in the PHE data appear to be from an adult population, and therefore using the PHE data to reflect the SSI incidence in adults was judged to be reasonable (Public Health England, 2020).

Clinical advice was sought on the relevance of the PHE data to children. Experts noted that the reported risk of SSI in children varies significantly depending on the source of reporting. The majority of the data relate to the most common abdominal surgical emergency that is appendectomy. The 'Getting it right first time' (GIRFT) survey collected some data in April 2017 specific to a paediatric population in emergency appendectomy (4.8%) (Wong, Ho et al, 2019). Similar SSI risks in children have been reported in a systematic review and meta-analysis in Europe (5%) (Danwang, Bigna et al, 2020), the US (5.1% with range of 1.4% to 12.4%) (Boomer, Cooper et al, 2014), and in high development index countries (6.3%) (GlobalSurg Collaborative, 2020). Independent clinical experts would expect the UK incidence of SSI to be similar to those reported in the previous sentence. Therefore, the use of the PHE data in the model for the children subgroup is judged to be conservative.

For the baseline risk of infection in clean (0.8%) and non-clean (6.8%) subgroups the PHE data was also used and in addition, the surgical categories were split into those most likely to result in a clean and unclean wound. Data on wound class was provided in the PHE data but only as a proportion of the surgeries that had a contaminated or dirty wound. It was not clearly reported how this was assessed in the data and it was also reported that 'unknown' was an available response option. Therefore, rather than use this data the surgeries were classified in line with Troughton et al 2018, and validated by independent clinical experts. The following surgeries were classified as clean:

- Breast surgery

- Cardiac surgery (non-CABG)
- Coronary artery bypass graft
- Cranial surgery
- Hip replacement
- Knee replacement
- Limb amputation
- Reduction of long bone fracture
- Repair of neck of femur
- Spinal surgery
- Vascular surgery

The following surgeries were classified as non-clean:

- Abdominal hysterectomy
- Bile duct, liver or pancreatic surgery
- Cholecystectomy
- Gastric surgery
- Large bowel surgery
- Small bowel surgery

Surgical Site Infection risk with Plus Sutures (value = 0.71)

The post-surgery SSI risk with Plus Sutures was calculated using the relative risk (RR) of infection derived from the meta-analysis as reported in the clinical submission (part 1, specifically the fixed effects estimate including STRATAFIX in Figure 7h) and applying this RR to the base case SSI risk from PHE. The RR derived from the fixed effects model was used in line with the conclusions drawn in the clinical submission with the random effects model used in a scenario analysis. The RR from the sensitivity analysis including STRATAFIX studies was used for the base case analysis, with RRs for each of the subgroups – children, adults, clean and non-clean used for each of the subgroup analyses.

Resource identification, measurement and valuation

Technology costs

Provide the list price for the technology (excluding VAT).

MONOCRYL Plus £4.60
PDS Plus £5.11
VICRYL Plus £3.56

Blended price = £4.13

All variations of suture (polymer, length, gauge, needle, including barbed design/STRATAFIX) are included in the intervention and comparator prices.

List prices have been used to provide the most consistent pricing available to the NHS. [redacted]

[redacted]

We have provided a weighted average of list prices based on volumes supplied to the NHS, to reflect an average price per suture strand, taking account of all individual suture code characteristics (suture polymer, gauge, length, needle, and suture design, including barbed sutures) to cost both Plus Sutures and comparator sutures.

The cost used in the model for Plus Sutures is: £4.13

The cost used in the model for comparator sutures is: £3.28

Ethicon conventional absorbable sutures were used to estimate the cost of the comparator used in the model because:

- This aligns with the clinical evidence submission where the majority of trials compared Plus Sutures to other Ethicon conventional absorbable sutures (i.e. Ethicon sutures that do not contain an antibacterial agent).
- List prices for non-Ethicon products are not known and can only be estimated.

[redacted]

If the list price is not used in the model, provide the price used and a justification for the difference.

The list price has been used in the model, with a weighted average calculated.

NHS and unit costs

Describe how the clinical management of the condition is currently costed in the NHS in terms of reference costs, the national tariff and unit costs (from PSSRU and HSCIC). Please provide relevant codes and values (e.g. OPCS codes and ICD codes) for the operations, procedures and interventions included in the model.

There is no NHS tariff code specifically for a SSI. The following codes were identified from reference costs and the national tariff that may be relevant. However, it is noted that these are not specific to SSI and SSI may occur as part of the initial episode cost for a surgical procedure rather than a new admission.

WH07A Score 2+	Infections or Other Complications of Procedures, with Multiple Interventions, with CC
WH07B Score 0-1	Infections or Other Complications of Procedures, with Multiple Interventions, with CC
WH07C Score 2+	Infections or Other Complications of Procedures, with Single Intervention, with CC
WH07D Score 0-1	Infections or Other Complications of Procedures, with Single Intervention, with CC
WH07E 4+	Infections or Other Complications of Procedures, without Interventions, with CC Score
WH07F 2-3	Infections or Other Complications of Procedures, without Interventions, with CC Score
WH07G 0-1	Infections or Other Complications of Procedures, without Interventions, with CC Score

Resource use

Describe any relevant resource data for the NHS in England reported in published and unpublished studies. Provide sources and rationale if relevant. If a literature search was done to identify evidence for resource use then please provide details in appendix A.

Cost of SSI

The cost used in the model for SSI in the base case was £6,016.

Jenks et al 2014 report the cost of SSI from a study conducted in a single centre in the UK NHS between 2010 and 2012 (Jenks, Laurent et al, 2014). This has been widely used in UK economic evaluations to cost SSIs. The costs reported by Jenks are also reported by surgery type. This source has been used in the model to cost SSI and has been inflated from 2011/12 to the current price year (2019/20) using Personal Social Services and Research Unit Healthcare inflation indices (Personal Social Services Research Unit (PSSRU), 2020). This approach was used in a recent submission to MTEP (MTG55) and was accepted by the EAC and NICE committee as an acceptable source for the cost of SSI in the economic model (National Institute for Health and Care Excellence, 2021).

The length of stay data reported by Jenks were also used in the NICE SSI guideline model to calculate approximate mean excess bed days for SSI by surgery type. This was combined with a cost per bed

day from NHS reference costs to calculate the cost associated with SSI (National Institute for Health and Care Excellence, 2019). Using this approach, SSIs are potentially the most costly in gastric surgery (29.0 additional bed days, costing £9,056) and the least costly in breast surgery (2.6 additional bed days, costing £823). These costs are restricted to length of stay in hospital and do not include the costs of other resources that may be attributable to SSI so would likely understate the cost. These other resources include:

- Antibiotic use – Information in Part 1 on antibiotic use was limited. However, NICE guideline stipulates that "when surgical site infection is suspected by the presence of cellulitis, either by a new infection or an infection caused by treatment failure, give the patient an antibiotic that covers the likely causative organisms" (National Institute for Health and Care Excellence, 2020)
- Readmission - GIRFT data from 95 NHS Trusts reported a cost of £5,065 per subsequent admission (i.e. readmission) due to SSI (April 2019)
- Repeat surgery – GIRFT data reported that 1807 SSI cases (36.2%) reported reoperation in their survey (Wong, Ho et al, 2019)

It is acknowledged that the Jenks source is quite outdated and likely to be a conservative estimate, however, no other source was identified which was judged to better represent the cost of treating an SSI in the NHS today. Independent clinical experts were asked about any significant changes in the treatment of SSI that may impact on the cost of treating SSI over the last 10 years. One expert noted that there has been an increase in the number of infections caused by multi-drug resistant bacteria which could result in longer duration of IV antibiotics and longer admissions in hospital or IV antibiotics in the community. Another expert added that complexity of NHS care is increasing in terms of multi-morbidity of the population. Both of which would likely increase the cost of treating an SSI since the paper was published.

The cost reported by Jenks et al incorporates costs attributable to operating theatres, critical care, wards, medical and other clinical staff, pathology services, imaging and other diagnostics, pharmacy services and drugs, prosthetics and implants, blood products, other therapies, overheads and 'other' costs. The overall median cost attributable to SSI for all categories of surgery was used for the base case, and the adults and children subgroups to cost SSI in the model.

Clean and non-clean subgroups

Jenks et al 2014 reports a different median cost attributable to SSI for each category of surgery. These were used to calculate a cost of SSI for the clean and non-clean subgroups. The categories of surgery were categorised as clean and non-clean in line with the Troughton 2018 paper (which was used to categorise the same surgeries from the PHE data for the baseline risk of infection and mortality used in the model) and validated with independent clinical experts (Troughton, Birgand et al, 2018). The cost for each surgical category was weighted by the number of infections for that category as reported by Public Health England in their SSI surveillance report for 2020 for the clean and non-clean surgeries (Public Health England, 2020). The PHE data was used for the number of infections because it is a larger data set than that used in the Jenks study and was judged to better reflect the distribution of surgery types in the NHS today for the subgroups. This resulted in a cost of £7,543 for SSIs resulting from clean wounds and a cost of £6,227 resulting from non-clean wounds. Independent clinical experts were queried about the potential reasons that SSIs resulting from clean wound procedures might be more costly than non-clean wound procedures and noted that clean wound procedures encompass the following:

- Cardiac surgical procedures which require admission to high dependency units and intensive care units during the primary procedure and during additional procedures to treat infections. Admission to these high cost units is linked to underlying cardiac pathology and a high level of comorbidities such as high BMI, diabetes etc. in this cohort of patients.

- Procedures where the infection may affect the bone (hip, knee, femur, sternum), and the treatment of bone infection requires frequently prolonged IV antibiotics and multiple surgical debridement.
- Procedures where there is use of prosthetic material (cardiac surgery, hip, knee). Treatment of infection where there is use of prosthetic material occasionally requires the replacement of the prosthesis and drives routinely prolonged antibiotic courses to reduce the chances of re-infection of the prosthesis.
- Procedures that are on average performed on an elderly cohort of patients.

Number of sutures

The number of sutures in the base case analysis is based on a study by Leaper et al. who used an average requirement of 5 sutures for surgery (Leaper, Holy et al, 2020). This is based on communication from an author and is not reported in the published paper. Additionally, independent clinical experts independently advised that whilst the range for the number of sutures required can vary, an average of 5 per procedure would be reasonable. There was not anticipated to be any difference in the number of sutures between comparator sutures and Plus Sutures. The number of sutures and the range across different surgery types is explored further in sensitivity and a scenario analysis. Independent clinical experts agreed that approximately 85% of surgical procedures would require a range of between 3 and 9 sutures per surgery.

Describe the resources needed to implement the technology in the NHS. Please provide sources and rationale.

No additional resources would be needed to implement Plus Sutures in the NHS, as the technology represents a direct replacement of one range of sutures with another within the current treatment pathway. No additional training is required for a health care professional to use Plus Sutures.

Training programmes on SSI prevention including the implementation of Plus Sutures are provided by J&J/Ethicon at no cost to healthcare professionals, however, they are not a prerequisite to the safe and effective use of Plus Sutures, therefore no additional costs or resources are required for the NHS. These programmes should be considered as standalone which may provide additional benefit beyond the suture. The studies included within the clinical submission and used for the relative risk of SSI with Plus Sutures do not mention these programs as being part of the reduced risk.

Describe the resources needed to manage the change in patient outcomes after implementing the technology. Please provide sources and rationale.

No additional resources would be needed to manage the change in patient outcomes after implementing Plus Sutures as the technology represents a direct replacement of one range of sutures with another within the current treatment pathway. It is anticipated that the change would result in fewer patients developing SSIs, which would consequently release NHS resources.

Describe the resources needed to manage the change in system outcomes after implementing the technology. Please provide sources and rationale.

No additional resources would be needed to manage the change in system outcomes after implementing Plus Sutures as the technology represents a direct replacement of one range of sutures with another within the current treatment pathway.

Table 5 Resource use costs

In this table, summarise how the model calculates the results of these changes in resource use. Please adapt the table as necessary.

	Plus Sutures costs	**Comparator sutures costs***	**Difference in resource use costs**
Cost of resource use associated with SSI			
Base case (all surgery), Adults, Children	£6,016	£6,016	£0
Clean subgroup	£7,543	£7,543	£0
Non-clean subgroup	£6,227	£6,227	£0
Cost of sutures per patient Number of sutures x cost of sutures	5 x £4.13 = £20.65	5 x £3.28 = £16.40	£4.25
Total costs without an SSI	Base case = £20.65	Base case = £16.40	£4.25**
Total costs with an SSI	Base case = £6,037 Adults/Children subgroups = £6,037 Clean subgroup = £7,564 Non-clean subgroup = £6,247	Base case = £6,032 Adults/Children subgroups = £6,032 Clean subgroup = £7,559 Non-clean subgroup = £6,243	£4.25**
* Sutures that do not contain an antibacterial agent ** Note that these do not include the differing incidence of SSI between the treatment and comparator			

Adverse event costs

If costs of adverse events were included in the analysis, explain how and why the risk of each adverse event was calculated.

Adverse events were not included in the model based on the clinical evidence submission. As reported in Table 6 of the clinical evidence submission, 13 studies included in the clinical review reported the occurrence of adverse events. The studies were mixed in terms of the occurrence of adverse events with Plus Sutures and comparator sutures. Five studies reported more adverse events in the Plus Sutures treatment arm (but none were reported to be a statistically significant difference, and two were not confirmed to be suture related), and 3 studies reported more adverse events with comparator sutures (again not statistically significant). Additionally, none of the adverse events appeared to be events that might have a substantial impact on resource use, costs or patient quality of life. The majority appear to be related to adverse skin reactions. The only one that appeared to be serious was that reported in Ruiz-Tovar 2015 which reported death prior to assessment of outcomes due to multi-organ failure secondary

to septic status. Although it is scientifically impossible to say for certain that this event was not related to sutures, in the context of a surgical procedure it is extremely unlikely that the septic status was driven by the sutures rather than any other source of infection. Additionally, SSIs and mortality related to these are captured elsewhere in the model.

No adverse events were found in a search of the MHRA database on Plus Sutures as detailed in Section 6 of the clinical submission dossier. Some adverse events reports were returned from a search of the FDA Maude database (full details were provided in Section 6 of the clinical submission dossier); however, the events reported are a combination of events secondary to the surgical technique and events that are multifactorial. With the information available it is difficult to attribute the cause of the event to the suture used and even more to the Plus technology, as the event reported affected both types of suture. Additionally, this [redacted]. A total of 870 reports were returned. [redacted] A summary of the types of events reported is provided in Section 6 of the clinical submission dossier but were judged to be unlikely to have significant impacts on costs or quality of life for patients as a result of Plus Sutures. SSI was also reported on this database which would already be captured within the model.

Three independent clinical experts were also consulted and reported that in their experience, the use of Plus Sutures had not resulted in any significant or serious adverse events that required treatment or would impact on a patient's quality of life.

[redacted]

Table 6 Adverse events and costs in the model

In this table, summarise the costs associated with each adverse event included in the model. Include all adverse events and complication costs, both during and after long-term use of the technology. Please explain whether costs are provided per patient or per event.

Table not applicable, adverse events were not included in the model

Miscellaneous costs

Describe any additional costs or resource considerations that have not been included elsewhere (for example, PSS costs, and patient and carer costs). If none, please state.

No other costs were included in the model that have not been discussed.

Are there any other opportunities for resource savings or redirection of resources that have not been possible to quantify?

Costs in the community and social care were not considered in the model because the clinical data was based around SSIs that occurred during an inpatient admission or a readmission. However, there may be SSIs that occur and are treated within a community or social care setting which would not be captured within the model. Newton et al reported that 66.7% of patients with SSI in their study (1,559 colorectal surgery patients) presented in the community to either a GP or community nurse (Newton, Dewi et al, 2020). Data are not available on whether Plus Sutures would reduce the risk of these types of infections; however, if they do then this would result in further cost savings with the introduction of Plus Sutures. Furthermore, any follow up costs that are incurred in the community or social care from an infection that did occur and was treated within a hospital setting would also not be captured in the model. As stated in Jenks 2014 (the source used for cost of SSI in the model) the cost data collected were specific to a hospital setting and therefore the financial burden of SSI on the health care system outside of this setting would not have been captured (Jenks, Laurent et al, 2014). Therefore, the cost of SSI could be underestimated in the model due to not capturing costs related to the community such as those that would fall on primary care, patients and social services/social care.

Litigation costs are also not considered in the model; however, it is expected that an SSI could potentially result in these in some cases as noted in the GIRFT national survey of SSI across NHS Trusts in England where 383 medical negligence claims relating to SSI were captured between April 2012 to March 2017, estimated to cost £35.2 million (Wong, Ho et al, 2019). To provide context to this litigation cost, based on PHE data, there were 8,382 SSIs between April 2012 and March 2017 (Public Health England, 2017). Using the cost per SSI in the model of £6,016 suggests a total cost of SSI treatment of over £50 million.

Any additional costs that may be associated with mortality are also not captured in the model so as to avoid potential double counting with the cost of SSI that was included.

*Total costs

In the following tables, summarise the total costs:

- Summarise total costs for the technology in table 7.
- Summarise total costs for the comparator in table 8. This can only be completed if the comparator is another technology.

Table 7 Total costs for the technology in the model

Description	Cost	Source
Cost of Plus Sutures per patient	£20.65	Average number of sutures = 5 based on clinical expert opinion and Leaper et al 2020 and clinical expert opinion (Leaper, Holy et al, 2020). This is multiplied by £4.13 which is based on the weighted average (by J&J sales data) of the list prices of the 4 different types of Plus Sutures.

Table 8 Total costs for the comparator in the model

Description	Cost	Source
Cost of comparator sutures per patient	£16.40	Average number of sutures = 5 based on Leaper et al 2017 and clinical expert opinion (Leaper, Edmiston et al, 2017). This is multiplied by £3.28 which is based on the weighted average (by J&J sales data) of the list prices for non-Plus J&J sutures.

Results

Table 9 Base-case results

In this table, report the results of the base-case analysis. Specify whether costs are provided per treatment or per year. Adapt the table as necessary to suit the cost model. If appropriate, describe costs by health state.

Table 9: Base case results – Differences in costs

	Plus Sutures	Comparator sutures*	Difference (Plus Sutures minus Comparator)**
Device cost (Mean cost per patient - £)	£20.65	£16.40	£4.25
Cost of SSI treatment (Mean cost per patient - £)	£44.39	£62.53	-£18.13
Total per patient	£65.04	£78.93	-£13.88
Total (per 1,000 patients)	£65,045	£78,928	-£13,883

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Table 9a: Cost per clinical outcome averted, presented for 1,000 patients

	Plus Sutures	Comparator sutures*	Difference (Plus Sutures minus Comparator)**
Number of SSIs per 1,000 patients	7.4	10.4	-3.0
Cost per SSI averted			**Dominant**
Number of deaths per 1,000 patients	13.04	13.06	-0.02
Cost per death averted			**Dominant**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Scenario analysis

If relevant, explain how scenario analyses were identified and done. Cross-reference your response to the decision problem in part 1, section 1 of the submission.

The following scenario analyses were conducted to assess areas of the model where conservative assumptions around the applicability of data were used. These are as follows:

- The baseline risk of SSI with comparator sutures and the source used to populate this in the base case is likely to under-report the incidence of SSI (PHE surveillance data, 2020) and thus be conservative. In order to address this a scenario was run using an alternative source for the baseline risk of SSI (Jenks et al 2014) (Jenks, Laurent et al, 2014). Threshold/breakeven analysis was also conducted.
- A choice was made to use the results from the fixed effects model from the meta-analysis conducted as part of the clinical evidence submission. Choosing the random effects model results in a slightly different relative risk of SSI with Plus Sutures. Therefore, in order to assess the robustness of the base case results and test the impact of this choice the relative risk calculated using the random effects model is tested in a scenario analysis. Threshold/breakeven analysis was also conducted to assess any uncertainty reflected in the confidence intervals from the meta-analysis.

Subgroup analyses were conducted in line with the scope and are reported under Miscellaneous results.

Describe the differences between the base case and each scenario analysis.

The following scenarios were run in the model:

1. Alternative Baseline SSI risk for comparator sutures was used in this scenario based on incidence reported in Jenks et al rather than the PHE 2020 data used in the base case (Public Health England, 2020, Jenks, Laurent et al, 2014). This was run to address the under-reporting of SSI within the PHE data and determine what impact using the higher risk from Jenks et al would have on the results of the model. Using the incidence reported in Jenks is also consistent with the cost source used in the model. A similar scenario was conducted by the External Assessment Centre for the recent MTEP guidance MTG55 (National Institute for Health and Care Excellence, 2021). Independent clinical experts were asked whether there have been significant changes to clinical practice in the last 10 years that may have impacted on the incidence of SSI in the NHS and they noted that multiple measures have been introduced to reduce SSI which would be applicable to all surgeries. They were also asked which of the published SSI rates were more representative of their own experiences in clinical practice, and advised that average baseline infection risk across the NHS would be expected to vary between surgery types and hospitals. It is plausible that Jenks remains a conservative estimate, particularly in light of recent 12-month Hospital Episode Statistics (HES) analysis showing a national inpatient SSI rate of 3.3% across 767,278 procedures covering 28 different surgical specialities and procedures (Johnson & Johnson data on file).
2. Alternative meta-analysis results using the results from the random effects model in a scenario, rather than fixed effects (used in the base case), was run to assess the impact of using this on the results of the model.

The different values used for each scenario in the table below.

Scenario	Base case value and source	Scenario value and source

1. Alternative baseline SSI risk	1.0% based on PHE 2020 (Public Health England, 2020)	1.97% based on Jenks 2014 (282 SSIs from 14,300 surgical episodes)
2. Alternative meta-analysis model result	0.71 based on fixed effects model (Figure 7h in the clinical submission dossier)	0.70 based on random effects model (Figure 7h in the clinical submission dossier)

Describe how the scenario analyses were included in the cost analysis.

Scenario analyses were run manually by changing the inputs in the model in cells D9:D16 on the 'Inputs' tab.

Describe the evidence that justifies including any scenario analyses.

As described within this submission it is widely reported that the PHE surveillance data is likely to underestimate SSI incidence in the NHS. This was acknowledged by the NICE guideline committee when developing the NICE guidelines on the prevention and treatment of SSI, as well as by the External Assessment Centre critiquing a recent submission to NICE [MTG55] (National Institute for Health and Care Excellence, 2019, National Institute for Health and Care Excellence, 2021). Independent clinical experts consulted for the purposes of this submission agreed that it is widely known that the PHE data under-reports and provided references to that effect (Singh, Bartsch et al, 2014, Tanner, Padley et al, 2013). Therefore, it was deemed important to consider a scenario analysis using alternate (less conservative) baseline SSI data.

Table 10 Scenario analyses results

In this table, describe the results of any scenario analyses that were done. Adapt the table as necessary.

	Mean cost per patient using Plus Sutures (£)	Mean cost per patient using comparator sutures (£)*	Difference in cost per patient (£) (Plus Sutures minus Comparator)**
Base case	**£65.04**	**£78.93**	**-£13.88**
Scenario 1 – alternative baseline SSI risk	£104.88	£135.04	-£30.15
Scenario 2 – alternative meta-analysis result	£64.42	£78.93	-£14.51
* Sutures that do not contain an antibacterial agent ** Negative values indicate a cost saving.			

Sensitivity analysis

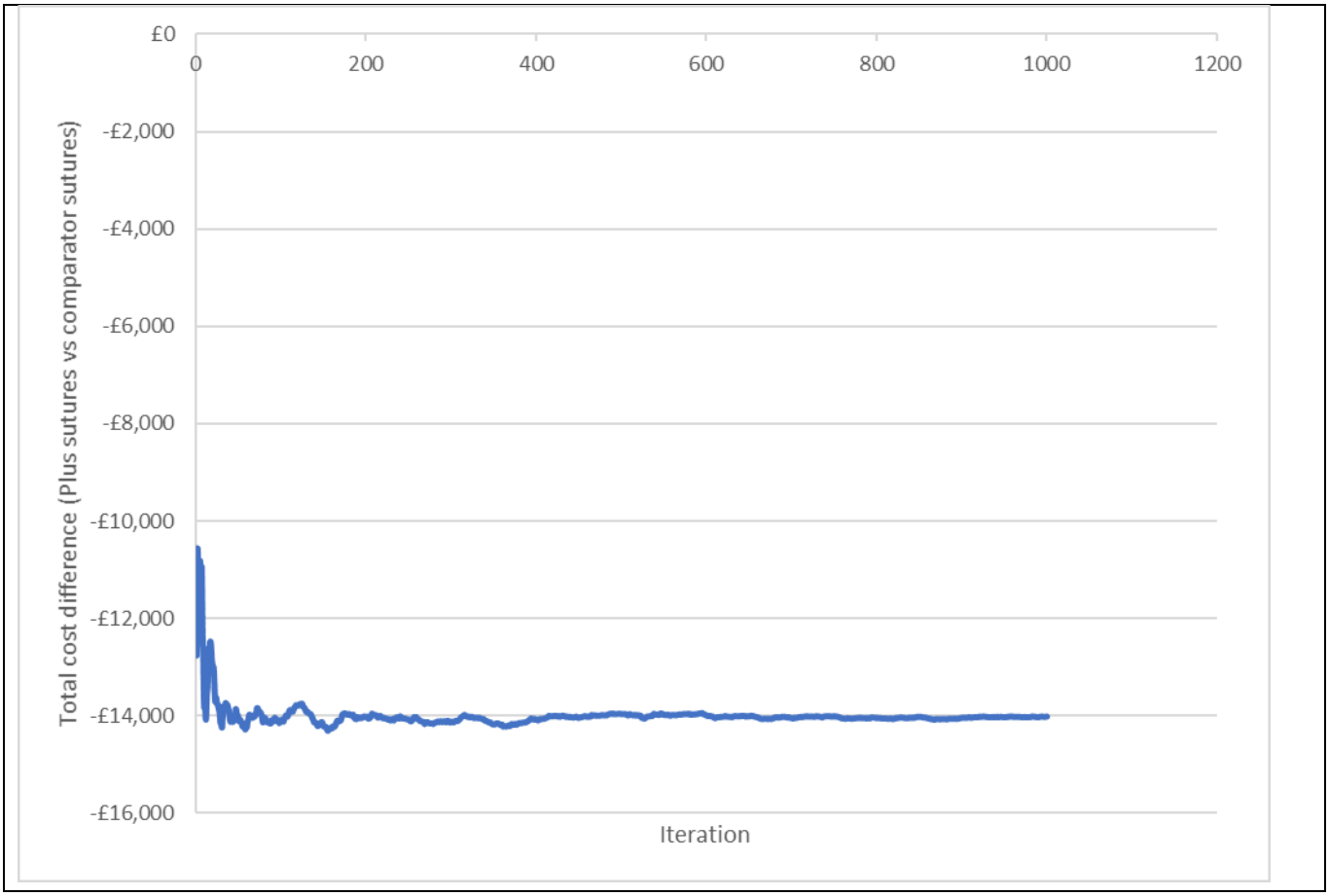
Describe what kinds of sensitivity analyses were done. If no sensitivity analyses have been done, please explain why.

Three methods for sensitivity analysis were undertaken – One-way deterministic sensitivity analysis (presented using break-even analyses and a tornado diagram), two-way sensitivity analysis and probabilistic SA.

One-way deterministic sensitivity analysis was conducted to explore the impact on the results of varying individual model parameters and identify key drivers of the analysis. Threshold/breakeven analysis was conducted around the baseline SSI incidence with comparator sutures, the cost of SSI, the relative risk reduction of SSI incidence with Plus Sutures, and the number of sutures. A tornado diagram is used to present one-way analysis for all model inputs. Ranges reported have, where possible, been taken from the literature. Where these data were unavailable, clinical opinion or assumptions have been used.

Two-way deterministic sensitivity analyses were conducted around the baseline risk of SSI with comparator sutures and the relative risk reduction in SSI with Plus Sutures, and around the cost of SSI and the baseline risk of SSI with comparator sutures.

Probabilistic sensitivity analysis (PSA) was also conducted in order to explore second order uncertainty in the results of the analysis. This was run using 1,000 iterations in the model because that was the number of iterations needed to produce stability in the results of the model as shown in the graph below (note that the total cost difference is based on a cohort of 1,000 patients).



Summarise the variables used in the sensitivity analyses and provide a justification for them. This may be easier to present in a table (adapt as necessary).

Ranges used for deterministic and probabilistic sensitivity analysis are summarised in the table below.

Parameter	Base case value	Range and source used for DSA	Range and source used for PSA
Baseline risk of SSI with comparator sutures	1.0%	Lower and upper bound 0.5% to 9.1% Lowest and highest values reported by PHE 2020 (Public Health England, 2020)	Distribution Beta (Alpha: 7040, Beta 670303) PHE 2020 (Public Health England, 2020)
Cost of SSI	£6,016	Lower and upper confidence interval £5,307 to £7715 Jenks 2014 (Jenks, Laurent et al, 2014) Wider variation explored in two-way SA based on NICE health economic report (with cost inflated to current price year*) £3,374 used for lower value	Distribution Gamma Standard error £614, calculated from confidence intervals in Jenks 2014 (Jenks, Laurent et al, 2014)
Cost of comparator sutures	£3.28	Lower and upper bound £2.62 to £3.94 Assumption based on 20% variation from the mean	Distribution Gamma Standard error 0.34 Assumption based on 20% variation from the mean
Cost of Plus Sutures	£4.13	Lower and upper bound £3.30 to £4.96 Assumption based on 20% variation from the mean	Distribution Gamma Standard error 0.42 Assumption based on 20% variation from the mean
Number of sutures per procedure	5	Lower and upper bound 3 to 9 Based on clinical expert opinion	Distribution Gamma Standard error 1.53, Based on lower and upper bounds provided by independent clinical experts
Mortality with SSI	1.87%	Lower and upper confidence interval 1.6% to 2.2% NICE health economic report (National Institute for Health and Care Excellence, 2019)	Distribution Beta (Alpha: 157, Beta 8225) NICE health economic report (National Institute for Health and Care Excellence, 2019)
Mortality without SSI	1.30%	Lower and upper confidence interval 1.27% to 1.33% NICE health economic report (National Institute for Health and Care Excellence, 2019)	Distribution Beta (Alpha: 8507, Beta 645854) NICE health economic report (National Institute for Health and Care Excellence, 2019)

Relative risk of SSI with Plus Sutures	0.71	Lower and upper confidence interval 0.64 to 0.79 Meta-analysis conducted as part of the clinical submission (see Section 7, clinical submission)	Distribution Lognormal (ln mean: -0.342, ln SE: 0.0537) Meta-analysis conducted as part of the clinical submission (see Section 7, clinical submission)

*Note the method used in the NICE report to calculate the cost of SSI (using the LoS reported in Jenks et al and combining with the excess bed day cost for procedures in NHS reference costs related to infection or complication following a procedure could not be replicated because the most recent NHS reference cost database no longer reports those values. Therefore, the cost reported in the NICE economic report was simply inflated.

If any parameters or variables listed in table 3 were omitted from the sensitivity analysis, please explain why.

All parameters were included in deterministic and probabilistic sensitivity analysis.

Sensitivity analyses results

Present the results of any sensitivity analyses using tornado plots when appropriate.

Threshold/break-even analysis results are shown in the table below. A tornado plot presenting the further one-way deterministic analysis is shown in

Threshold ***analyses results***

Parameter	Base case value	Threshold/breakeven value
Cost of SSI	£6,016	£1,410
Baseline risk of SSI with comparator sutures	1.04%	0.24%
Relative risk reduction with Plus Sutures	0.71	0.93
Average number of sutures per procedure	5	21

Figure 1. Two-way sensitivity analyses are presented in Figure 2 and

Figure **3**. PSA results are presented in Figure 4 and Figure 5. Note all sensitivity analysis results are presented per 1,000 patients.

Threshold analyses results

Parameter	Base case value	Threshold/breakeven value
Cost of SSI	£6,016	£1,410
Baseline risk of SSI with comparator sutures	1.04%	0.24%
Relative risk reduction with Plus Sutures	0.71	0.93
Average number of sutures per procedure	5	21

Figure 1: Tornado plot presenting one-way sensitivity analysis

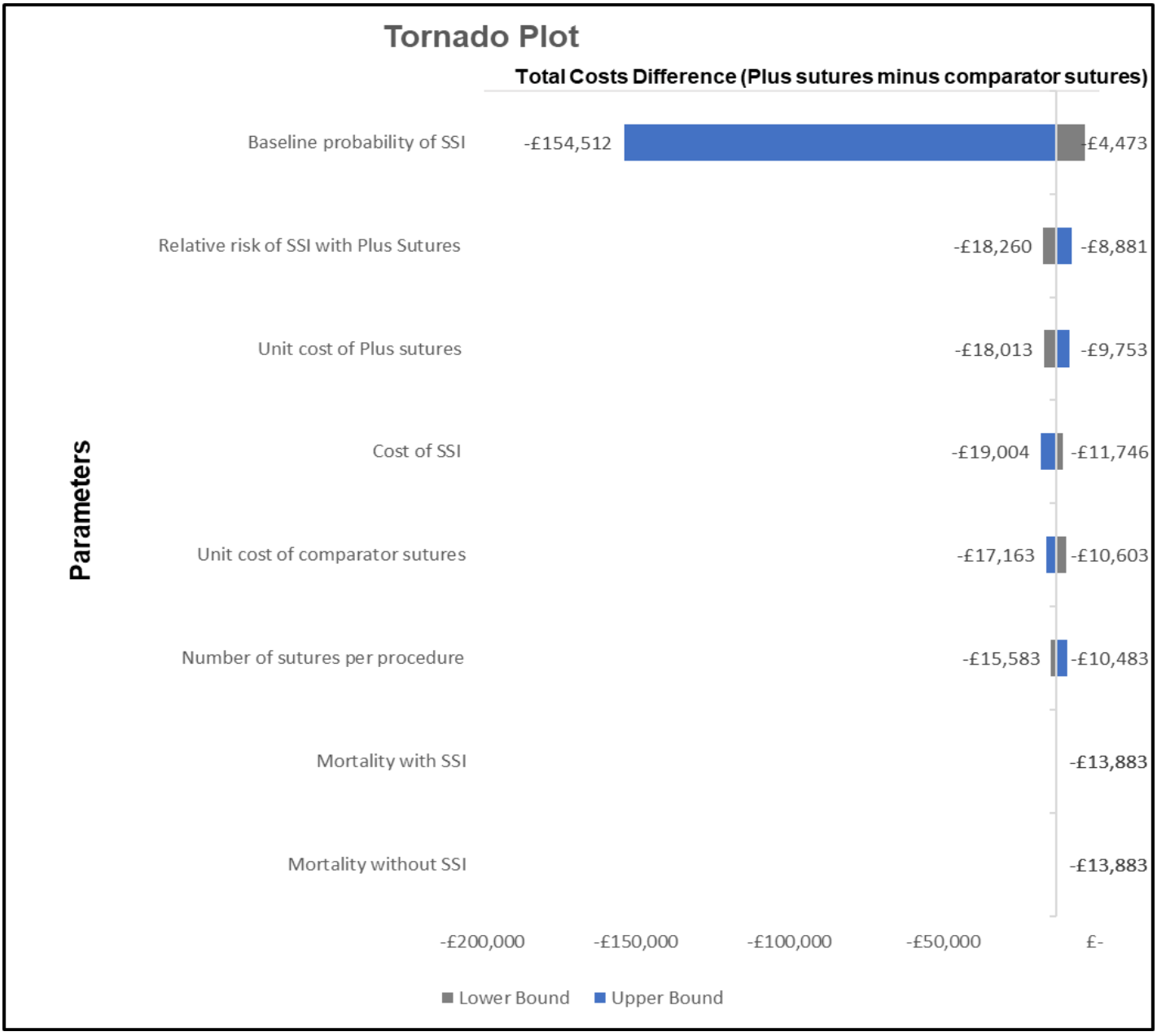


Figure 2: Two-way sensitivity analysis baseline probability of SSI and RR of SSI with Plus Sutures per 1,000 patients

			Baseline probability of SSI																
		Variation	45%	50%	60%	70%	80%	90%	Base case	150%	230%	310%	390%	470%	550%	630%	710%	790%	870%
	Variation	-13883.01	0.47%	0.52%	0.62%	0.73%	0.83%	0.94%	1.04%	1.56%	2.39%	3.22%	4.05%	4.88%	5.72%	6.55%	7.38%	8.21%	9.04%
RR of SSI with Plus sutures	90%	0.64	-£ 5,908	-£ 7,036	-£ 9,293	-£ 11,551	-£ 13,808	-£ 16,065	-£ 18,322	-£ 29,609	-£ 47,667	-£ 65,725	-£ 83,783	-£ 101,841	-£ 119,899	-£ 137,957	-£ 156,015	-£ 174,072	-£ 192,130
	92%	0.65	-£ 5,508	-£ 6,592	-£ 8,761	-£ 10,929	-£ 13,098	-£ 15,266	-£ 17,435	-£ 28,277	-£ 45,625	-£ 62,972	-£ 80,320	-£ 97,668	-£ 115,015	-£ 132,363	-£ 149,710	-£ 167,058	-£ 184,406
	94%	0.67	-£ 5,109	-£ 6,148	-£ 8,228	-£ 10,308	-£ 12,387	-£ 14,467	-£ 16,547	-£ 26,945	-£ 43,582	-£ 60,220	-£ 76,857	-£ 93,494	-£ 110,132	-£ 126,769	-£ 143,406	-£ 160,044	-£ 176,681
	96%	0.68	-£ 4,709	-£ 5,704	-£ 7,695	-£ 9,686	-£ 11,677	-£ 13,668	-£ 15,659	-£ 25,613	-£ 41,540	-£ 57,467	-£ 73,394	-£ 89,321	-£ 105,248	-£ 121,175	-£ 137,102	-£ 153,029	-£ 168,956
	98%	0.70	-£ 4,309	-£ 5,260	-£ 7,163	-£ 9,065	-£ 10,967	-£ 12,869	-£ 14,771	-£ 24,281	-£ 39,498	-£ 54,715	-£ 69,932	-£ 85,148	-£ 100,365	-£ 115,582	-£ 130,798	-£ 146,015	-£ 161,232
	Base case	0.71	-£ 3,910	-£ 4,817	-£ 6,630	-£ 8,443	-£ 10,256	-£ 12,070	**-£ 13,883**	-£ 22,950	-£ 37,456	-£ 51,962	-£ 66,469	-£ 80,975	-£ 95,482	-£ 109,988	-£ 124,494	-£ 139,001	-£ 153,507
	103%	0.73	-£ 3,311	-£ 4,151	-£ 5,831	-£ 7,511	-£ 9,191	-£ 10,871	-£ 12,551	-£ 20,952	-£ 34,393	-£ 47,834	-£ 61,275	-£ 74,715	-£ 88,156	-£ 101,597	-£ 115,038	-£ 128,479	-£ 141,920
	106%	0.75	-£ 2,711	-£ 3,485	-£ 5,032	-£ 6,579	-£ 8,125	-£ 9,672	-£ 11,219	-£ 18,954	-£ 31,329	-£ 43,705	-£ 56,080	-£ 68,456	-£ 80,831	-£ 93,207	-£ 105,582	-£ 117,958	-£ 130,333
	109%	0.77	-£ 2,112	-£ 2,819	-£ 4,232	-£ 5,646	-£ 7,060	-£ 8,474	-£ 9,887	-£ 16,956	-£ 28,266	-£ 39,576	-£ 50,886	-£ 62,196	-£ 73,506	-£ 84,816	-£ 96,126	-£ 107,436	-£ 118,746
	112%	0.80	-£ 1,513	-£ 2,153	-£ 3,433	-£ 4,714	-£ 5,995	-£ 7,275	-£ 8,556	-£ 14,958	-£ 25,203	-£ 35,448	-£ 45,692	-£ 55,937	-£ 66,181	-£ 76,426	-£ 86,670	-£ 96,915	-£ 107,159

Figure 3: Two-way sensitivity analysis baseline probability of SSI and cost of SSI per 1,000 patients

			Baseline probability of SSI																
		Variation	45%	50%	60%	70%	80%	90%	Base case	150%	230%	310%	390%	470%	550%	630%	710%	790%	870%
	Variation	-13883.01	0.47%	0.52%	0.62%	0.73%	0.83%	0.94%	1.04%	1.56%	2.39%	3.22%	4.05%	4.88%	5.72%	6.55%	7.38%	8.21%	9.04%
Cost of SSI	56.09%	£ 3,374	-£ 327	-£ 835	-£ 1,852	-£ 2,870	-£ 3,887	-£ 4,904	-£ 5,921	-£ 11,006	-£ 19,143	-£ 27,279	-£ 35,416	-£ 43,553	-£ 51,689	-£ 59,826	-£ 67,963	-£ 76,099	-£ 84,236
	60%	£ 3,610	-£ 646	-£ 1,190	-£ 2,278	-£ 3,366	-£ 4,454	-£ 5,542	-£ 6,630	-£ 12,070	-£ 20,774	-£ 29,477	-£ 38,181	-£ 46,885	-£ 55,589	-£ 64,293	-£ 72,997	-£ 81,700	-£ 90,404
	65%	£ 3,910	-£ 1,054	-£ 1,643	-£ 2,822	-£ 4,001	-£ 5,179	-£ 6,358	-£ 7,536	-£ 13,430	-£ 22,859	-£ 32,288	-£ 41,717	-£ 51,146	-£ 60,576	-£ 70,005	-£ 79,434	-£ 88,863	-£ 98,292
	70%	£ 4,211	-£ 1,462	-£ 2,097	-£ 3,366	-£ 4,635	-£ 5,904	-£ 7,174	-£ 8,443	-£ 14,790	-£ 24,944	-£ 35,099	-£ 45,253	-£ 55,408	-£ 65,562	-£ 75,717	-£ 85,871	-£ 96,026	-£ 106,180
	75%	£ 4,512	-£ 1,870	-£ 2,550	-£ 3,910	-£ 5,270	-£ 6,630	-£ 7,990	-£ 9,350	-£ 16,150	-£ 27,029	-£ 37,909	-£ 48,789	-£ 59,669	-£ 70,549	-£ 81,428	-£ 92,308	-£ 103,188	-£ 114,068
	80%	£ 4,813	-£ 2,278	-£ 3,003	-£ 4,454	-£ 5,904	-£ 7,355	-£ 8,806	-£ 10,256	-£ 17,510	-£ 29,115	-£ 40,720	-£ 52,325	-£ 63,930	-£ 75,535	-£ 87,140	-£ 98,745	-£ 110,351	-£ 121,956
	85%	£ 5,114	-£ 2,686	-£ 3,457	-£ 4,998	-£ 6,539	-£ 8,080	-£ 9,622	-£ 11,163	-£ 18,870	-£ 31,200	-£ 43,530	-£ 55,861	-£ 68,191	-£ 80,522	-£ 92,852	-£ 105,183	-£ 117,513	-£ 129,844
	90%	£ 5,414	-£ 3,094	-£ 3,910	-£ 5,542	-£ 7,174	-£ 8,806	-£ 10,438	-£ 12,070	-£ 20,230	-£ 33,285	-£ 46,341	-£ 59,397	-£ 72,453	-£ 85,508	-£ 98,564	-£ 111,620	-£ 124,676	-£ 137,731
	Base case	£ 6,016	-£ 3,910	-£ 4,817	-£ 6,630	-£ 8,443	-£ 10,256	-£ 12,070	**-£ 13,883**	-£ 22,950	-£ 37,456	-£ 51,962	-£ 66,469	-£ 80,975	-£ 95,482	-£ 109,988	-£ 124,494	-£ 139,001	-£ 153,507
	105%	£ 6,317	-£ 4,318	-£ 5,270	-£ 7,174	-£ 9,078	-£ 10,982	-£ 12,886	-£ 14,790	-£ 24,309	-£ 39,541	-£ 54,773	-£ 70,005	-£ 85,236	-£ 100,468	-£ 115,700	-£ 130,932	-£ 146,163	-£ 161,395
	110%	£ 6,618	-£ 4,726	-£ 5,723	-£ 7,718	-£ 9,712	-£ 11,707	-£ 13,702	-£ 15,696	-£ 25,669	-£ 41,627	-£ 57,584	-£ 73,541	-£ 89,498	-£ 105,455	-£ 121,412	-£ 137,369	-£ 153,326	-£ 169,283
	115%	£ 6,918	-£ 5,134	-£ 6,176	-£ 8,262	-£ 10,347	-£ 12,432	-£ 14,518	-£ 16,603	-£ 27,029	-£ 43,712	-£ 60,394	-£ 77,077	-£ 93,759	-£ 110,441	-£ 127,124	-£ 143,806	-£ 160,488	-£ 177,171
	120%	£ 7,219	-£ 5,542	-£ 6,630	-£ 8,806	-£ 10,982	-£ 13,158	-£ 15,334	-£ 17,510	-£ 28,389	-£ 45,797	-£ 63,205	-£ 80,612	-£ 98,020	-£ 115,428	-£ 132,836	-£ 150,243	-£ 167,651	-£ 185,059
	125%	£ 7,520	-£ 5,950	-£ 7,083	-£ 9,350	-£ 11,616	-£ 13,883	-£ 16,150	-£ 18,416	-£ 29,749	-£ 47,882	-£ 66,015	-£ 84,148	-£ 102,281	-£ 120,414	-£ 138,547	-£ 156,680	-£ 174,813	-£ 192,946
	130%	£ 7,821	-£ 6,358	-£ 7,536	-£ 9,894	-£ 12,251	-£ 14,608	-£ 16,966	-£ 19,323	-£ 31,109	-£ 49,968	-£ 68,826	-£ 87,684	-£ 106,543	-£ 125,401	-£ 144,259	-£ 163,118	-£ 181,976	-£ 200,834

Figure 4: PSA results showing cost difference on histogram (per 1,000 patients)

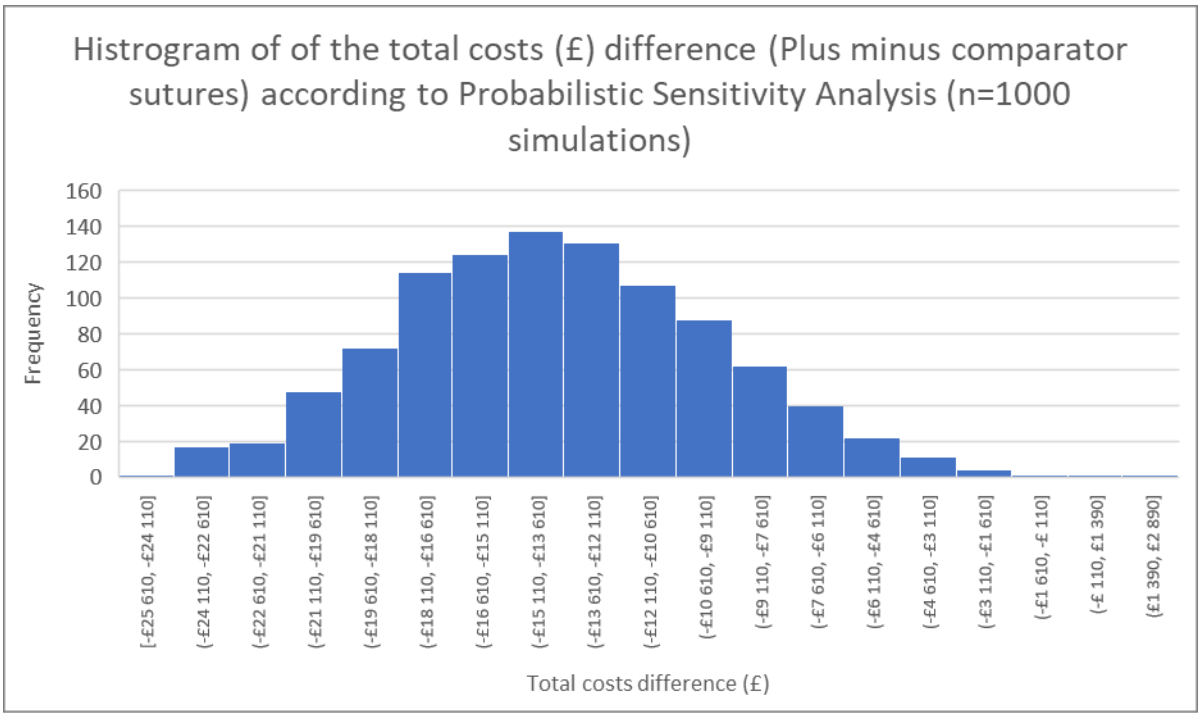
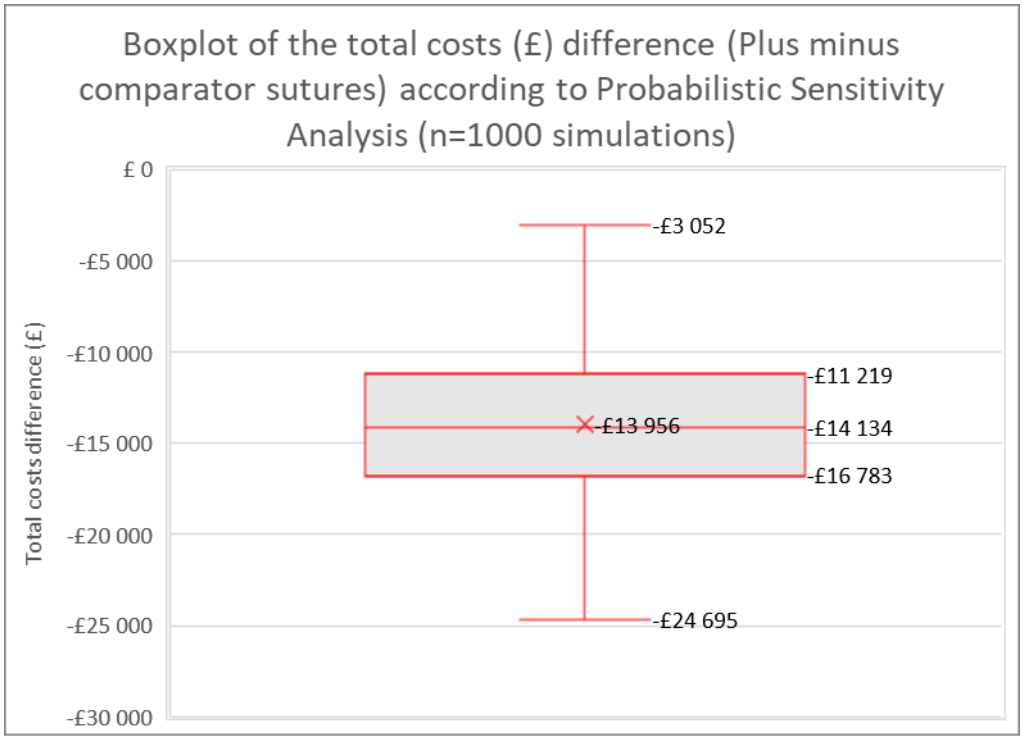


Figure 5: PSA results boxplot (per 1,000 patients)



Note: Cross=mean, middle line=median, box=quarter 1 and quarter 3, whiskers=+/-1.5 interquartile range.

What were the main findings of each of the sensitivity analyses?

Scenario analysis

All scenario analyses demonstrated cost savings with the use of Plus Sutures compared with comparator sutures. A higher, potentially more realistic, baseline risk of SSI increased cost savings from around £14 per patient to around £30 per patient. The use of the meta-analysis result from the random or fixed effects model resulted in very similar cost savings providing confidence in the use of either meta-analysis model.

One-way and two-way sensitivity analysis

As shown in the tornado plot, use of Plus Sutures remained the cost saving treatment strategy across all parameters that were changed individually within plausible ranges. The main driver of the analysis is the baseline risk of SSI with comparator sutures, followed by the relative risk of SSI with Plus Sutures and the cost of SSI.

These were all explored in two-way sensitivity analyses with:

- the baseline risk of SSI being varied between the highest and lowest incidence reported in the PHE surveillance report (which is considered to be conservative as discussed previously) (Public Health England, 2020).
- the cost of SSI varied using a conservative cost used in the NICE SSI guideline (National Institute for Health and Care Excellence, 2020) and the upper confidence interval reported by Jenks (Jenks, Laurent et al, 2014).
- the relative risk of SSI with Plus Sutures (varied between confidence intervals reported in the meta-analysis conducted for the clinical submission).

Figure 2 and 3 show the results of the model are highly robust to the two-way sensitivity analyses. Plus Sutures does remain cost saving when both the lowest cost of SSI (£3,374) and the lowest baseline risk of SSI (0.5%) are used (please see threshold analysis results which show up to a baseline SSI risk of 0.24% Plus Sutures would be cost-saving). As described previously, the cost used in the NICE SSI guideline is likely to understate the cost of SSI because it considers the impact of SSI on the length of stay using a bed day cost for any type of infection or complication following a procedure (cost per day of £312 over a 10 day length of stay was applied), and so does not fully capture other additional resource use such as antibiotic use, wound dressings, critical care and repeat surgery (National Institute for Health and Care Excellence, 2020). As reported by Jenks, 11% of the additional cost attributable to SSI was related to operating theatre costs and 12% was related to diagnostics, wound dressings, antibiotics and other therapies (Jenks, Laurent et al, 2014). Further the lowest baseline SSI incidence in the PHE surveillance report is likely to be extremely conservative due to the issues of under-reporting that have been discussed previously. Therefore, the plausibility of this scenario as reflective of costs and baseline risk for SSI in the NHS is very low.

Threshold analysis

Threshold/breakeven analysis shows the univariate change needed in the key model parameters in order for Plus Sutures to no longer be cost saving. This analysis confirms the robustness of the base case (which uses conservative values) by estimating the wide scope of variation that each input can take whilst remaining cost saving. Each input is discussed in turn.

Threshold analysis on the cost of SSI would need to decrease from £6,061 to £1,410 which is lower than any of the costs reported for a specific surgery by Jenks et al (after inflation). The lowest cost reported was for breast surgery £1,687 based on 14 procedures (Jenks, Laurent et al, 2014). Additionally, a conservative cost was used in the NICE economic report based only on the increased length of stay following SSI which may not fully capture additional resources such as repeat surgery,

readmission, antibiotics etc, and this is still considerably higher than the threshold value (£3,374 (after inflation)).

Threshold analysis run on the baseline risk of infection with comparator sutures showed that this would need to decrease from 1.04% to 0.24%. A risk of SSI of 0.24% is lower than any value reported for any of the surgical categories in the latest PHE SSI surveillance report (Public Health England, 2020).

Threshold analysis on the relative risk of SSI with Plus Sutures showed this value would need to increase to 0.93 which is outside of the confidence interval calculated in the meta-analysis (0.64 to 0.79).

Threshold analysis on the average number of sutures per procedure showed this would need to increase to 21 for Plus Sutures and comparator sutures to no longer be cost saving. This is outside the range of sutures reported by independent clinical experts (3 to 9). Independent clinical experts also confirmed that in rare cases where high numbers of Plus Sutures and comparator sutures are needed, baseline infection risk and SSI costs would also be higher than used in the model.

PSA

The PSA demonstrates that the results are robust to joint parameter uncertainty. All parameters were varied in the PSA with the majority of distributions based on confidence intervals reported in the literature or as per the meta-analysis conducted as part of the clinical submission, particularly for those parameters that are key drivers of the results (baseline risk of SSI, RR of SSI with Plus Sutures and cost of SSI). 99.8% of iterations were cost saving when 1,000 iterations were run as shown in Figure 4 and 5.

What are the main sources of uncertainty about the model's conclusions?

The results of the model are robust to the sensitivity analyses conducted providing confidence in the model's conclusions. Potential sources of uncertainty (and variability) are discussed below; however, these are unlikely to change the direction of the models results in all plausible situations:

- The baseline risk of SSI with comparator sutures is conservative – there is likely to be variability between hospitals and surgery types in the baseline risk of SSI and therefore in the scope to benefit from the introduction of Plus Sutures. This may also vary between different types of procedure and/or patients. However, Plus Sutures remain cost saving even when an incidence below the lowest incidence of SSI reported by PHE surveillance is used (i.e. the break-even point is 0.24%). It is widely accepted that this source underestimates the incidence of SSI in the NHS which would only increase the scope to benefit from the introduction of Plus Sutures. Only in very specific cases where the baseline risk of SSI falls below 0.24% would Plus Sutures be unlikely to be cost saving. Independent experts suggested that if surgery with such a low risk of SSI exists, it is unlikely that in the absence of robust data collection methods, the NHS can identify these surgeries.
- The source used for the cost of SSI (Jenks et al 2014) is quite outdated; however, no more suitable sources were identified with which to populate this parameter. Independent clinical experts identified substantial changes that have occurred in the past 10 years that could impact on the cost of treating SSIs in the NHS; however, some of these changes would be likely to increase the cost of SSI. Further, costs incurred in the community related to SSI are not captured within the model which could further increase the treatment costs associated with SSI. These could be incurred for SSIs occurring and being treated in the community, as well as SSIs that were treated in hospital but require follow up care in the community. A recent study reported that 66.7% of patients with SSI presented in the community, and therefore these costs could be substantial (Newton, Dewi et al, 2020). Increasing the cost of SSI would further

increase the cost savings associated with Plus Sutures, hence demonstrating the model's existing results to be conservative.

Miscellaneous results

Include any other relevant results here.

Results for each of the subgroup analyses are presented below. As shown, Plus Sutures is estimated to be cost saving in all subgroups.

Adults

Cost savings	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Device cost (Mean cost per patient - £)	£20.65	£16.40	£4.25
Cost of SSI treatment (Mean cost per patient - £)	£45.65	£62.53	-£16.88
Total (per patient)	**£66.30**	**£78.93**	**-£12.63**
Total (per 1,000 patients)	**£66,295**	**£78,928**	**-£12,632**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Cost per clinical outcome averted, presented for 1,000 patients	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Number of SSIs per 1,000 patients	7.6	10.4	-2.8
Cost per SSI averted			**Dominant**
Number of deaths per 1,000 patients	13.04	13.06	-0.02
Cost per death averted			**Dominant**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Children

Cost savings	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Device cost (Mean cost per patient - £)	£20.65	£16.40	£4.25
Cost of SSI treatment (Mean cost per patient - £)	£32.51	£62.53	-£30.01
Total (per patient)	**£53.16**	**£78.93**	**-£25.76**
Total (per 1,000 patients)	**£53,164**	**£78,928**	**-£25,763**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Cost per clinical outcome averted, presented for 1,000 patients	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Number of SSIs per 1,000 patients	5.4	10.4	-5.0
Cost per SSI averted			**Dominant**
Number of deaths per 1,000 patients	13.03	13.06	-0.03
Cost per death averted			**Dominant**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Clean wounds

Cost savings presented per patient	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Device cost (Mean cost per patient - £)	£20.65	£16.40	£4.25
Cost of SSI treatment (Mean cost per patient - £)	£45.12	£60.16	-£15.04
Total (per patient)	**£65.77**	**£76.56**	**-£10.79**
Total (per 1,000 patients)	**£65,771**	**£76,562**	**-£10,790**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Cost per clinical outcome averted, presented for 1,000 patients	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Number of SSIs per 1,000 patients	6.0	8.0	-2.0
Cost per SSI averted			**Dominant**
Number of deaths per 1,000 patients	13.08	13.10	-0.02
Cost per death averted			**Dominant**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Non-clean wounds

Cost savings presented per patient	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Device cost (Mean cost per patient - £)	£20.65	£16.40	£4.25
Cost of SSI treatment (Mean cost per patient - £)	£281.00	£425.76	-£144.76
Total (per patient)	**£301.65**	**£442.16**	**-£140.51**
Total (per 1,000 patients)	**£301,649**	**£442,156**	**-£140,507**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Cost per clinical outcome averted, presented for 1,000 patients	**Plus Sutures**	**Comparator sutures***	**Difference (Plus Sutures minus Comparator)****
Number of SSIs per 1,000 patients	45.1	68.4	-23.2
Cost per SSI averted			**Dominant**
Number of deaths per 1,000 patients	24.56	24.58	-0.02
Cost per death averted			**Dominant**

* Sutures that do not contain an antibacterial agent

** Negative values indicate a cost saving

Validation

Describe the methods used to validate, cross-validate (for example with external evidence sources) and quality assure the model. Provide sources and cross-reference to evidence when appropriate.

The economic model was built inhouse at Johnson & Johnson and the model structure was validated against the literature identified in the economic review, as well as against the model used for the NICE SSI guidelines and NICE medical technologies guidance (National Institute for Health and Care Excellence, 2019, National Institute for Health and Care Excellence, 2021). The model underwent quality assurance processes and review of all inputs by an independent health economist at York Health Economics Consortium Ltd. Key inputs, where possible, were based on values previously accepted by NICE, either those used for the NICE SSI guideline or those accepted as part of previous NICE guidelines (National Institute for Health and Care Excellence, 2019, National Institute for Health and Care Excellence, 2021). Independent NHS clinical experts were also involved in validating key inputs.

Eight other cost-effectiveness analyses were identified in the economic review (as shown in Table 1), all of which reported cost savings with the introduction of Plus Sutures (Ceresoli, Carissimi et al, 2020, Fleck, Moidl et al, 2007, Leaper, Edmiston et al, 2017, Leaper, Holy et al, 2020, Mahajan, Pillai et al,

2020, Nakamura, Kashimura et al, 2013, Singh, Bartsch et al, 2014, Stone, Gruber et al, 2010). One study which was UK based reported cost savings of £91.25 per procedure which is substantially more than the cost savings estimated in this model (£13.88) (Leaper, Edmiston et al, 2017). It is not clear from the published paper what inputs were used and therefore not possible to comment on the differences between the analyses. However, it appears the baseline risk of SSI with comparator sutures used in the Leaper analysis could be higher than that used in this model. This result is expected given the conservative nature of this analysis and suggests cost savings could be higher than those estimated in this analysis.

Give details of any clinical experts who were involved in validating the model, including names and contact details. Highlight any personal information as confidential.

- Colonel Douglas Bowley, University Hospital Birmingham [redacted]
- Dr Katie Hardy, Royal Derby Hospital [redacted]
- Mr Dimitri Pournaras, Southmead Hospital Bristol [redacted]

4 Summary and interpretation of economic evidence

Describe the main findings from the economic evidence and cost model. Explain any potential cost savings and the reasons for them.

The economic review and cost-consequence model indicate that the use of Plus Sutures results in estimated cost savings of £14 per patient if introduced in the NHS for all surgical groups and subgroups. Cost savings result from a reduction in SSIs (as demonstrated in the clinical submission) and therefore a reduction in the health care related costs and resources associated with treating SSIs in a hospital setting. As demonstrated by the cost-consequence model, the slight increase in costs of using Plus Sutures compared with sutures that do not contain an antibacterial agent (i.e. comparator sutures) is outweighed by the costs saved from a reduction in SSI incidence, independent of patient population and type of surgery. This was estimated to remain the case in 99.8% of model iterations when running 1,000 iterations of the model as part of PSA for the base case analysis. Results were also robust to changes in individual input parameters as demonstrated in sensitivity analyses. Further, these cost savings are likely to be underestimated due to the conservative source used to estimate the baseline risk of SSI with comparator sutures as demonstrated in scenario analyses. There may also be additional costs associated with treating SSIs in the community that would not be captured in the model, and therefore potentially further underestimating the potential cost savings of introducing Plus Sutures.

Briefly discuss the relevance of the evidence base to the scope.

As discussed in the clinical submission dossier, the clinical evidence demonstrating a reduction in the incidence of SSI with Plus Sutures was robust and well aligned with the scope. The quality of the studies was generally high and demonstrated a reduction in the risk of SSI with Plus Sutures in all subgroups of patients named in the scope. Three independent clinical experts assessed the evidence on Plus Sutures considered within the clinical submission dossier to be directly relevant across the NHS.

The cost-consequence model was from the perspective of the NHS and Personal Social Services and all parameters used in the model were aligned with a UK setting. The sources used to populate the baseline risk of SSI with comparator sutures and the cost of SSI have been previously accepted by NICE (National Institute for Health and Care Excellence, 2019, National Institute for Health and Care Excellence, 2021). In addition, the source used for the baseline risk of SSI with comparator sutures has been recognised to under-report. The baseline risk used in the model for comparator sutures was lower than that reported in the UK based studies included the clinical submission (22.9% 1.4%, 2.5% (Williams, Sweetland et al, 2011, Sukeik, George et al, 2019, Sprowson, Jensen et al, 2018)). The model aligns with the claimed benefits in the scope by estimating cost savings as a result of reduced treatment of SSIs. A reduction in bed days and readmission associated with reduced treatment of SSIs is implicitly captured within the cost of SSI treatment used in the model, which is from a UK source.

All subgroups outlined in the NICE scope were assessed in the model, with results consistent with the base case which demonstrated cost savings with the use of Plus Sutures compared with sutures that do not contain an antibacterial agent.

Briefly discuss if the results are consistent with the published literature. If they are not, explain why and justify why the results in the submission be favoured over those in the published literature.

The results of the model are consistent with the published literature, demonstrating cost-savings with the introduction of Plus Sutures compared with sutures that do not contain an antibacterial agent. Only 1 study identified was from a UK perspective and this study estimates higher cost savings with the introduction of Plus Sutures than that estimated in this submission (£91 vs £14) (Leaper, Edmiston et al, 2017). The cost model developed for this submission used conservative assumptions to present a conservative case for the introduction of Plus Sutures and therefore the model outputs, cost savings, are likely to be lower than that reported in the literature. The Leaper study also reported cost savings per procedure of £57 for clean wound procedures and £248 for non-clean wound procedures. This compares to estimated cost savings of £11 and £141 respectively for clean and non-clean wound procedures in this model. The paper by Leaper et al does not report the inputs used in their model so it is not possible to compare inputs used or reasons why the results differ; however, it appears that the cost of SSI used and the baseline risk of SSI with comparator sutures used in the Leaper model may have been higher. It has been acknowledged throughout the submission that the baseline risk used for incidence of SSI with comparator sutures in this model is likely to be an underestimate of the true incidence in the NHS due to issues associated with SSI surveillance that have been acknowledged by independent clinical experts, the NICE guideline committee and the published literature (National Institute for Health and Care Excellence, 2019, Tanner, Padley et al, 2013, Singh, Davies et al, 2015). Using a higher value for the incidence of SSI with comparator sutures increases the estimated cost savings with Plus Sutures in the model. For example, where a higher baseline risk of SSI from Jenks is used, the cost savings with Plus Sutures compared with sutures that do not contain an antibacterial agent are estimated to be £30.15 per patient.

Describe if the cost analysis is relevant to all patient groups and NHS settings in England that could potentially use the technology as identified in the scope.

The cost analysis is relevant to all groups included in the scope. Although some parameters such as the baseline risk of SSI, the relative risk of infection with Plus Sutures, the cost of SSI treatment and the average number of sutures required per procedure are all likely to vary between different surgical categories and wound types, this was tested extensively in sensitivity analyses and the results of the model were robust to variations in these input parameters. The relative risk of SSI with Plus Sutures used in the cost model is based on a wide body of evidence across different surgery types and patients and is therefore relevant to all patient types and NHS settings/procedure types. Therefore, Plus Sutures should be considered for inclusion as part of an evidence-based surgical care bundle.

Briefly summarise the strengths and limitations of the cost analysis, and how these might affect the results.

Strengths of the analysis include:

- The structure and results are aligned with previously published models identified in the economic review. The model structure is also consistent with the model developed for the NICE guideline for the prevention of SSIs and other NICE guidance (National Institute for Health and Care Excellence, 2019, National Institute for Health and Care Excellence, 2021).
- The inputs used are based on published literature and data sources used for key input parameters (baseline risk of SSI and cost of SSI) that have been previously accepted by NICE (National Institute for Health and Care Excellence, 2019, National Institute for Health and Care Excellence, 2021).
- The relative risk of SSI with Plus Sutures has been identified through a systematic review and meta-analysis process and is based on a sizable body of RCTs with statistically significant

confidence intervals estimated. This evidence has also been assessed by independent clinical experts to be directly relevant across the NHS and accurately reflect the range of patients and procedures within the NHS.

- Extensive sensitivity analysis has been conducted and the results of the model appear robust to plausible changes in input parameters.
- Conservative parameter estimates/assumptions have been used in the cost-consequence model, which therefore minimise uncertainty and provide robust estimates of the cost-saving associated with the use of Plus Sutures within the NHS.

Limitations of the analysis include:

- The source used for the baseline risk of SSI is widely accepted to underreport the incidence of SSI in the NHS and therefore the cost savings in the model may be underestimated if this is the case.
- The source used for the cost of SSI is outdated; however, a more suitable source could not be identified. If the average cost of SSI today is higher than that reported by Jenks et al, then the cost savings in the model may be underestimated. Independent clinical experts noted changes that have happened in clinical practice over the last 10 years (since publication of the Jenks study), including the number of infections caused by multi-drug resistant bacteria and the increase in complexity of care due to multi-morbidity of the population, which suggest the costs of SSI may have increased.
- Quality of life was not considered in the model (in line with the NICE scope), however, a reduction in the incidence of SSI is likely to impact on patient's quality of life. According to the NICE economic report produced as part of the NICE guidelines on SSI prevention, a reduction in utility of approximately 0.06 may be seen for patients experiencing an SSI compared with those who do not (National Institute for Health and Care Excellence, 2019).

Detail any further analyses that could be done to improve the reliability of the results.

The results of the cost analysis are likely to provide a good reflection of the impact of introducing Plus Sutures into routine care in the NHS, however it is expected that these results underestimate the true savings that could be released within clinical practice from adoption of Plus Sutures across the NHS. Estimates of baseline risk of SSI are likely to vary between settings, patients, and procedures and therefore the potential magnitude of cost savings will also vary. The estimates used in this submission are based on national reporting and are conservative and likely to under-report. On implementation of Plus Sutures at regional or individual hospital level SSI outcomes could be reviewed alongside this analysis.

Limitations with existing SSI surveillance at both local and national levels has been widely recognised despite high levels of engagement from NHS teams currently (National Institute for Health and Care Excellence, 2019, Tanner, Padley et al, 2013, Singh, Davies et al, 2015). Further attention on how SSI outcomes are audited and reviewed (i.e. surveillance and reporting) would likely be beneficial, and continued collaborations within UK, but also global collaborations, to share best practice and further improve SSI surveillance and performance should be supported.

The cost of SSI is also uncertain due to the referenced study being outdated (Jenks, Laurent et al, 2014). Further research could be conducted into the true cost of treating SSIs by surgery type in the NHS today within both primary and secondary care settings. Additionally, the impact of Plus Sutures on antibiotic prescribing has been difficult to quantify and further analysis and research could be undertaken to quantify the reduction of antibiotic prescribing and their contribution to an anti-microbial resistance action plan through optimised use of antimicrobials such as Plus Sutures.

Further research could provide more accurate estimates to use in the model, however, the results of the model appeared robust when tested using conservative values both for baseline risk and cost of SSI in sensitivity analyses and therefore would be unlikely to change the direction of the results.

5 References

Please include all references below using NICE's standard referencing style.

1. Ceresoli M, Carissimi F, Piemontese A, Paragò V, Galvain T, Tommaselli GA, et al. The Clinical and Economic Value of Triclosan-Coated Surgical Sutures in Abdominal Surgery. Applied Sciences. 2020;10(3):1090.
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6 Appendices

Appendix A: Search strategy for economic evidence

Describe the process and methods used to identify and select the studies relevant to the technology being evaluated. See section 2 of the user guide for full details of how to complete this section.

A single search was used for the clinical and economic evidence.

Inclusion and exclusion criteria:

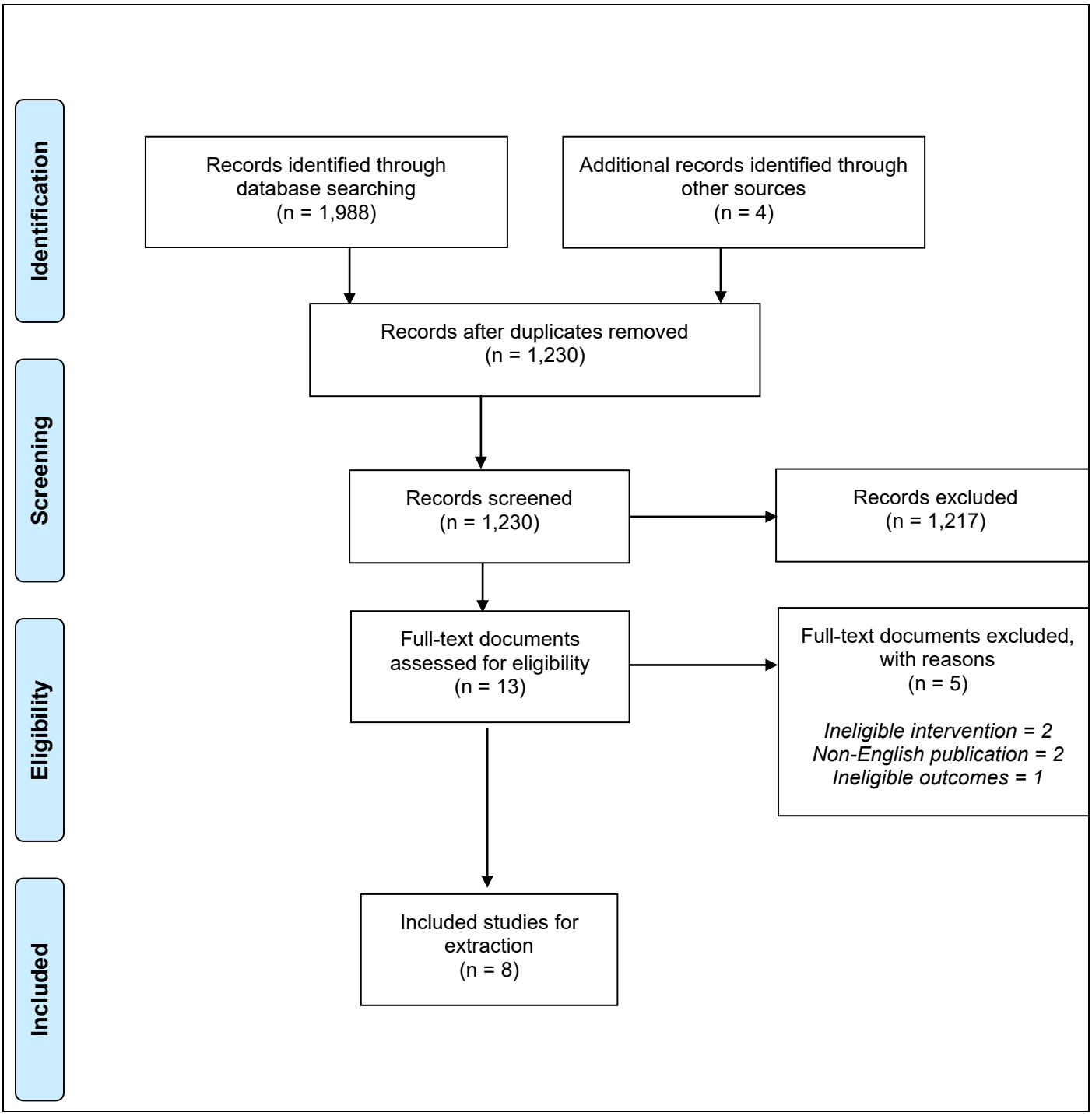
	Inclusion Criteria	**Exclusion Criteria**
Population	• Studies in adults and children in whom Plus Sutures (including STRATAFIX Plus) are an appropriate option • Studies assessing sutures for wound closure following an invasive surgical procedure Population subgroups of interest are as follows: • Adults • Children • Clean wound procedures • Non-clean wound procedures	• Participants with a known allergy to triclosan or contraindicated for the use of Plus Sutures • Studies assessing sutures for wound closure in settings other than invasive surgery
Intervention	Plus Sutures (Ethicon, Johnson & Johnson Medical Ltd): • PDS Plus Antibacterial (polydioxanone) Suture • MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture • Coated VICRYL Plus Antibacterial (polyglactin 910) Suture • STRATAFIX Symmetric PDS Plus Knotless Tissue Control Device • STRATAFIX Spiral PDS Plus Knotless Tissue Control Device • STRATAFIX Spiral MONOCRYL Plus Knotless Tissue Control Device Studies assessing “triclosan coated sutures” that do not refer to a brand name, will also be eligible	• Studies of any sutures other than the named eligible technologies • Studies of mixed eligible and ineligible interventions where results are not disaggregated according to suture variety or variant, i.e. studies where some patients in the intervention group receive one or more of the named Plus Sutures, and the remaining patients in the intervention group receive an ineligible intervention
Comparators	Standard of care, i.e. • Sutures without any antibacterial coating	• Other sutures with an antibacterial coating
Outcomes	• Incremental cost • Incremental cost per QALY (or other outcome)	
Study Design	Heath economic studies: • Cost-effectiveness • Cost-utility • Cost-benefit • Cost-minimisation • Cost-consequence.	Non-comparative cost analyses including cost of illness studies Studies report as abstracts only

Excluded studies

List any excluded studies below. These are studies that were initially considered for inclusion at the level of full text review, but were later excluded for specific reasons.

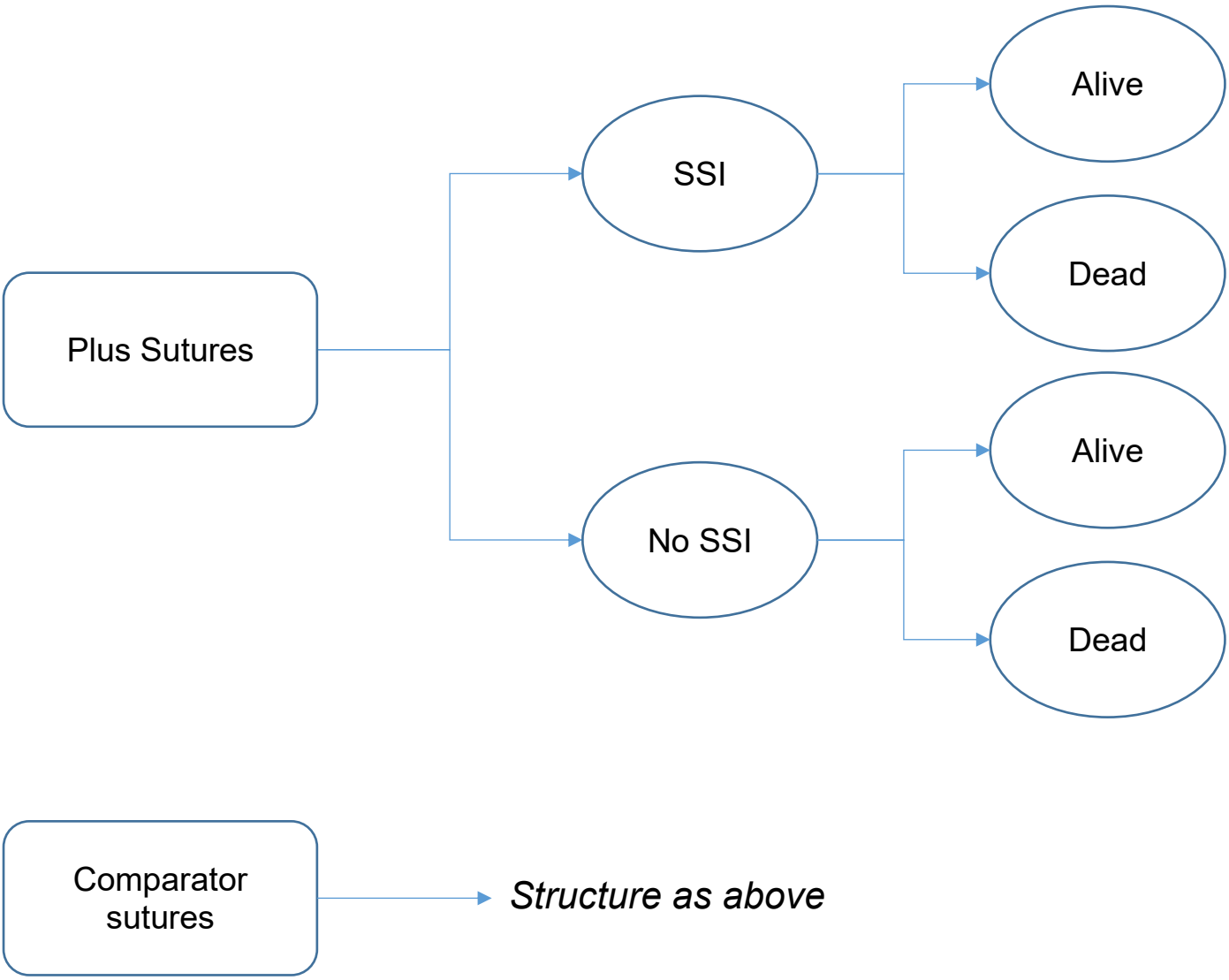
Authors	Title	Rationale for exclusion	Company comments
Chan, Vincent W. K., Chan, Ping-Keung, Chiu, Kwong-Yuen, Yan, Chun-Hoi and Ng, Fu-Yuen	Does Barbed Suture Lower Cost and Improve Outcome in Total Knee Arthroplasty? A Randomized Controlled Trial	Different intervention	Text
Galal, Ibrahim and El-Hindawy, Khaled	Impact of using triclosan-antibacterial sutures on incidence of surgical site infection	Ineligible outcomes	Text
Huszár, O., Baracs, J., Tóth, M., Damjanovich, L., Kotán, R., Lázár, G., Mán, E., Baradnai, G., Oláh, A., Benedek-Tóth, Z. and et al.	Comparison of wound infection rates after colon and rectal surgeries using triclosan-coated or bare sutures -- a multi-center, randomized clinical study	Non-English full text	Text
Johnston, Stephen S., Chen, Brian Po-Han, Tommaselli, Giovanni A., Jain, Simran and Pracyk, John B.	Barbed and conventional sutures in spinal surgery patients: an economic and clinical outcomes comparison	Different intervention	Text
Sakdinakiattikoon, M. and Tanavalee, A.	Continuous barbed suture versus knotted interrupted suture for wound closure in total knee arthroplasty: A prospective randomized study	Non-English full text	Text

Report the numbers of published studies included and excluded at each stage in an appropriate format (e.g. PRISMA flow diagram).



Appendix B: Model structure

Please provide a diagram of the structure of your economic model.



Appendix C: Checklist of confidential information

Please see section 1 of the user guide for instructions on how to complete this section.

Does your submission of evidence contain any confidential information? (please check appropriate box):

No	☐	If no, please proceed to declaration (below)
Yes	☒	If yes, please complete the table below (insert or delete rows as necessary). Ensure that all relevant sections of your submission of evidence are clearly highlighted and underlined in your submission document, and match the information provided in the table. Please add the referenced confidential content (text, graphs, figures, illustrations, etc.) to which this applies.

Page	**Nature of confidential information**	**Rationale for confidential status**	**Timeframe of confidentiality restriction**
#33	☒ Commercial in confidence ☐ Academic in confidence	Commercially sensitive data provided	Indefinite
Details	Adverse event costs section, sales figures provided on **page 33**		
#27-28	☒ Commercial in confidence ☐ Academic in confidence	Commercially sensitive data provided	Indefinite
Details	Technology costs section, information relating to discounts and market share provided on **pages 27 to 28**		

#52	☒ Commercial in confidence ☐ Academic in confidence	Commercially sensitive data provided	Indefinite
Details	Validation section, email addresses of clinical experts provided on **page 52**		

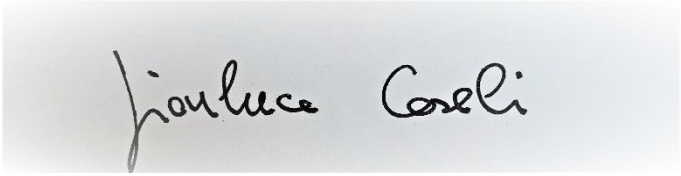
Confidential information declaration

I confirm that:

- all relevant data pertinent to the development of medical technology guidance (MTG) has been disclosed to NICE
- all confidential sections in the submission have been marked correctly
- if I have attached any publication or other information in support of this notification, I have obtained the appropriate permission or paid the appropriate copyright fee to enable my organisation to share this publication or information with NICE.

Please note that NICE does not accept any responsibility for the disclosure of confidential information through publication of documentation on our website that has not been correctly marked. If a completed checklist is not included then NICE will consider all information contained in your submission of evidence as not confidential.

Signed*:
** Must be Medical Director or equivalent*



Date: **29/03/2021**

Print: Gianluca Casali

Role / organisation: Medical Director UK/IRE, Johnson & Johnson Medical Ltd.

Contact email: [redacted]

National Institute for Health and Care Excellence

Collated comments table

MTG Medtech Guidance:

Expert contact details and declarations of interest:

Expert #1	Melissa Rochon, Quality & Safety Lead for Surveillance, Royal Brompton and Harefield Hospitals, part of Guy's and St Thomas' NHS FT,
	Nominated by: IPS
	DOI: NONE
Expert #2	Mike Reed, Consultant Orthopaedic Surgeon, Northumbria Healthcare NHS FT,
	Nominated by: Company
	DOI: yes – I gave paid talk at a webinar they funded recently. I have previously run a very large RCT that advised against its use on the basis of efficacy. Recently did a meta-analysis which supported it use. Hence they wanted me on the podium to discuss that.
Expert #3	Justin Wormald, DPhil Candidate and Specialty Trainee/ Registrar in Plastic and Reconstructive Surgery (ST6), Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, Click here to enter text.
	Nominated by : NICE
	DOI: NONE
Expert #4	Lilian Chiwera, Infection control surveillance team leader, Guy's & St Thomas' NHS Foundation Trust, Click here to enter text.
	Nominated by: Company
	DOI: NONE
Expert #5	Mohamedshafi Mussa, Consultant Congenital Cardiac Surgeon, University Hospitals Bristol and Weston NHS Foundation Trust
	Nominated by: Company
	DOI-NONE
Expert #6	Name, job title, organisation, email address
	Nominated by:

	DOI:

			Response
1	Please describe your level of experience with the procedure/technology, for example: Are you familiar with the procedure/technology? Have you used it or are you currently using it? Do you know how widely this procedure/technology is used in the NHS or what is the likely speed of uptake? Is this procedure/technology performed/used by clinicians in specialities other than your own? − If your specialty is involved in patient selection or referral to another specialty for this procedure/technology, please indicate your experience with it.	Expert #1: I am familiar with the Plus Sutures for preventing surgical site infection. One of our hospital sites routinely uses Plus Sutures in surgery. Our second hospital site offers the technology (based on operator preference). I am aware that the agent Tricolsan lasts longer in Moncryl and PDS (monofilaments) because they are impregnated, vs Vicryl which is braided and coated. I am aware that NHS Improvement announced that as part of their Innovations, the ITP would support the introduction of triclosan sutures, paying the differences between products (if the hospital rates qualified for the re-imbursement, >4%) and that it was a one-off (not continuous) discount.	
		Expert #2 Very familiar. This is a suture I use for almost every operation I do.	

		Yes No sure how commonly it is used compared to competitor products. Yes No	
		Expert #3 I am a plastic surgery registrar and the majority of my clinical practice involves the use of sutures with different types of wounds. I have used Plus sutures in my practice on an ad hoc basis. I am currently doing full-time research (DPhil) at the Univeristy of Oxford. As part of my DPhil I am conducting a Cochrane review of antimicrobial sutures to prevent surgical site infection. I am also conducting a multi-centre feasibility RCT of antimicrobial sutures vs. standard sutures in upper limb trauma (n=116, three sites).	

		I am therefore familiar with the literature on Plus sutures and have practical experience of using them in surgical procedures.	
	–	Expert #4 The technology has been used in my organisation as an SSI prevention intervention. My organisation is currently using it for various surgical procedures.	
	–	Expert #5 I used PLUS Antibacterial sutures for wound closure on a daily basis at a previous institution. I was actually unaware that these sutures were in use, as they handled exactly like standard sutures. I am not using the sutures at my current institution as they are not part of the current stock. I am not sure how widely the sutures are used in the NHS. I would imagine that the sutures would be used across all surgical specialties.	

	–	Expert #6	
	–	Expert #7	
	–	Expert #8	
2	– Please indicate your research experience relating to this procedure (please choose one or more if relevant):	Expert #1: I have done bibliographic research on this procedure. I have done research on this procedure in laboratory settings (e.g. device-related research). I have done clinical research on this procedure involving patients or healthy volunteers. I have published this research. I have had no involvement in research on this procedure. Other (please comment) I was a NICE NG125 2019 committee member I am a co-author of Cochrane protocol reviewing SSI preventions in cardiac surgery https://www.cochrane.org/CD013332/VASC_interventions-	

		prevent-surgical-site-infection-adults-undergoing-cardiac-surgery	
		Expert #2 I have done bibliographic research on this procedure. Yes I have done research on this procedure in laboratory settings (e.g. device-related research). No I have done clinical research on this procedure involving patients or healthy volunteers. Yes I have published this research. Yes I have had no involvement in research on this procedure.	
		Expert #3 **I have done bibliographic research on this procedure. YES** I have done research on this procedure in laboratory settings (e.g. device-related research). **I have done clinical research on this procedure involving patients or healthy volunteers. PLANNED** **I have published this research. PLANNED** I have had no involvement in research on this procedure.	

	–	Expert #4 I have done bibliographic research on this procedure. I have done research on this procedure in laboratory settings (e.g. device-related research). I have done clinical research on this procedure involving patients or healthy volunteers. I have published this research. X I have had no involvement in research on this procedure	
	–	Expert #5 I have done bibliographic research on this procedure.	
	–	Expert #6	
	–	Expert #7	
	–	Expert #8	

Current management

3	How innovative is this procedure/technology, compared to the current standard of care? Is it a minor variation or a novel approach/concept/design? Which of the following best describes the procedure (please choose one):	Expert #1: In adult cardiac surgery in the UK, I don't believe that it is standard practice to use the antimicrobial tricolosan-coated sutures (estimate <25%). Established practice and no longer new. A minor variation on an existing procedure, which is unlikely to alter the procedure's safety and efficacy. Definitely novel and of uncertain safety and efficacy. The first in a new class of procedure	
		Expert #2 Monir variation with subtle but important reduction in infection rates. **Established practice and no longer new.** A minor variation on an existing procedure, which is unlikely to alter the procedure's safety and efficacy.	

		Definitely novel and of uncertain safety and efficacy. The first in a new class of procedure.	
		Expert #3 Established practice and no longer new. **A minor variation on an existing procedure, which is unlikely to alter the procedure's safety and efficacy.** Definitely novel and of uncertain safety and efficacy. The first in a new class of procedure.	
		Expert #4 X Established practice and no longer new. A minor variation on an existing procedure, which is unlikely to alter the procedure's safety and efficacy. Definitely novel and of uncertain safety and efficacy. The first in a new class of procedure.	
		Expert #5 A minor variation on an existing procedure, which is unlikely to alter the procedure's safety and efficacy.	

		Expert #6	
		Expert #7	
		Expert #8	
4	Does this procedure/technology have the potential to replace current standard care or would it be used as an addition to existing standard care?	Expert #1: At the moment it is in addition to existing standard of care although the potential to replace exists	
		Expert #2 **Replace**	
		Expert #3 May replace standard care if effectiveness and cost-effectiveness are demonstrable.	
		Expert #4 Potential to replace, however if there are cost implications then it can be used for procedures considered to be high risk.	
		Expert #5 Has the potential to replace current standard of care.	

		Expert #6	
		Expert #7	
		Expert #8	

Potential patient benefits

5	Please describe the current standard of care that is used in the NHS.	Expert #1: I am not from a theatre background but uncoated Vicryl may be used for deep soft tissue, Monocryl for skin layers	
		Expert #2 Same sutures, often with the same Brand of suture but without the antibacterial coating.	
		Expert #3 There appears to be substantial variability in the use of Plus sutures. Some specialties within the same trust will use them, others are unaware of their existence. There are between-trust and within-trust differences in practice.	
		Expert #4 Currently used for different surgeries	
		Expert #5 Non-antibacterial sutures.	

		Expert #6	
		Expert #7	
		Expert #8	
6	Are you aware of any other competing or alternative procedure/technology available to the NHS which have a similar function/mode of action to this? If so, how do these differ from the procedure/technology described in the briefing?	Expert #1: No	
		Expert #2 No	
		Expert #3 No I am not aware.	
		Expert #4 Not aware, need to research	
		Expert #5 I am unaware of a competing product.	
		Expert #6	
		Expert #7	

		Expert #8	
7	What do you consider to be the potential benefits to patients from using this procedure/technology?	Expert #1: Fewer patients may suffer an SSI. This complication can have devastating impact to patient and families	
		Expert #2 Reduced infection rates	
		Expert #3 They may reduce surgical site infection	
		Expert #4 In line with already published literature, the product is an evidence based SSI prevention intervention, therefore would reduce the risk of wound infections.	
		Expert #5 Potential reduced rate of surgical site infection, with reduced requirement for antibiotic treatment, reduction in prolonged hospital stay, and further wound review in the primary care and hospital settings.	
		Expert #6	
		Expert #7	

		Expert #8	

Potential system impact

8	Are there any groups of patients who would particularly benefit from using this procedure/technology?	Expert #1: NICE guidance suggests paediatric surgery	
		Expert #2 Possibly those patients with triclosan allergy. I haven't met any patients with that though.	
		Expert #3 Potentially those at higher risk of infection (e.g. immunosuppression, diabetes)	
		Expert #4 Current NICE guidance suggests a benefit in paediatric surgery	
		Expert #5 All patients could benefit.	
		Expert #6	
		Expert #7	

		Expert #8	
9	Does this procedure/technology have the potential to change the current pathway or clinical outcomes to benefit the healthcare system? Could it lead, for example, to improved outcomes, fewer hospital visits or less invasive treatment?	Expert #1: Improve outcomes	
		Expert #2 yes	
		Expert #3 Yes, by preventing SSI which leads to significant additional morbidity and mortality	
		Expert #4 If surgical site infections are avoided, then yes there will be patient, organisation & economic benefits	
		Expert #5 See my answer to Q7.	
		Expert #6	
		Expert #7	
		Expert #8	

10	Considering the care pathway as a whole, including initial capital and possible future costs avoided, is the procedure/technology likely to cost more or less than current standard care, or about the same? (in terms of staff, equipment, care setting etc)	Expert #1: Prevention of SSI = costs avoided	
		Expert #2 Cheaper. We including a basic cost analysis in one of our papers	
		Expert #3 Plus sutures are more expensive. This needs to be weighed against the cost of SSI.	
		Expert #4 There is potential for a return in investment if surgical site infections are avoided	
		Expert #5 I believe that PLUS antibacterial sutures cost more than standard sutures.	
		Expert #6	
		Expert #7	
		Expert #8	
11	What do you consider to be the resource impact from adopting this	Expert #1: Costs more than standard care	

	procedure/technology (is it likely to cost more or less than standard care, or about same-in terms of staff, equipment, and care setting)?	Expert #2 The actual suture costs slightly more than standard care. This risk is that the manufacturer will put the cost up if it becomes standard of care, as I believe it holds the patent, and other companies cannot compete	
		Expert #3 It will cost more, but only in relation to the cost of the sutures themselves. There shouldn't be any additional costs.	
		Expert #4 The product will probably cost more than standard care but if infections are avoided, then it may be cost neutral	
		Expert #5 Potential reduction in antibiotic treatment for surgical site infection, reduction in prolonged hospital stay, reduction in follow-up requirements. These could lead to potential cost savings.	
		Expert #6	
		Expert #7	
		Expert #8	

12	What clinical facilities (or changes to existing facilities) are needed to do this procedure/technology safely?	Expert #1: Potential storage, if stocked in addition to standard	
		Expert #2 None over existing	
		Expert #3 None	
		Expert #4 No changes to facilities	
		Expert #5 No changes required.	
		Expert #6	
		Expert #7	
		Expert #8	

General advice

13	Is any specific training needed in order to use the procedure/technology with respect to efficacy or safety?	Expert #1: Not that I am aware	
		Expert #2 No	
		Expert #3 No	
		Expert #4 Perhaps just raising awareness of upcoming change then support for clinicians should they have queries or concerns	
		Expert #5 None required.	
		Expert #6	
		Expert #7	
		Expert #8	

Other considerations

14	What are the potential harms of the procedure/technology? Please list any adverse events and potential risks (even if uncommon) and, if possible, estimate their incidence: Adverse events reported in the literature (if possible, please cite literature) Anecdotal adverse events (known from experience) Theoretical adverse events	Expert #1: CDC has suggested use is considered, with no evidence of harm Theoretical increased resistance to triclosan	
		Expert #2 Possible allergy. I havent seen this	
		Expert #3 There are some reports of allergy to Triclosan, the active ingredient There are also some reports of distant organ pathology (e.g. thyroid disease) from exposure to Triclosan	
		Expert #4 Not aware, unless contraindicated	
		Expert #5 Potential allergic reaction to PLUS antibacterial sutures, although my anecdotal experience is that this is no more likely than standard sutures.	
		Expert #6	
		Expert #7	

		Expert #8	
15	Please list the key efficacy outcomes for this procedure/technology?	Expert #1: Prevention of superficial SSI Prevention of deep SSI Prevention of SSI across different wound classes	
		Expert #2 Infection rates	
		Expert #3 Reduction of surgical site infection	
		Expert #4 SSI reduction & improved patient outcomes	
		Expert #5 Surgical site infection rate, rate of sterile wound dehiscence, antibiotic treatment for surgical site infection.	
		Expert #6	
		Expert #7	

		Expert #8	
16	Please list any uncertainties or concerns about the efficacy and safety of this procedure/?	Expert #1: Evidence based on smaller, less robust studies	
		Expert #2	
		Expert #3	
		Expert #4 Not aware	
		Expert #5 None.	
		Expert #6	
		Expert #7	
		Expert #8	

17	Is there controversy, or important uncertainty, about any aspect of the procedure/technology?	Expert #1: Cost-effectiveness to detail economic benefit is needed Antimicrobial resistance Does targeted intervention make sense (eg. high risk patients)	
		Expert #2	
		Expert #3 Plus sutures may only be effective in certain populations or certain wound types. Just because they may be effective in laparotomy wounds, does not mean they are effective in traumatic wounds, or elective surgery	
		Expert #4 Not aware	
		Expert #5 None.	
		Expert #6	
		Expert #7	

		Expert #8	
18	If it is safe and efficacious, in your opinion, will this procedure be carried out in (please choose one):	Expert #1: Most or all district general hospitals. A minority of hospitals, but at least 10 in the UK. Fewer than 10 specialist centres in the UK. Cannot predict at present.	
		Expert #2 **Most or all district general hospitals.** A minority of hospitals, but at least 10 in the UK. Fewer than 10 specialist centres in the UK. Cannot predict at present.	
		Expert #3 **Most or all district general hospitals.** A minority of hospitals, but at least 10 in the UK. Fewer than 10 specialist centres in the UK. Cannot predict at present.	
		Expert #4 X Most or all district general hospitals. A minority of hospitals, but at least 10 in the UK. Fewer than 10 specialist centres in the UK.	

		Cannot predict at present.	
		Expert #5 Most or all district general hospitals.	
		Expert #6	
		Expert #7	
		Expert #8	
19	Please list any abstracts or conference proceedings that you are aware of that have been recently presented / published on this procedure/technology (this can include your own work). Please note that NICE will do a comprehensive literature search; we are only asking you for any very recent abstracts or conference proceedings which might not be found using standard literature searches. You do not need to supply a comprehensive reference list but it will help us if you list any that you think are particularly important.	Expert #1: Conferences have been suspended due to COVID-19	
		Expert #2 None recent. My last paper in BMJ open in ? 2019	
		Expert #3 Not aware of any	

		Expert #4 Product used as part of an SSI prevention bundle for our adult cardiac surgery patients. Check publications: https://pubmed.ncbi.nlm.nih.gov/29604297/. https://bmjopenquality.bmj.com/content/9/3/e000976.	
		Expert #5 None	
		Expert #6	
		Expert #7	
		Expert #8	
20	Are there any major trials or registries of this procedure/technology currently in progress? If so, please list.	Expert #1: I am not aware	
		Expert #2 Not aware but check ISRCTRN	
		Expert #3	
		Expert #4 Not aware	

		Expert #5 Not that I know of.	
		Expert #6	
		Expert #7	
		Expert #8	
21	Approximately how many people each year would be eligible for an intervention with this procedure/technology, (give either as an estimated number, or a proportion of the target population)?	Expert #1: Clean and contaminated surgeries may consider, paediatric surgery	
		Expert #2 ?3M	
		Expert #3 I only know this for hand trauma – about 200,000 patients/ per in the UK	
		Expert #4 Unable to say	
		Expert #5 Potentially all patients undergoing surgery requiring wound closure with absorbable sutures.	

		Expert #6	
		Expert #7	
		Expert #8	

22	Are there any issues with the usability or practical aspects of the procedure/technology?	Expert#1 Surgeon preference	
		Expert#2 No	
		Expert#3 No	
		Expert #4 Not aware	
		Expert #5 None.	
		Expert #6	
		Expert #7	
		Expert #8	
23	Are you aware of any issues which would prevent (or have prevented) this procedure/technology being adopted in your organisation or across the wider NHS?	Expert#1 Cost -and lack of data- if there is no 'issue' with SSI rates, theatres would be unlikely to change	
		Expert#2 No – our organisation has just adopted for all surgery	
		Expert#3	

		Additional cost, lack of evidence of effectiveness	
		Expert #4 Not aware	
		Expert #5 The only issue I can foresee is cost versus benefit.	
		Expert #6	
		Expert #7	
		Expert #8	
24	Is there any research that you feel would be needed to address uncertainties in the evidence base	Expert#1 Antimicrobial resistance, target high risk	
		Expert#2 No	
		Expert#3 A Cochrane review is essential. RCTs in populations that have not currently been studied (as mentioned above).	
		Expert #4	

		Expert #5 None. There meta-analyses available that support the use of these sutures.	
		Expert #6	
		Expert #7	
		Expert #8	
25	Please suggest potential audit criteria for this procedure/technology. If known, please describe: − Beneficial outcome measures. These should include short- and long-term clinical outcomes, quality-of-life measures and patient-related outcomes. Please suggest the most appropriate method of measurement for each and the timescales over which these should be measured. − Adverse outcome measures. These should include early and late complications. Please state the post procedure timescales over which these should be measured	Expert#1 Beneficial outcome measures: Generally, superficial SSI up to 30 days, deep SSI 90 days Adverse outcome measures: Allergy/Sensitivity Surgical wound dehiscence	

		Expert#2 Beneficial outcome measures: Very tricky infection is a rare complication that could only be detected in huge trials Adverse outcome measures:	
		Expert#3 Beneficial outcome measures: Surgical site infection measured at 30/90 days and defined according to the CDC criteria Measured by patient reported outcome measure and/or hospital records Adverse outcome measures: Incidence of allergy	
		Expert #4 Beneficial outcome measures: Need a robust surgical site infection surveillance programme in place to monitor surgical site infection rates locally	

		Adverse outcome measures: Not anticipated	
		Expert #5 Beneficial outcome measures: Surgical site infection rates – already being measured in all UK paediatric cardiac surgery units Reduction in antibiotic use for surgical site infection Hospital length of stay solely for antibiotic administration / surgical site infection treatment. All should be measured over a 30-day post-operative period. Adverse outcome measures: Wound dehiscence Allergic reaction to sutures Both should be measured over a 90-day post-operative period, as the sutures would be completely absorbed by this time.	

		Expert #6	
		Expert #7	
		Expert #8	
26	Please add any further comments on your particular experiences or knowledge of the procedure/technology,	Expert#1	
		Expert# 2	
		Expert#3	
		Expert #4 n/a	
		Expert #5 No further comment.	

		Expert #6	
		Expert #7	
		Expert #8	

NICE National Institute for Health and Care Excellence

External Assessment Centre correspondence log

MT507 Plus Sutures

The purpose of this log is to show where the External Assessment Centre relied in their assessment of the topic on information or evidence not included in the company's original submission. This is normally where the External Assessment Centre:

a) become aware of additional relevant evidence not submitted by the company;
b) needs to check "real world" assumptions with NICE's expert advisers, or;
c) needs to ask the company for additional information or data not included in the original submission, or;
d) needs to correspond with an organisation or individual outside of NICE

These events are recorded in the table to ensure that all information relevant to the assessment of the topic is captured. The table is shared with the NICE medical technologies advisory committee (MTAC) as part of the committee documentation, and is published on the NICE website at public consultation.

#	Date	Who / Purpose	Question/request	Response received
1.	09/03/2021	Initial teleconference with the company, raising EAC queries on company submission of clinical evidence		EAC notes from call: Appendix 2
2.	11/03/2021	Ethicon supplied additional written responses to the questions on triclosan submitted in advance of the Company call		Additional responses: Appendix 3

3.	16/03/2021	Expert Engagement meeting	EAC questions for clinical experts shared in advance of the meeting (summarised as appendix to the notes)	Notes from Expert Engagement meeting: Appendix 4
4.	09/04/2021	Company Engagement meeting		Notes from Company Engagement meeting and additional information provided by the Company following the call Appendix 5
5.	09/04/2021	Additional paper provided by the Company		Company provided pdf of additional study: Dhom J, Bloes DA, Peschel A, Hofmann UK. Bacterial adhesion to suture material in a contaminated wound model: Comparison of monofilament, braided, and barbed sutures. J Orthop Res. 2017 Apr;35(4):925-933. doi: 10.1002/jor.23305. Epub 2016 Jun 14. PMID: 27208547.
6.	14/04/2021	Additional paper provided by the Company		Company provided pdf of additional study: Elsolh B, Zhang L, Patel SV. The Effect of Antibiotic-Coated Sutures on the Incidence of Surgical Site Infections in Abdominal Closures: a Meta-Analysis. J Gastrointest Surg. 2017 May;21(5):896-903. doi: 10.1007/s11605-017-3357-6. Epub 2017 Jan 18. PMID: 28101722.
7.	19/04/2021	Combined EAQs (MIB and MTG) received from NICE		Collated comments from EAQs Appendix 6
8.	19/04/2021	Query to Suzi Patel at Quidel	Good morning Suzi, Hope you had a lovely weekend.	Hi Kim, You are correct - the SE, alpha and beta parameters used in the subgroups analysis in the model were not correct and the base case values

<table>
<tr>
<td></td>
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<td></td>
<td>We have an additional query regarding the number of sutures (and its modelled distribution) which is applied in the economic model.
There appears to be a difference between the SE, alpha and beta parameters used in the base-case and those used in the different scenarios (adults, children, clean, non-clean) – see below table.

<table>
<tr><th>Analysis</th><th>From economic submission (report)</th><th>From Excel model</th></tr>
<tr><td>Base case</td><td>Distribution Gamma
Standard error 1.53
Based on lower and upper bounds provided by independent clinical experts</td><td>Standard error 1.531
Alpha 10.67
Beta 0.47
[Data_store worksheet, cell C7, E7, F7]

[The 95% CI of this distribution would be from 2.4 to 8.4 sutures]</td></tr>
<tr><td>Adults
Children
Clean
Non-clean</td><td>Not reported</td><td>Standard error 1.020
Alpha 24.0
Beta 0.208
[e.g. Data_store worksheet, cell C19, E19, F19]</td></tr>
</table>
</td>
<td>should have been applied. The model has been updated accordingly, attached.

We do not believe this changes the results provided in the submission dossier itself.

I’ve cc’d our economic modeler, Thibaut, into my reply (who has confirmed this). Please let us know if any further queries?

Many thanks, Suzi</td>
</tr>
</table>

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<tr>
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<td>
<table>
<tr><td></td><td></td><td>[The 95% CI of this distribution would be from 3.2 to 7.2 sutures]</td></tr>
</table>

Can you provide some explanation as to why the distribution of number of sutures is different in the scenario analysis?
Many thanks</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>19/04/2021</td>
<td>Query sent to clinical experts:</td>
<td>The EAC is currently reviewing the economic model for Plus Sutures. We have been able to validate most of the data inputs used in the model, however, one parameter we have been unable to verify is the average number of unit sutures used (for reference, each unit costs around about £3 and £5 each). The company has made the following estimate which was derived from contacting the authors of an economic study and the company's own expert advisers:
Average number used per procedure: 5
Range (used in sensitivity analysis): 3 to 9

We appreciate this variable will be dependent on the patient (e.g. adult/child) and procedure complexity used, but do these estimates sound reasonable to you? If you have access to any audit data which might be informative this would also be useful.

Many thanks for your help
Best wishes
Emma</td>
<td>
<table>
<tr><th>Sent to</th><th>Replied</th><th>Response</th></tr>
<tr><td>Mike Reed</td><td></td><td></td></tr>
<tr><td>Melissa Rochon</td><td></td><td></td></tr>
<tr><td>Justin Wormald</td><td>26/04/2021</td><td>Briefly, I'd say those figures are reasonable for most operations. Some plastic surgery procedures, such as breast reconstruction, would use many more suture packs (15-20 perhaps), but for most I would say we</td></tr>
</table>
</td>
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						would use around 5 packs. Let me know if you'd like further info.
				Lillian Chiwera		
				Shafi Mussa	20/04/2021	In cardiac surgery these sutures are used mainly for wound closure. In adults, the average number of “vicryl” sutures used is 2, in paediatrics it is usually 1. Given that sutures occasionally snap, it would be reasonable to say the range in adults is 2-4, and paediatrics 1-2. I personally use vicryl sutures for sternal closure in smaller children (on average 3 sutures per case) but this is not

						routine for all surgeons. I hope this helps. I don't have any audit data to substantiate the numbers but this is based on clinical experience. Happy to discuss further.

Insert more rows as necessary

Appendix 1

During correspondence with the company and experts, additional information is sometimes included as file attachments, graphics and tables. Any questions that included additional information of this kind is added below in relation to the relevant question/answer:

File attachments/additional information from question X:

Insert

File attachments/additional information from question X:

Insert

File attachments/additional information from question X:

Insert

Appendix 2

Plus Sutures – post submission meeting [Zoom]

Tuesday 09 March 2021, 15:30 – 16:30

In attendance:
Company (Ethicon): Suzi Patel (SP), Gianluca Casali (GC), Stephen Murray (SM), Walt Danker (WD)
Newcastle EAC: Iain Willits (IW), Kim Keltie (KK), Emma Belilios (EB), Kathryn Fletcher (KF)
NICE: Victoria Fitton (VF), Kimberley Carter (KC), Rebecca Owens (RO), Samantha Baskerville (SB).

NOTES

1. **Introductions**

Suzi Patel – Health Economics and Market Access (UK)
Walt Danker - Health Economics and Market Access (Global)
Stephen Murray – Marketing (Europe, Middle East & Africa)
Gianluca Casali – Medical Director (UK & Ireland)

2. **Clinical evidence submission (Part 1): external assessment centre (EAC) questions**

IW thanked the Company for a comprehensive submission – the EAC has very few questions.

The list of questions was circulated in advance of the meeting. The Company's R&D department (based in the US) are working on the questions in parallel and will provide a full response. They will also be happy to answer any additional questions that arise as the assessment progresses, though due to the time difference there may be a slight delay.

ACTION: Company will submit written responses to the questions on triclosan

POST MEETING NOTE: Response received 11/03/2021

The technology

i) Can you confirm that the list of brand/trade names included in the submission (see below) is a comprehensive list of all the variants available? Can you also add any additional variants not included in this list please?

- PDS Plus

- PDS II Plus
- VICRYL Plus
- MONOCRYL Plus
- STRATAFIX Spiral MONOCRYL Plus
- STRATAFIX Spiral PDS Plus
- STRATAFIX SYM PDS Plus

Company Response:
Plus Sutures are all absorbable sutures – the first decision a surgeon will make is whether a permanent or absorbable suture is needed. There are 3 'traditional' Plus Sutures (containing triclosan), PDS, VICRYL and MONOCRYL. PDS II is a standard suture (does not contain triclosan), not a Plus Suture. Therefore the company requested that PDS II Plus be removed from the list.

Stratafix sutures were not included in the original scope, but the Company thought it was important to include them in the submission. There are 3 STRATAFIX Plus brands, 2 with PDS polymers and 1 with MONOCRYL polymer. Stratafix is a knotless technology.

Ethicon do produce Stratafix versions of permanent (non-Plus) sutures, but most (95-96%) Stratafix sutures are absorbable Plus Sutures

ii) Could you briefly describe what are the differences between these technologies and when they may be indicated (e.g. operation type, depth of incised layer), or direct us to information on this?

Company Response:
The difference between the polymers/ suture types is the length of time the suture takes to absorb, and therefore how long the suture will support the tissue. The 3 polymers are therefore suitable for different wound types – a surgeon will make a clinical judgement as to which is the most appropriate.

iii) Can you confirm that the suture polymers (polyglactin, poliglecaprone, polydioxanone) can be regarded as equivalent for purposes of analysis?

iv) Can you confirm whether polyglactin and poliglecaprone polymers are specific to Ethicon Plus Sutures?

Company Response:
PDS, VICRYL and MONOCRYL are all trademarked and unique to J&J/Ethicon. Polyglactin and poliglecaprone are the chemical polymer names (not trademarked and not specific to J&J/Ethicon).

v) Are Ethicon Plus Sutures the only available suture with triclosan coating? Is this a patented use of triclosan or are they otherwise a protected intellectual technology?

Company Response:

Plus Sutures are the only sutures with Triclosan available worldwide with antibacterial protection offered by IRGACARE®† MP (Triclosan)*. Ethicon Plus Sutures are also the only triclosan coated sutures with CE Mark and FDA approval.

Comparator

vi) *The comparator in the scope is "Sutures that do not contain an antibacterial agent". To be regarded as a fair comparator, would you agree the sutures should be otherwise equivalent (e.g. made of same polymer, same thread size etc)?*

Company Response:
[redacted]

vii) *We understand that* [redacted]*. Is this representative of sales of sutures in the UK NHS? What proportion of the UK NHS market is currently supplied by the equivalent non-Plus Ethicon sutures? Can you name some widely used brands in the NHS that would act as fair comparators?*

Company Response:
[redacted]

viii) *Are there any other anti-microbial coated or impregnated sutures on the market?*

Company Response:
The Company are aware of sutures containing chlorohexidine, but to the best of their knowledge, today they are not available in the UK. Ethicon Plus Sutures are the only anti-microbial sutures with FDA and CE mark approval

Contraindications

ix) *What are the contraindications to use of Plus Sutures other than known allergy to triclosan?*

Company Response:
No other contraindications. Plus Sutures are absorbable, so would not be used where a permanent suture is needed.

x) *Regarding triclosan allergy, how would a person know they had it? Is it likely healthcare professionals would be informed about such an allergy? What would be the likely consequence of a person with a triclosan allergy receiving Plus Sutures? Is the rate of triclosan allergy known?*

Company Response:
Triclosan is widely used in cosmetics and toiletries. Patients may well be aware if they have a triclosan allergy. Reactions at the wound site may be due to the suture or the surgery rather than

the triclosan – it would be very hard to differentiate. Some reaction (e.g. redness) is a normal part of the reabsorption process.

Adverse event rates are quoted in the submission – allergic reaction is extremely rare. Triclosan dosage on the sutures is very low compared to exposure from toiletries and cosmetic products.

xi) Other than cost and known contraindications (see below) are there any reason Plus Sutures would NOT be used?

Company Response:
No known issues. Would always recommend using a Plus Suture where an absorbable suture is appropriate and the patient does not have a known allergy to triclosan.

Antibiotic stewardship

xii) Would it be correct to consider triclosan to be a broad spectrum bacteriostatic antiseptic rather than an antibiotic per se?

Company Response:
Yes

POST MEETING NOTE: Company submitted written response to triclosan questions, received 11/03/2021

xiii) Whilst triclosan could potentially reduce antibiotic use, is there the possibility that it could directly contribute to antimicrobial resistance, especially if used indiscriminately?

Company Response:
No

Economic model

xiv) Could you give us any "heads up" information regarding the economic model, in terms of:

- *Software used (Excel, other).*
- *Model structure (decision tree, Markov)*
- *Population scenarios?*

Company Response:
The model has been built in Excel. It is a decision tree, cost consequence model, aligned to the NICE scope. The Company are currently working on specific sensitivity analyses.

The Company agreed to request the EndNote bibliography of search results from the York Health Economics Consortium (YHEC).

ACTION: Company to request EndNote bibliography from YHEC and share with the EAC

POST MEETING NOTE: 10/03/2021 SP updated that due to licencing restrictions, it would be challenging to share the library in its current format. The Company are happy to respond to specific questions relating to the search libraries.

3. **Future correspondence and the EAC correspondence log**

   Going forward the EAC will contact Company directly. RO will share contact details with the EAC and the Company. SP is the key Company contact, GC will be copied in to all correspondence. NICE should also be copied in to communications.

   All correspondence contributing to the development of the assessment report will be logged by EB in the external correspondence log which will be published in the public domain on NICE's website. All information highlighted by the Company as commercially sensitive or academic in confidence will be redacted before publication. The Company will have the opportunity to check the correspondence log before it is published.

4. **Handling confidential information and the confidential information checklist**

   The Company are asked to highlight all confidential information shared with the EAC and NICE so that it can be redacted. The Company's completion of the confidentiality checklist in the submission looks very thorough, but NICE are happy for any omissions to be redacted retrospectively. If any information currently redacted becomes publically available and redaction is therefore no longer necessary, the Company are asked to inform NICE/EAC.

5. **Next steps and any other business**

   - **16/03/2021 - Expert Engagement meeting**: 8 experts from a range of specialities will be present at the meeting – RO will follow up with details of specialities represented. The Company are not invited to the Expert Engagement meeting, but notes from the meeting will be published in the correspondence log.

     ACTION: RO to share details of expert specialities.

   - **30/03/2021 - Economic submission**
   - **09/04/2021 - Company engagement meeting**
   - **29/04/2021 - Final report and correspondence log submitted to NICE**

Appendix 3

10.03.21 J&J Ethicon reply to Newcastle EAC

Contraindications

9. What are the contraindications to use of Plus Sutures other than known allergy to triclosan?

Plus Antibacterial sutures and the equivalent non Plus version share the same base polymer. The only difference is the addition of the triclosan antibacterial agent. The contraindications are the same as the base polymer. The only additional contraindication for Plus Antibacterial sutures is it should not be used in patients with a known allergic reaction to Irgacare MP (triclosan).

Please also refer to the IFUs shared alongside our submission part 1.

10. Regarding triclosan allergy, how would a person know they had it? Is it likely healthcare professionals would be informed about such an allergy? What would be the likely consequence of a person with a triclosan allergy receiving Plus Sutures? Is the rate of triclosan allergy known?

Allergenicity

The substances that trigger allergies are a particular type of antigen called “allergens.” Allergens are typically proteins that in some people, for reasons that are not clear, fool the immune system into thinking that they are harmful and trigger the production of antibodies (usually IgE immunoglobulins). The antibodies then trigger mast cells to release chemicals, including histamine, into the bloodstream to defend against the allergen "invaders." There are some non-protein allergens that in certain circumstances low-molecular-weight sugars, metals and isocyanates act as substances called “haptens.” Haptens are small molecules that by themselves, are not antigenic (not capable of making allergens.) But if a hapten binds to a protein, the complex becomes capable of triggering antibody formation. The proteins that they bind to are called the carriers.

Allergenicity of Plus Sutures

Triclosan is an antimicrobial active substance that has been used for over 40 years. According to BASF (the supplier of triclosan used in Plus sutures) , triclosan does not contain protein, heavy metals, isocyanates or molecules that can act as haptens and as a result is considered non-allergenic. This position is further validated with the support of numerous studies investigating the skin sensitization potential of triclosan, submitted to the authorities for review[4] with subsequent expert opinions[3] affirming that triclosan is not classifiable as a skin contact allergen. As with any substance there are always some individuals with unique responses. While the existence of triclosan-related acute contact dermatitis (ACD) can occur, the rate at which this happens is relatively low compared to the higher incidence seen for other substances. Such as fragrance mix with a reactivity rate of 14.0% and nickel sulfate, with a 14.3% reactivity rate, according to the North American Contact Dermatitis Group.[2]

Triclosan coated sutures have been evaluated in standard preclinical biocompatibility assays and were found to be noncytotoxic, nonirritating, and not a chemical pyrogen. The tissue reaction, healing response, and absorption profile of the suture were not affected by the presence of triclosan[1]. Ford et al 2005, compared the intraoperative handling and wound healing characteristics of coated polyglactin 910 suture with triclosan and traditional coated polyglactin 910 suture in pediatric patients undergoing various general surgical procedures. In this randomized controlled trial, coated polyglactin 910 suture with triclosan performed as well or better than traditional coated polyglactin 910 suture in pediatric patients. Significantly fewer patients treated with coated polyglactin 910 suture reported pain at post-operative day 1. There were no significant differences in wound healing parameters and adverse events between the two groups.[5] A review of our post marketing safety and surveillance data did not show any trends of increased allergic reactions or skin reactions with Plus sutures compared to the non Plus suture.

Allergenicity of Triclosan in general

In a 1989, the Swiss Contact Dermatitis Research Group conducted a 1-year study to evaluate the frequency of sensitization to common preservatives. Triclosan was shown to have a low sensitizing potential as only 0.8% of the 2,295 patients tested had positive reactions.[4] Schena et al 2008, evaluated the sensitizing potential of triclosan and triclosan based skin care products in patients with eczematous dermatitis. Two hundred and seventy-five patients were patch tested with standard patch test series as well as triclosan and triclosan based products. Only two patients developed positive reactions to triclosan (0.7%) and four (1.4%) to triclosan-based products.[2] Several cases of patients who developed allergic contact dermatitis secondary to triclosan-containing products, none of which were triclosan coated sutures, have been reported, including one case of a health care worker whose contact dermatitis from triclosan was confirmed by patch testing. [6,10,11,12,13] Wahlberg published a large series in 1976 that showed negative test results for 902 patients tested with 0.5% and 1.0% triclosan concentrations for 16 months but reported three cases of allergic contact dermatitis from triclosan at a 2.0% concentration among 1,100 patients tested for 17 months.[12]

Triclosan is generally patch-tested at a concentration of 2% in petrolatum. Overall, it appears that the frequency of positive patch-test reactions to triclosan is low and that the prevalence of allergic and irritant contact dermatitis due to triclosan is very low, especially considering its widespread use in consumer and health care products.

It should be noted that a patient's exposure to triclosan from suture is minimal and is less than typical daily exposure from personal care products. Triclosan is rapidly metabolized before being excreted in a neutralized form; therefore, it does not accumulate in the body and has minimal impact on the environment.

References:

1. Barbolt, T. A. (2002). Chemistry and safety of triclosan, and its use as an antimicrobial coating on coated VICRYL. plus antibacterial suture (coated polyglactin 910 suture with triclosan). Surgical Infections, 3(SUPPL. 1), S-45-S-53.
2. Brown L. and Brancaccio R. (2002). Cosmetics and Allergies. Skin and Aging, 10(6), www.skinandaging.com.
3. European Scientific Committee on Consumer Products, Opinion on Triclosan, 21 January 2009 (SCCP/1192/08); Priority Existing Chemical Assessment Report No. 30, Triclosan, January 2009, Australian Government, NICNAS
4. Evaluation of the sensitization potential of triclosan. A comprehensive review containing predictive tests in animals and humans as well as clinical data. March 2003. Ciba Specialty Chemicals, Basel, Switzerland
5. Ford, H. R., Jones, P., Gaines, B., Reblock, K., & Simpkins, D. L. (2005). Intraoperative handling and wound healing: controlled clinical trial comparing coated VICRYL® Plus antibacterial suture (coated polyglactin 910 suture with triclosan) with Coated VICRYL® suture (coated polyglactin 910 suture). Surgical infections, 6(3), 313-321.
6. Lachapelle, J. M. (2014). A comparison of the irritant and allergenic properties of antiseptics. European Journal of Dermatology, 24(1), 3-9.
7. Leaper, D. J., Edmiston Jr, C. E., & Holy, C. E. (2017). Meta-analysis of the potential economic impact following introduction of absorbable antimicrobial sutures. Journal of British Surgery, 104(2), e134-e144.
8. Perrenoud, D., Bircher, A., Hunziker, T., Sutter, H., Bruckner-Tuderman, L., Stäger, J., ... & Swiss Contact Dermatitis Research Group. (1994). Frequency of sensitization to 13 common preservatives in Switzerland. Contact Dermatitis, 30(5), 276-279.
9. Schena, D., Papagrigoraki, A., & Girolomoni, G. (2008). Sensitizing potential of triclosan and triclosan-based skin care products in patients with chronic eczema. Dermatologic therapy, 21, S35-S38.
10. Steinkjer, B., & Braathen, L. R. (1988). Contact dermatitis from triclosan (Irgasan DP 300). Contact Dermatitis, 18(4), 243-244.
11. Veronesi, S., De Padova, S. M. P., Vanni, D., & Melino, M. (1986). Contact dermatitis to triclosan. Contact Dermatitis, 15(4), 257-258.
12. Wahlberg, J. E. (1976). Routine patch testing with Irgasan DP 300®. Contact Dermatitis, 2(5), 292-292.
13. Zaugg, T., & Hunziker, T. (1987). Germall II and triclosan. Contact dermatitis, 17(4), 262-262.

Antibiotic stewardship

12. Would it be correct to consider triclosan to be a broad spectrum bacteriostatic antiseptic rather than an antibiotic per se?

Yes. Triclosan (TCS), or 5-chloro-2-(2,4-dichlorophenoxy)phenol, is a synthetic broad-spectrum antiseptic developed in the 1960s. The product has activity against gram-negative and gram-positive bacteria as well as yeast and fungi. It achieves its antimicrobial effect by inhibiting the activity of the enzyme enoyl-acyl carrier-protein reductase, which catalyzes an essential step in membrane synthesis of many bacteria and fungi. Triclosan has been widely employed for over 40 years in a variety of personal care and human hygiene applications as well as professional medical applications. Irgacare MP is a medical grade of triclosan employed in Plus Sutures.

13. Whilst triclosan could potentially reduce antibiotic use, is there the possibility that it could directly contribute to antimicrobial resistance, especially if used indiscriminately?

Sutures, while necessary to close the incision and provide external support to maintain wound edge apposition during the critical wound healing period; do act as a foreign body (even absorbable sutures). Small numbers of bacteria in the wound can colonize the suture surface and develop into a biofilm which is resistant to phagocytic immune cells as well as to antibiotics. In this way, the suture although ubiquitous and necessary for surgical wound closure, also presents a risk factor for the development of surgical site infection. This risk factor can be addressed by coating the suture surface with an antibacterial agent that inhibits bacterial colonization of the suture surface and prevents biofilm formation.

While laboratory studies have value in evaluating mechanisms of action of and resistance to biocides, including triclosan, wherever possible, findings from laboratory studies should be correlated to the actual clinical uses of these agents. Existing clinical surveys on the use of biocides, including triclosan have typically failed to support such correlation from laboratory studies. In a 10-year clinical survey, it was found that there was no relationship between triclosan usage and antibiotic resistance in MRSA and P. aeruginosa (Lambert 2002). Another clinical survey found no significant differences in overall titers of bacteria, potential pathogens or frequencies of antibiotic resistance in a single-time analysis of homes that did or did not use surface antibacterial agents including triclosan (Marshall 2003). A third comprehensive clinical survey could find no relationship between the use of triclosan and other biocides and antibiotic resistance in homes where biocidal products were or were not being used (Cole 2003). A review of the literature does not support the conclusion medical grade triclosan has a clinical connection with antibiotic resistance. Given the short-term nature of suture use, it is highly unlikely that such use would do other than reduce the risks of postoperative infection (Gilbert and McBain 2002).

Overall, there is no convincing evidence to support the contention that triclosan usage has resulted in the clinical development of antibiotic-resistant bacteria. Nevertheless, it would be wise to restrict the use of triclosan to areas where it has been shown to be effective in order to retain its important and valuable application. One such area of importance is the use of triclosan as an antibacterial coating on sutures.

There is an abundance of clinical data examining the use of triclosan coated sutures and their effects on reducing the risk of surgical site infection for patients. Prospective randomized controlled trials, as well as prospective and retrospective comparative cohort studies and case series have been conducted since 2002 to present, in over 23 countries, and in surgical procedures encompassing all four CDC surgical wound classifications. Multiple prospective meta-analyses of the higher-level studies over the past 6 years have consistently demonstrated a statistically significant clinical benefit associated with triclosan coated sutures versus non-coated sutures for the outcome of reducing the risk for surgical site infection. The most recent such meta-analysis also included a trial sequential analysis concluding that the outcome of the meta-analysis was robust with additional data unlikely to change the summary effect (De Jonge 2017).

In discussing the treatment controversy involving triclosan resistance, it is important to distinguish between the expansion of the scientific literature describing the modes of action and mechanisms of resistance of triclosan versus risk assessment and/or demonstration of actual clinical effect or failure. The argument that the use of triclosan in

medical devices, and in particular Plus sutures, poses some peculiar risk relative to fostering triclosan or antibiotic resistance fails to consider the following:

- All antimicrobials that are safe for human use exhibit limits in their spectrum of activity.
- Bacteria have various and ever-changing susceptibility (or resistance) to antibacterial chemistry as they respond to the selective pressures placed on them.
- The selection and isolation of bacterial mutants resistant to all sorts of antimicrobials is common practice in microbiology and molecular biology labs worldwide.
- The fact that bacteria can become resistant to antimicrobials does not change the fact that antimicrobials are useful and necessary components of infection control practice.
- The argument against indiscriminate and non-value-added use of antimicrobials is well recognized.
- The predominant cause of antibiotic resistance is the abundant and often poorly managed use of antibiotics, including agricultural uses and uncontrolled exposure through wastewater and other environmental sources. Medical devices and their packaging are managed very closely as medical waste, and their potential to contribute to environmental exposure is small.
- The literature on triclosan resistance continues to focus on the issues of environmental exposure from triclosan use in consumer and industrial products and the hypothesis of triclosan resistance leading to or co-existing with antibiotic resistance.
- The significant reduction in consumer product use of triclosan, including toothpaste and hand soaps, can only improve the risk of resistance.

The Scientific Committee on Consumer Safety (SCCS) conducted a comprehensive review. The SCCS approved this opinion at the 7th plenary of 22 June 2010 after public consultation.

There is so far no epidemiological data linking outbreaks of antimicrobial resistant human and zoonotic pathogens following exposure to triclosan from cosmetics and other products. When used appropriately, biocides, including triclosan, have an important role to play in disinfection, antisepsis and preservation. To preserve the role of triclosan in infection control and hygiene, SCCS can only recommend its prudent use, for instance limited to applications where a health benefit can be demonstrated.

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6. SCCS (Scientific Committee on Consumer Safety), Opinion on triclosan (antimicrobial resistance), 22 June 2010

What is the amount of triclosan is in the sutures and how is it excreted?

To provide further detail to support part 1 of our submission on triclosan, a patient's exposure to triclosan from a suture is minimal, and is less than typical daily exposure from personal care products. Triclosan is rapidly metabolized before

being excreted in a neutralized form; therefore, it does not accumulate in the body and has minimal impact on the environment.

Numerous pharmacokinetic studies have been conducted, specifically oral and dermal routes of exposure. Absorption of triclosan from the gastrointestinal tract is rapid and estimated to be 50-100% of the administered dose across species. It is well distributed in the body, binding to serum albumin and is present as the sulfate and or glucuronide conjugate. Only a small amount of free triclosan is detected in the blood with the majority found in its conjugated form. There is no indication that triclosan accumulates in the plasma or in the tissues over time.

Coated VICRYL™ Plus suture has a coating of copolymer and calcium stearate and contains no more than 275 micrograms/m Triclosan. MONOCRYL™ Plus and PDS™ Plus Sutures contain no more than 2,360 micrograms/m Triclosan.

References

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Ford, H. R., Jones, P., Gaines, B., Reblock, K., & Simpkins, D. L. (2005). Intraoperative handling and wound healing: controlled clinical trial comparing coated VICRYL® Plus antibacterial suture (coated polyglactin 910 suture with triclosan) with Coated VICRYL® suture (coated polyglactin 910 suture). Surgical infections, 6(3), 313-321.

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Appendix 4

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Medical Technologies Evaluation Programme

Expert Engagement Meeting

MT507 Plus Sutures for preventing surgical site infection

Date: **16/03/2021**

Time: **09:30 – 11:00**

Documents

MIB: **MIB 204 Plus Sutures for preventing surgical site infection**

MTG Scope: **Plus sutures for preventing surgical site infection - final scope**

NOTES

In attendance:

NICE: Victoria Fitton (VF), Rebecca Owens (RO), Kim Carter (KC), Louisa Regan (LR), Helen Crosbie (HC), Chris Chesters (CC), Sam Baskerville (SB)

Newcastle EAC: Iain Willits (IW), Kim Keltie (KK), Emma Belilios (EB)

Experts:

- **MTG**
  - Mike Reed (MR) - Consultant Orthopaedic Surgeon, Northumbria Healthcare
  - Melissa Rochon (MRo) - Quality and Safety lead for Surveillance, Royal Brompton and Harefield Hospitals, part of Guy's and St Thomas' NHS FT
  - Justin Wormald, DPhil Candidate and Specialty Trainee/ Registrar in Plastic and Reconstructive Surgery (ST6), Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford
  - Lillian Chiwera, Infection control surveillance team leader, Guy's & St Thomas' NHS Foundation Trust

- Shafi Mussa (SM), Consultant Congenital Cardiac Surgeon, University Hospitals Bristol and Weston NHS FT

- **MIB**
  - Giles Bond-Smith (GBS), Consultant Surgeon, Clinical Lead for Emergency General Surgery, Clinical Lead for SSI Reduction, Oxford University Hospitals NHS Foundation Trust

Welcome and introductions

Declarations of interest: MR gave a talk for Ethicon last year (already declared).

No additional conflicts of interest were declared.

Questions for the professional experts by theme: (see below)

Technology and indication

Despite some initial scepticism (one expert co-authored an earlier RCT which showed no evidence of effectiveness of triclosan in reducing SSI) all the experts are now confident that Plus Sutures are effective in reducing SSI rates (same expert co-authored a more recent meta-analysis which demonstrated significant reduction in SSI at 30 days from the use of Plus Sutures). Sutures are a known risk area for biofilm formation, and there is an established evidence base supporting the use of Plus Sutures to minimise this risk. The experts were not aware of any safety concerns. One expert reported that the evidence for Plus Sutures is stronger for some wound types than for others and that the sutures are likely to be more effective for some wound types than others.

Choice of suture should be considered as part of a package of measures to reduce the risk of SSI.

The experts agreed that because STRATAFIX sutures differ in mechanism from standard Plus Sutures it would not be possible to isolate the additional effect of triclosan when making comparisons with standard sutures. Would need to compare Stratafix Plus Suture with an equivalent barbed suture without triclosan for the same indication for fair comparison. Barbed sutures are used for different indications to standard sutures.

Triclosan allergy

None of the experts had experience of triclosan allergy in practice. Triclosan is very widely used in toiletries and cosmetics. Patch testing is available for triclosan allergy, but this would not be carried out routinely before using Plus Sutures. The Company may have more information on prevalence of triclosan allergy, or, might be useful to speak with an allergy specialist.

Symptoms of triclosan allergy are likely to be blistering, redness and discharge at the wound site, and would be difficult to differentiate from symptoms of an SSI.

Surgical site infection

Definition

PHE's definition of an SSI is based on the US National Healthcare Safety Network's Centre for Disease Control (CDC) definition, and works well, although it is important that Trusts ensure that all staff are using the same definition. The CDC criteria changed in 2019 - length of follow up reduced to 3 months. PHE's SSI surveillance protocol still requires 1 year follow up for some surgeries.

Assessment and treatment

The experts were aware of the ASEPSIS wound scoring method, but found it difficult as many of the categories are hard to quantify. It also requires sight of the wound which is problematic for wounds that need a dressing. The experts felt there was generally a lack of consistency in SSI assessment and treatment (particularly, when antibiotics would be prescribed) between clinicians, specialities and Trusts, although some Trusts have done a lot of work to standardise their approach.

Patients with larger/deeper wounds would usually receive prophylactic antibiotics initially and their wounds would be well managed in hospital. There is less consistency once they are discharged to primary/community care. One expert reported that their Trust has developed an app so that patients can share pictures of their wound with their surgical team if they are concerned. For minor procedures, patients go home on the day of their surgery and are expected to self-manage their wound care, meaning that issues may not be picked up in good time. The Bluebelle wound healing questionnaire (14 questions to patients) gives a score which helps to guide patients on when they should seek medical attention.

The experts agreed that although it is usually impossible to identify a single factor that caused an SSI, factors that increase the risk are well known. Clinicians should follow SSI 'care bundle' of measures to reduce risk of SSI. One expert reported that for a laparotomy wound, if no measures are taken to prevent infection, there is a 40% SSI rate. With strict adherence to SSI bundle, this goes down to 4%.

One expert reported that their Trust has an SSI investigation protocol based on NG125 Surgical Site Infections: prevention and treatment to see if any elements were missed.

Classification

Studies in the company meta-analyses have been grouped into clean and contaminated wounds. The experts agreed that this was appropriate as the categorisation is well recognised amongst medical professionals.

Other useful sub-groups for analysis suggested:

- Paeds/adults
- By speciality - this would be relatable to clinicians (unclear if there are enough studies to facilitate this subgroup analysis)
- Emergency c/w elective procedures

The experts agreed that attempting to classify by comorbidities should be avoided.

It is unclear at this stage whether the evidence will support a positive recommendation for use of Plus Sutures for all procedures where absorbable sutures are used, or for specific procedures only. The evidence seems strongest for emergency procedures and contaminated wounds, and one expert reported that their Trust is mandating use of Plus Sutures for emergency procedures only.

Management and cost of surgical site infection

Management of superficial/deep SSI

Management of an SSI depends on the location of the wound and what the procedure was.

Generally, superficial infections would be treated with antibiotics. The experts recommended that the wound should be swabbed for confirmation of infection before prescribing antibiotics as the redness that occurs as a normal part of suture reabsorption can be confused with superficial SSI. Deeper infections may require further surgical interventions.

For joint replacement procedures, a deep SSI would require at least one surgical debridement at a cost of c.£10K, and failure of this could potentially lead to a revision procedure costing c.£30K.

For day case procedures, patients would usually present to primary care with superficial SSIs so it is difficult to estimate cost or prevalence.

Length of stay (LoS)

One expert reported that their Trust had reduced their LoS considerably through a focussed reduction in SSIs.

One expert reported that their Trust prospectively collects data on LoS related to SSI.

One expert reported that in their speciality, SSI would usually result in a readmission rather than an extension to the LoS of the primary admission.

Discharge to primary/community care

The experts agreed SSIs could be safely treated in primary/community care provided a care plan was in place.

Incidence of SSI

The experts agreed that incidence of SSI varied greatly between specialities, surgery-types, emergency/elective surgery, patient populations. Pre-procedure risk assessment is important.

Emergency/contaminated surgeries represent the highest risk. One expert reported that Hepato-Pancreato-Biliary (HPB) procedures were a particular concern in their speciality, as they often involve open surgery and large wounds in immunocompromised patients with co-morbidities. There are sub-groups within all specialities that are at higher risk, e.g., cardiac procedures usually classed as 'clean' but procedures involving neonates are higher risk (immunocompromised, hypoxic, desaturated, cooled), diabetic adults with ischaemic heart disease also high risk. Open surgery is higher risk than laparoscopic surgery.

Range of Costs and known studies

Huge range, very difficult to estimate. There will also be significant costs to primary care (GP time, district nurse costs etc.) which will not be reflected in HES, also social costs (patients need time off work etc.)

Prof Leaper's US-based study calculates additional cost of colorectal SSI as c. $100,000. Hard to compare with UK/NHS costs, but the experts thought that the overall cost is likely to be underestimated.

The experts did not know of any additional studies on cost of SSI.

MR might have some information on SSI costs in joint replacement for grant applications which he can share.

Next steps

The experts agreed that the evidence suggests that Plus Sutures appear to be effective. They noted that surgeons value having a choice of suture, and many have strong personal preferences that work well for them. If the choice is likely to be limited, that change will have to be carefully managed.

Draft guidance will go to Committee in May. A positive recommendation is needed to meet the requirements of the MedTech Funding Mandate. The technology will also have to be shown to meet the cost saving criteria.

Questions for discussion

Technology and Indication

1. *What are the indications for using the three Ethicon sutures that were included in the original scope? These were PDS Plus, VICRYL Plus, MONOCRYL Plus. What information guides choice of suture?*

2. *We understand that Plus Sutures are equivalent to their non-Plus counterparts in every way except for the addition of the antiseptic triclosan. Are there any specific indications where you would:*

   - *Specifically want to use Plus Sutures rather than their non-triclosan alternatives?*
   - *Specifically not want to use them (other than documented allergy)?*

   If there are no reasons not to use Plus Sutures over their counterparts, would you have any concerns about this technology being adopted as the standard of care? What are the potential drawbacks, if any, of non-discriminatory use?

3. *The company added STRATAFIX Plus to the scope in their submission. This is a barbed/knotless suture. Would you agree that because this suture differs in mechanism, it is not possible to isolate the additional effect of triclosan when making comparisons with standard sutures?*

Triclosan allergy

4. *Triclosan allergy is the only contraindication for use of Plus Sutures we are aware of. Do you know:*

   - *What proportion of patients have a known allergy to triclosan? If not, have you ever encountered this in clinical practice?*
   - *Would an allergy to triclosan be documented in the clinical record? Would patients be prompted on this prior to having an operation involving Plus Sutures?*
   - *If a person was allergic to triclosan, but this was missed and they were operated on with Plus Sutures, how would this clinically manifest itself?*

Surgical site infections (SSI)

5. *Many studies have adopted the US National Healthcare Safety Network's Centre for Disease Control (CDC) definition of SSI. Is this an accepted definition used in the UK? Are there any other definitions or diagnostic criteria we should be aware of?*

6. *In practice, how are SSIs identified and their severity graded? We are aware of the ASEPSIS wound scoring method, but this was developed in 1986. Is it used routinely across the NHS, and if not, what other methods (if any) are used?*

7. *Is there consistency in assessment of SSI between surgeons/specialities/centres*?

8. *SSI risk factors are multifactorial and the aetiology is complex. Given this, in practice is it ever possible to attribute the cause of an individual SSI (e.g. SSI due to suture use) or to make assumptions on this?*

9. *Relating to the above, studies in meta-analyses have been grouped into clean and contaminated wounds. In practice, how are could these groupings be determined and do you think this grouping is reflective of NHS practice? What other classifications of SSI type might be useful for subgroup analysis (e.g. procedure/specialty type, comorbidities etc)?*

Management and cost of SSIs

10. *Although we appreciate every case will be different, can you briefly describe how an SSI is managed:*
    - *Presenting in superficial tissue?*
    - *Presenting in deep tissue?*
11. *What are the typical consequences of an SSI on hospital length of stay (LoS)? Do you think this could be accurately measured, or would involvement of other factors mean this is essentially not measurable (we are aware that no studies have reported statistically significant differences in LoS between treatment arms).*

12. *Can patients with SSIs be safely discharged and treated in primary/community care? What are the typical barriers to discharge?*

13. *Incidence of SSI appears to vary greatly between surgery types, populations etc. Is this in line with your experience in the NHS?*

14. *Which types of surgery give rise to the highest SSI incidence rate and are these qualitatively different to SSIs from other surgery types?*

15. *Finally, we anticipate putting an average cost on an SSI will be one of the most challenging aspects of economic modelling. With this in mind:*

- *Could you make a reasonable estimate on how costly it is to treat an SSI and what the range of costs might be?*
- *Are you aware of any source or study that have investigated the costs of SSIs previously?*

Appendix 5

Company Engagement Meeting
09/04/2021 @ 14:00

Attendees:

NICE: Kim Carter, Chris Chesters, Rebecca Owens, Sam Baskerville,
EAC: Iain Willits, Kim Keltie
Company (J&J, Ethicon):

- Suzi Patel, UK HEMA (Health Economics and Market Access)
- Gianluca Casali, UK Medical Director
- Stephen Murray, EMEA Marketing
- Walt Danker, Global HEMA
- Liza Ovington, Global Medical Director
- Meagen Hicks, UK/EMEA HEMA

1. **Question from EAC:**

- We note that the device costs included in the submission are based on weighted average volumes (assuming this represents sales volume of each VICRYL Plus, MONOCRYL Plus, and PDS Plus). The economic submission also states that Stratafix costs were included in the intervention and comparator arm costs.

  However as your main meta-analysis of the clinical submission excluded STRATAFIX, could you please send us the intervention and comparator costs without STRATAFIX (i.e. representing the weighted average of VICRYL Plus, MONOCRYL Plus, and PDS Plus alone) please?

  Company response:
  This is an evaluation of "Plus technology", not suture characteristic. As barbed sutures were referenced in the description of the technology section of the final scope, we took the decision to present it within a subgroup analysis rather than our main meta-analysis simply to minimise heterogeneity. Inclusion of STRATAFIX did not change the results of our meta-analysis. However, looking to our economic submission, because the use of barbed sutures is well established as part of clinical practice in the NHS, its inclusion ensures completeness and is more reflective of NHS clinical practice.

  For the purposes of the economic model, it is the price differential between Plus and non-Plus that is most relevant. And the economic submission was intentionally presented with as conservative estimates as possible. The company explained that the technology price would reduce if STRATAFIX was removed. However all scenarios were showing a cost saving.

  With regards to STRATAFIX, the company highlighted Ruiz-Tovar 2020 from the clinical submission, that compared STRATAFIX PDS Plus, PDS Plus and uncoated PDS, and reiterated that it is the Plus technology that is the focus for this evaluation. The company explained how it is relevant to note that the suture itself – whether monofilament, braid, or barbed represents a foreign body with surface area for bacteria to colonize, form a biofilm and pose a risk for SSI (e.g. its base polymer or its morphology is less important than its physical presence).

  Clarification from EAC: Evidence on STRATAFIX sutures has been excluded from the assessment of the clinical submission as out of scope. The clinical experts consulted had

advised that it was not possible to attribute better outcomes to the triclosan coating or the barbed nature of the suture, and that barbed sutures would be used in different procedures and used in a different way by surgeons. Therefore STRATAFIX has been excluded, as there are no uncoated equivalent absorbable STRATAFIX sutures, and therefore no direct comparator. The EAC appreciated the approach taken in the clinical submission (i.e. main analysis without STRATAFIX, but a scenario analysis included STRATAFIX). Therefore anticipated the same approach to the economics (i.e. STRATAFIX not included in basecase, however included in scenario analysis).

2. AOB

Assessment report is completed by EAC on 29th April. The company will have until COP (UK time) 5th May to return comments.

Additional information provided by the company post-meeting

Removing cost of STRATAFIX falls within the 20% variance modelled within the pricing sensitivity analysis presented within the submission.

Barbed sutures have a greater surface area than a monofilament and are subject to bacteria hiding in the barb cleft (Dhom 2016 Bacterial Adhesion of Suture Material in a Contaminated Wound Model: Comparison of Monofilament, Braided, and Barbed Sutures, Journal of Orthopedic Research).

Company explained that the specific outcome of SSI would only be attributable to the triclosan coating as barbed closure has not previously been suggested or clinically associated with a decreased risk of infection versus triclosan coating of a suture which has been associated with a decreased risk of SSI.

To provide additional supporting information on this topic, several meta-analyses of Plus Sutures and SSI risk reduction have performed meta regressions (De Jonge 2017) or subgroup analyses (Elsohl 2017) on suture type (e.g., monofilament versus braid) and found no differential association of effect with suture morphology. While barbed suture studies were indeed not part of the included data in these meta-analyses, one can surmise that the effect on SSI is due to the antibacterial coating alone and extrapolate to a similar effect on barbed sutures.

Appendix 6

MTG Medtech Guidance: MT507 Plus Sutures

Expert contact details and declarations of interest:

Expert #1	ANDREW MILLER, **CONSULTANT COLORECTAL SURGEON,** UNIVERSITY HOSPITALS OF LEICESTER NHS TRUST, [redacted]
	DOI: YES Travel reimbursement and honorarium For travel and involvement on the consensus meeting held at Royal College of Surgeons on 16th July 2016 July 2016 July 2016 Co-author of paper reporting a consensus meeting looking at triclosan coated sutures – paper published June 2017 July 2016 June 2017
Expert #2	ANNE PULLYBLANK, **CONSULTANT SURGEON/MEDICAL DIRECTOR,** NORTH BRISTOL NHS TRUST/WEST OF ENGALND ACADEMIC HEALTH SCIENCE NETWORK, [redacted]
	DOI: No
Expert #3	Giles Bond-Smith, **Consultant Surgeon, Clinical Lead for Emergency General Surgery, Clinical Lead for SSI Reduction,** Oxford University Hospitals NHS Foundation Trust, [redacted]
	DOI: YES Spoke at Ethicon event about SSI Reduction 27/11/2019 27/11/2019 Spoke at Ethicon event about SSI Reduction 21/11/2019 22/11/2019 Spoke at Ethicon event about SSI Reduction 10/09/2019 11/09/2019
Expert #4	Melissa Rochon, Quality & Safety Lead for Surveillance, Royal Brompton and Harefield Hospitals, part of Guy's and St Thomas' NHS FT[redacted]
	Nominated by: IPS
	DOI: NONE
Expert #5	Mike Reed, Consultant Orthopaedic Surgeon, Northumbria Healthcare NHS FT, [redacted]

	Nominated by: Company
	DOI: yes – I gave paid talk at a webinar they funded recently. I have previously run a very large RCT that advised against its use on the basis of efficacy. Recently did a meta-analysis which supported it use. Hence they wanted me on the podium to discuss that.
Expert #6	Justin Wormald, DPhil Candidate and Specialty Trainee/ Registrar in Plastic and Reconstructive Surgery (ST6), Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, [redacted]
	Nominated by : NICE
	DOI: NONE
Expert #7	Lilian Chiwera, Infection control surveillance team leader, Guy's & St Thomas' NHS Foundation Trust, [redacted]
	Nominated by: Company
	DOI: NONE
Expert #8	Mohamedshafi Mussa, Consultant Congenital Cardiac Surgeon, University Hospitals Bristol and Weston NHS Foundation Trust [redacted]
	Nominated by: Company
	DOI-NONE
Expert #9	

1		Expert #1: Please describe your level of experience with the technology, for example: − Are you familiar with the technology?

	Please describe your level of experience with the procedure/technology, for example: Are you familiar with the procedure/technology? Have you used it or are you currently using it? Do you know how widely this procedure/technology is used in the NHS or what is the likely speed of uptake? Is this procedure/technology performed/used by clinicians in specialities other than your own? − If your specialty is involved in patient selection or referral to another specialty for this procedure/technology, please indicate your experience with it.	− − Are you currently using it? Are you familiar with the technology? YES Have you used it? YES Are you currently using it? NO Have you been involved in any research or development on this technology? NO Do you know how widely used this technology is in the NHS?NO
		Expert #2 I have used Plus sutures since 2013 as part of a bundle in a quality improvement project to reduce surgical site infection (SSI) after elective colorectal surgery. This halved patient-reported 30 day surgical site infection from approximately 16% to 8%. Our current rate is 6% this year I have not been involved in any R&D I am currently leading a region wide project in the West of England Academic Health Science Network to reduce SSI after colorectal surgery. The role of the AHSN is to improve uptake of new technology. As a result of this I know that in my region of 6 hospitals, 5 were not using Plus sutures for colorectal surgery prior to the start of this project
		Expert #3 I am familiar with the technology We are about to trial these sutures in Orthopaedics, HPB and Emergency Surgery. No involvement in the research or development of this technology

		Plus Sutures are slowly being adopted in centres around the UK as evidence and awareness increases about them.
	–	Expert #4: I am familiar with the Plus Sutures for preventing surgical site infection. One of our hospital sites routinely uses Plus Sutures in surgery. Our second hospital site offers the technology (based on operator preference). I am aware that the agent Tricolsan lasts longer in Moncryl and PDS (monofilaments) because they are impregnated, vs Vicryl which is braided and coated. I am aware that NHS Improvement announced that as part of their Innovations, the ITP would support the introduction of triclosan sutures, paying the differences between products (if the hospital rates qualified for the re-imbursement, >4%) and that it was a one-off (not continuous) discount.
	–	Expert #5 Very familiar. This is a suture I use for almost every operation I do. Yes No sure how commonly it is used compared to competitor products. Yes

		No
	–	Expert #6 I am a plastic surgery registrar and the majority of my clinical practice involves the use of sutures with different types of wounds. I have used Plus sutures in my practice on an ad hoc basis. I am currently doing full-time research (DPhil) at the Univeristy of Oxford. As part of my DPhil I am conducting a Cochrane review of antimicrobial sutures to prevent surgical site infection. I am also conducting a multi-centre feasibility RCT of antimicrobial sutures vs. standard sutures in upper limb trauma (n=116, three sites). I am therefore familiar with the literature on Plus sutures and have practical experience of using them in surgical procedures.
	–	Expert #7 The technology has been used in my organisation as an SSI prevention intervention. My organisation is currently using it for various surgical procedures.
	–	Expert #8 I used PLUS Antibacterial sutures for wound closure on a daily basis at a previous institution. I was actually unaware that these sutures were in use, as they handled exactly like standard sutures.

		I am not using the sutures at my current institution as they are not part of the current stock. I am not sure how widely the sutures are used in the NHS. I would imagine that the sutures would be used across all surgical specialties.
2	Has the technology been superseded or replaced?	Expert #1: No
		Expert #2 Not yet. There is another company who have just developed antibacterial sutures but to my knowledge, do not have appropriate sutures for colorectal surgery
		Expert #3 No
	–	Expert #4 – not asked
	–	Expert #5 – not asked
	–	Expert #6 – not asked
	–	Expert #7 – not asked
	–	Expert #8 – not asked

3	Please indicate your research experience relating to this procedure (please choose one or more if relevant):	Expert #1 – not asked
		Expert #2 – not asked
		Expert #3 - not asked
		Expert #4: I have done bibliographic research on this procedure. Other (please comment) I was a NICE NG125 2019 committee member I am a co-author of Cochrane protocol reviewing SSI preventions in cardiac surgery https://www.cochrane.org/CD013332/VASC_interventions-prevent-surgical-site-infection-adults-undergoing-cardiac-surgery
		Expert #5 I have done bibliographic research on this procedure. Yes I have done clinical research on this procedure involving patients or healthy volunteers. Yes I have published this research. Yes .
		Expert #6 **I have done bibliographic research on this procedure. YES**

		I have done clinical research on this procedure involving patients or healthy volunteers. PLANNED **I have published this research. PLANNED** Expert #7 X I have had no involvement in research on this procedure
		Expert #8 I have done bibliographic research on this procedure.

Current management

4	How innovative is this procedure/technology, compared to the current standard of care? Is it a minor variation or a novel approach/concept/design?	Expert #1: Innovative – it has the potential to address the huge issue of surgical site infections. It is novel design and concept
	Which of the following best describes the procedure (please choose one):	Expert #2 This is a minor variation. The sutures look and feel exactly the same as non antibacterial sutures
		Expert #3 It is a novel adaptation of a standard piece of surgical equipment to aid in the reduction of SSI.

		Expert #4: In adult cardiac surgery in the UK, I don't believe that it is standard practice to use the antimicrobial tricolosan-coated sutures (estimate <25%).
		Expert #5 Monir variation with subtle but important reduction in infection rates.
		Expert #6 **A minor variation on an existing procedure, which is unlikely to alter the procedure's safety and efficacy.**
		Expert #7 X Established practice and no longer new.
		Expert #8 A minor variation on an existing procedure, which is unlikely to alter the procedure's safety and efficacy
5	Does this procedure/technology have the potential to replace current standard care or	Expert #1: It would be in addition to current care because some patients may not be eligible for this technology and so will need standard care as exists at this time

	would it be used as an addition to existing standard care?	Expert #2 It would replace existing sutures. Currently the focus is on using these sutures for muscle and skin only. In theory they could be used for everything but this would probably not be cost effective
		Expert #3 It would replace standard sutures.
		Expert #4 - At the moment it is in addition to existing standard of care although the potential to replace exists
		Expert #5 - **Replace**
		Expert #6 - May replace standard care if effectiveness and cost-effectiveness are demonstrable.
		Expert #7 - Potential to replace, however if there are cost implications then it can be used for procedures considered to be high risk.
		Expert #8 - Has the potential to replace current standard of care.

Potential patient benefits

6	Please describe the current standard of care that is used in the NHS.	Expert #1 – not asked
		Expert #2 - not asked
		Expert #3 – not asked
		Expert #4 I am not from a theatre background but uncoated Vicryl may be used for deep soft tissue, Monocryl for skin layers

		Expert #5 Same sutures, often with the same Brand of suture but without the antibacterial coating.
		Expert #6 There appears to be substantial variability in the use of Plus sutures. Some specialties within the same trust will use them, others are unaware of their existence. There are between-trust and within-trust differences in practice.
		Expert 7 - Currently used for different surgeries
		Expert 8 - Non-antibacterial sutures.
7	Are you aware of any other competing or alternative procedure/technology available to the NHS which have a similar function/mode of action to this? If so, how do these differ from the procedure/technology described in the briefing?	Expert #1: No I am unaware of any competing technology
		Expert #2 No
		Expert #3 No. There are currently no comparative sutures with antimicrobial properties.
		Expert #4: No
		Expert #5 No
		Expert #6 No I am not aware.
		Expert #7

		Not aware, need to research
		Expert #8 I am unaware of a competing product.
8	What do you consider to be the potential benefits to patients from using this procedure/technology?	Expert #1: This has the potential to reduce length of stay for patients, to reduce their need for antimicrobial therapy (both in primary and secondary care) to reduce the need for re-operative surgery
		Expert #2 Firstly, many hospitals do not know their SSI rates. There is a wealth of evidence from RCTs and systematic reviews that anti-bacterial sutures reduce SSI and they have been recommended by NICE and WHO. I am confident that wider use of these sutures would reduce SSI
		Expert #3 A reduction in SSI rates.
		Expert #4: Fewer patients may suffer an SSI. This complication can have devastating impact to patient and families
		Expert #5 Reduced infection rates
		Expert #6 They may reduce surgical site infection
		Expert #7

		In line with already published literature, the product is an evidence based SSI prevention intervention, therefore would reduce the risk of wound infections.
		Expert #8 Potential reduced rate of surgical site infection, with reduced requirement for antibiotic treatment, reduction in prolonged hospital stay, and further wound review in the primary care and hospital settings.

Potential system impact

9	Are there any groups of patients who would particularly benefit from using this procedure/technology?	Expert #1: Anyone undergoing surgery that requires skin incision – that is applying the exclusions listed in this document – elderly , and those who are at risk of prolonged wound problems
		Expert #2 Patients in whom SSI is more common eg after colorectal surgery or emergency laparotomy or in areas where a SSI has serious consequences eg spinal or orthopaedic surgery
		Expert #3 Patients with high risk wounds. Patients who are in need of getting chemotherapy on time – an SSI would reduce the chance of this happening.
		Expert #4: NICE guidance suggests paediatric surgery

		Expert #5 Possibly those patients with triclosan allergy. I haven't met any patients with that though.
		Expert #6 Potentially those at higher risk of infection (e.g. immunosuppression, diabetes)
		Expert #7 Current NICE guidance suggests a benefit in paediatric surgery
		Expert #8 All patients could benefit.
10	Does this procedure/technology have the potential to change the current pathway or clinical outcomes to benefit the healthcare system? Could it lead, for example, to improved outcomes, fewer hospital visits or less invasive treatment?	Expert #1: It will not really change the pathway but will alter certain components eg length of stay and need for antimicrobial therapy in some individuals Outcomes may improve in terms of length of stay, re-operative rates and readmission rates
		Expert #2 Yes. For patients who have an SSI in hospital we know length of stay (LOS) is increased and SSI is a cause of readmission. In my own data of over 1300 patients undergoing colorectal surgery, 60% of SSI presented in the community so this is a significant burden on GPs in terms of time, dressing changes, cost of dressings and antibiotics. For patients this means pain and discomfort, increased scarring, slower recovery and slower return to work
		Expert #3 Yes. A reduction in SSI rates would mean a shorted length of stay, less morbidity, fewer returns to hospital, increase the percentage of patients hitting " optimal post-operative time to chemotherapy", less pressure on community services and an improved patient experience.

		Expert #4: Improve outcomes
		Expert #5 Yes
		Expert #6 Yes, by preventing SSI which leads to significant additional morbidity and mortality
		Expert #7 If surgical site infections are avoided, then yes there will be patient, organisation & economic benefits
		Expert #8 See my answer to Q7.
11	What do you consider to be the potential benefits to the health or care system from using this technology?	Expert #1: Potentially huge considering the huge burden that SSI places on the NHS at the present time
		Expert #2 Reduced LOS and emergency readmissions. Reduced GP/district nurse visits and reduced cost of treating SSI
		Expert #3 A reduction in overall cost in the surgical management of patients. SSI are expensive.

		Expert #4 – not asked
		Expert #5 – not asked
		Expert #6 – not asked
		Expert #7 – not asked
		Expert # 8 – not asked
12	Considering the care pathway as a whole, including initial capital and possible future costs avoided, is the procedure/technology likely to cost more or less than current standard care, or about the same? (in terms of staff, equipment, care setting etc)	Expert #1: Initial increase in cost to fund the technology but this should soon be offset by the reduced need for antimicrobial therapy, time in hospital and management of SSI – if the potential impact is fully realised
		Expert #2 The technology is estimated to cost about £1 more per suture which means approximately £3:00 per patient for colorectal surgery or emergency laparotomy (this will vary depending on site of surgery and type of closure). However, a SSI is estimated to cost on average £3000. The number needed to treat quoted in the literature is 28
		Expert #3 It will cost a “small” amount more but the price is likely to come down with increased use.
		Expert #4: Prevention of SSI = costs avoided
		Expert #5 Cheaper. We including a basic cost analysis in one of our papers
		Expert #6 Plus sutures are more expensive. This needs to be weighed against the cost of SSI.

		Expert #7 There is potential for a return in investment if surgical site infections are avoided
		Expert #8 I believe that PLUS antibacterial sutures cost more than standard sutures.
13	What do you consider to be the resource impact from adopting this procedure/technology (is it likely to cost more or less than standard care, or about same-in terms of staff, equipment, and care setting)?	Expert #1: The obvious resource impact will be in purchasing the technology initially. The biggest resource impact may be seen in terms of nursing time during shifts. The nurses will need to commit less time to the management of infected wounds and this should allow them to focus on other aspects of patient care. There will be no change in the number of staff required. If there are less SSI s in surgical patients this should also have an impact on the need for primary care nursing – eg District Nurse time – many SSIs occur in primary care after discharge
		Expert #2 This technology will reduce complications. It should reduce emergency readmissions to secondary care and emergency attendances in primary care.
		Expert #3 It will reduce the need for community services to deal with complex wound problems. It will reduce re-admission and length of stay in hospital.
		Expert #4: Costs more than standard care
		Expert #5 The actual suture costs slightly more than standard care. This risk is that the manufacturer will put the cost up if it becomes standard of care, as I believe it holds the patent, and other companies cannot compete

		Expert #6 It will cost more, but only in relation to the cost of the sutures themselves. There shouldn't be any additional costs.
		Expert #7 The product will probably cost more than standard care but if infections are avoided, then it may be cost neutral
		Expert #8 Potential reduction in antibiotic treatment for surgical site infection, reduction in prolonged hospital stay, reduction in follow-up requirements. These could lead to potential cost savings.
14	Are any changes to facilities or infrastructure, or any specific training needed in order to use the technology? Or What clinical facilities (or changes to existing facilities) are needed to do this procedure/technology safely?	Expert #1: No
		Expert #2 None. The suture is used exactly the same way as existing sutures
		Expert #3 No
		Expert #4: Potential storage, if stocked in addition to standard
		Expert #5 None over existing

		Expert #6 None
		Expert #7 No changes to facilities
		Expert #8 No changes required.
15	Are you aware of any safety concerns or regulatory issues surrounding this technology?	Expert #1: None other than sensitivity to Triclosan
		Expert #2 There has been anxiety about antimicrobial resistance but the sutures are antibacterial, not antibiotic. In theory, there is a risk of allergy however since 2013 I have not seen an incident of allergy.
		Expert #3 No
		Expert #4 – not asked
		Expert #5 – not asked
		Expert #6 – not asked
		Expert #7 – not asked

		Expert # 8 – not asked

General advice

16	Is any specific training needed in order to use the procedure/technology with respect to efficacy or safety?	Expert #1:
		Expert #2 My expertise comes from my own experience in over 1300 patients. However, the sutures were part of a bundle of care so all improvements cannot be attributed solely to antibacterial sutures
		Expert #3 In the small groups where PLUS sutures have been implemented alongside an SSI reduction bundle we have seen a significant reduction in SSI rates across a wide spectrum of surgical procedures.
		Expert #4: Not that I am aware
		Expert #5 No
		Expert #6 No

		Expert #7 Perhaps just raising awareness of upcoming change then support for clinicians should they have queries or concerns
		Expert #8 None required.

Other considerations

17	What are the potential harms of the procedure/technology? Please list any adverse events and potential risks (even if uncommon) and, if possible, estimate their incidence: Adverse events reported in the literature (if possible, please cite literature) Anecdotal adverse events (known from experience) Theoretical adverse events	Expert #1 – not asked
		Expert #2 – not asked
		Expert #3 – not asked
		Expert #4 CDC has suggested use is considered, with no evidence of harm Theoretical increased resistance to triclosan
		Expert #5 Possible allergy. I havent seen this

		Expert #6 There are some reports of allergy to Triclosan, the active ingredient There are also some reports of distant organ pathology (e.g. thyroid disease) from exposure to Triclosan
		Expert #7 Not aware, unless contraindicated
		Expert #8 Potential allergic reaction to PLUS antibacterial sutures, although my anecdotal experience is that this is no more likely than standard sutures.
18	Please list the key efficacy outcomes for this procedure/technology?	Expert #1 – not asked
		Expert #2 – not asked
		Expert #3 – not asked
		Expert #4 Prevention of superficial SSI Prevention of deep SSI Prevention of SSI across different wound classes
		Expert #5 Infection rates
		Expert #6 Reduction of surgical site infection
		Expert #7

		SSI reduction & improved patient outcomes
		Expert #8 Surgical site infection rate, rate of sterile wound dehiscence, antibiotic treatment for surgical site infection.
19	Please list any uncertainties or concerns about the efficacy and safety of this procedure/?	Expert #1 – not asked
		Expert #2 – not asked
		Expert #3 – not asked
		Expert #4: Evidence based on smaller, less robust studies
		Expert #5
		Expert #6
		Expert #7 Not aware
		Expert #8

		None.
20	Is there controversy, or important uncertainty, about any aspect of the procedure/technology?	Expert #1 – not asked
		Expert #2 – not asked
		Expert #3 – not asked
		Expert #4: Cost-effectiveness to detail economic benefit is needed Antimicrobial resistance Does targeted intervention make sense (eg. high risk patients)
		Expert #5
		Expert #6 Plus sutures may only be effective in certain populations or certain wound types. Just because they may be effective in laparotomy wounds, does not mean they are effective in traumatic wounds, or elective surgery
		Expert #7 Not aware
		Expert #8 None.
21		Expert #1 – not asked

	If it is safe and efficacious, in your opinion, will this procedure be carried out in (please choose one): Most or all district general hospitals. A minority of hospitals, but at least 10 in the UK. Fewer than 10 specialist centres in the UK Cannot predict at present.	Expert #2 – not asked
		Expert #3 – not asked
		Expert #4
		Expert #5 **Most or all district general hospitals.**
		Expert #6 **Most or all district general hospitals.**
		Expert #7 X Most or all district general hospitals.
		Expert #8 Most or all district general hospitals.
22	Are you aware of any further ongoing research or locally collected data (e.g. audit) on this technology? Please indicate if you would be able/willing to share this data with NICE. Any	Expert #1: No
		Expert #2 I would be willing to share my local data from 2013 to date. I am currently trying to get it published

	information you provide will be considered in confidence within the NICE process and will not be shared or published. (Experts 1 to 3) Or Please list any abstracts or conference proceedings that you are aware of that have been recently presented / published on this procedure/technology (this can include your own work). Please note that NICE will do a comprehensive literature search; we are only asking you for any very recent abstracts or conference proceedings which might not be found using standard literature searches. You do not need to supply a comprehensive reference list but it will help us if you list any that you think are particularly important. (Experts 4-8)	
		Expert #3 YES. Locally we are assessing the impact of PLUS sutures on our already implemented SSI reduction bundle.
		Expert #4: Conferences have been suspended due to COVID-19
		Expert #5 None recent. My last paper in BMJ open in ? 2019
		Expert #6 Not aware of any
		Expert #7 Product used as part of an SSI prevention bundle for our adult cardiac surgery patients. Check publications: https://pubmed.ncbi.nlm.nih.gov/29604297/. https://bmjopenquality.bmj.com/content/9/3/e000976.

		Expert #8 None
23	Are you aware of any further evidence for the technology that is not included in this briefing? (experts 1 to 3) Or Are there any major trials or registries of this procedure/technology currently in progress? If so, please list. (Expert 4 to 8)	Expert #1: No
		Expert #2 no
		Expert #3 Not that out performs the attached studies.
		Expert #4: I am not aware
		Expert #5 Not aware but check ISRCTRN
		Expert #6
		Expert #7 Not aware
		Expert #84Not that I know of.
24	Approximately how many people each year would be eligible for an intervention with this procedure/technology, (give either as	Expert #1: There are over 10 million operations undertaken in the NHS each year. Allowing for the exclusions listed in the document then several million patients per year will potentially be eligible

	an estimated number, or a proportion of the target population)?	
		Expert #2 It depends on whether the sutures are used for all surgeries or just high risk patients. There is no reason why the sutures could not be used for all patients undergoing surgery but there would need to be a cost benefit analysis
		Expert #3 ALL surgical procedures could utilise PLUS sutures.
		Expert #4: I am not aware
		Expert #5 Not aware but check ISRCTRN
		Expert #6
		Expert #7 Not aware
		Expert #8 Not that I know of.

25	Are there any issues with the usability or practical aspects of the procedure/technology?	Expert #1: No
		Expert #2 no
		Expert #3 No
		Expert#4 Surgeon preference
		Expert#5 No
		Expert#6 No
		Expert #7 Not aware
		Expert #8 None.
26	Are you aware of any issues which would prevent (or have prevented) this procedure/technology being adopted in your organisation or across the wider NHS?	Expert #1: No – only issue would be the usual spectre of financial constraint initially
		Expert #2 Only cost. They are more expensive. Most hospitals do not know their SSI rates and so they cannot see the benefit of the technology. As most SSI occurs in the community

		in some specialties eg colorectal, the hospital has to pay extra but the gains are mainly in primary care
		Expert #3 Price. Procurement feel they are more expensive than standard sutures. However, procurement are failing to see the overall reduction in the cost to the NHS through the reduction in SSI rates.
		Expert#4 Cost -and lack of data- if there is no 'issue' with SSI rates, theatres would be unlikely to change
		Expert#5 No – our organisation has just adopted for all surgery
		Expert#6 Additional cost, lack of evidence of effectiveness
		Expert #7 Not aware
		Expert #8 The only issue I can foresee is cost versus benefit.
27	Is there any research that you feel would be needed to address uncertainties in the evidence base	Expert #1: The research is all based around studies that look at skin closure. Particularly in the area of abdominal surgery many SSIs are not caused by skin bacteria but by enteric bacteria and as such the SSI involves the subcutaneous tissues and deeper layers of a wound.

		Work looking at using the triclosan sutures in all layers of wound closure would be very useful in abdominal surgery This should probably be made clear in the guidance
		Expert #2 I am only familiar with the evidence in the field of general surgery. It would be necessary to look at the evidence for all specialties before making final recommendations. Recommending Plus sutures for surgery where SSI rate is very low eg after excision of skin lesions, scrotal surgery etc might not be cost effective, especially where SSI is not being measured. Ideally linking of data between primary and secondary care would allow robust SSI measurement or else using technology to measure patient reported SSI would be less labour intensive than using postal questionnaire. Currently accurate measurement of SSI is hard and requires investment in manpower but large scale investment in antibacterial sutures would occur with a focus on measurement of SSI. The current GIRFT audit has flawed methodology. Data needs to be collected continuously and accurately
		Expert #3 No
		Expert#4 Antimicrobial resistance, target high risk
		Expert#5 No
		Expert#6 A Cochrane review is essential. RCTs in populations that have not currently been studied (as mentioned above).
		Expert #7

		Expert #8 None. There meta-analyses available that support the use of these sutures.
28	Please suggest potential audit criteria for this procedure/technology. If known, please describe: − Beneficial outcome measures. These should include short- and long-term clinical outcomes, quality-of-life measures and patient-related outcomes. Please suggest the most appropriate method of measurement for each and the timescales over which these should be measured. − Adverse outcome measures. These should include early and late complications. Please state the post procedure timescales over which these should be measured	Expert #1 – not asked
		Expert #2 – not asked
		Expert #3 - not asked
		Expert#1 Beneficial outcome measures: Generally, superficial SSI up to 30 days, deep SSI 90 days Adverse outcome measures:

		Allergy/Sensitivity Surgical wound dehiscence
		Expert#2 Beneficial outcome measures: Very tricky infection is a rare complication that could only be detected in huge trials Adverse outcome measures:
		Expert#3 Beneficial outcome measures: Surgical site infection measured at 30/90 days and defined according to the CDC criteria Measured by patient reported outcome measure and/or hospital records Adverse outcome measures: Incidence of allergy

		Expert #4 Beneficial outcome measures: Need a robust surgical site infection surveillance programme in place to monitor surgical site infection rates locally Adverse outcome measures: Not anticipated
		Expert #5 Beneficial outcome measures: Surgical site infection rates – already being measured in all UK paediatric cardiac surgery units Reduction in antibiotic use for surgical site infection Hospital length of stay solely for antibiotic administration / surgical site infection treatment. All should be measured over a 30-day post-operative period. Adverse outcome measures: Wound dehiscence Allergic reaction to sutures Both should be measured over a 90-day post-operative period, as the sutures would be completely absorbed by this time.

29	How useful would NICE guidance on this particular technology be to you or other NHS colleagues?	Expert #1: Very, particularly when producing business cases for the finance departments within the varying NHS organisations
		Expert #2 Very
		Expert #3 Very useful.
		Expert #4 – not asked
		Expert #5 – not asked
		Expert #6 – not asked
		Expert #7 – not asked
		Expert #8 – not asked
30	Please add any further comments on your particular experiences or knowledge of the procedure/technology,	Expert #1 – not asked
		Expert #2 - not asked

		Expert #3 - not asked
		Expert#4
		Expert# 5
		Expert#6
		Expert #7 n/a
		Expert #8 No further comment.

NICE National Institute for Health and Care Excellence

National Institute for Health and Care Excellence

Centre for Health Technology Evaluation

Pro-forma Response

Plus Sutures Medical Technologies Guidance (MTG) for the company fact check

MT507 Plus Sutures for preventing surgical site

Please find enclosed the MTG report prepared for this assessment by the NICE Committee.

You are asked to check the assessment report from the NICE Committee to ensure there are no factual inaccuracies contained within it. If you do identify any factual inaccuracies you must inform NICE by 5pm, **21st June 2021** using the below proforma comments table. All your comments on factual inaccuracies will receive a response from NICE and when appropriate, will be amended in the MTG report. This table, including NICE responses, will be presented to the Medical Technologies Advisory Committee and will subsequently be published on the NICE website.

17/06/2021

NICE National Institute for Health and Care Excellence

Issue 1

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 2.1 Bullet 1 (Vicryl) Suture is a multifilament suture (multiple braided threads) with an absorption rate of between 57 days and 70 days, making it best suited for general soft tissue approximation and ligation.	Suture is a multifilament suture (multiple braided threads) ***indicated for general soft tissue approximation and ligation. Vicryl Plus retains 75% of its original tensile strength at 2 weeks post implantation; 40-50% at 3 weeks and 25% at 4 weeks. Complete absorption occurs between 57 days and 70 days.***	Make consistent with the Vicryl Plus IFU. Clinicians need to know about tensile strength retention for appropriate selection.	Thank you for your comment. These details have been added in 2 parts so to avoid repetition. With editorial change to ranges for accessibility. Overarching paragraph: 'Three sutures were considered in this evaluation, are indicated for general soft tissue approximation and ligation.' Further detail added in Section 2.1 Bullet 1: 'Coated VICRYL Plus Antibacterial (polyglactin 910) Suture is a multifilament suture (multiple braided threads). VICRYL Plus retains 75% of its original tensile strength at 2 weeks after implantation; 40% to 50% at 3 weeks and 25% at 4 weeks. Complete absorption happens between 57 days and 70 days.'

NICE National Institute for Health and Care Excellence

Issue 2

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 2.1 Bullet 2 (Monocryl) Suture is a monofilament suture (solid and smooth thread) with an absorption rate of between 91 days and 119 days making it best suited for general soft tissue approximation and ligation.	Suture is a monofilament suture (solid and smooth thread) ***indicated for general soft tissue approximation and ligation. Monocryl Plus retains 50-60% of its original tensile strength at 1 week and 20-30% at 2 weeks. Complete absorption occurs between 91 days and 119 days.***	Make consistent with the Monocryl Plus IFU. Clinicians need to know about tensile strength retention for appropriate selection.	Thank you for your comment. These details have been added in 2 parts so to avoid repetition. With editorial change to ranges for accessibility. Overarching paragraph: 'Three sutures were considered in this evaluation, are indicated for general soft tissue approximation and ligation.' Further detail added in Section 2.1 Bullet 2: 'MONOCRYL Plus Antibacterial (poliglecaprone 25) Suture is a monofilament suture (solid and smooth thread). MONOCRYL Plus retains 50% to 60% of its original tensile strength at 1 week and 20% to 30% at 2 weeks. Complete absorption happens between 91 days and 119 days. This suture is also available in a barbed design for knotless suturing (STRATAFIX Plus) but this version of the technology was not included in the evaluation.'

Issue 3

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 2.1 Bullet 3 (PDS) PDS Plus Antibacterial (polydioxanone) Suture is a monofilament suture with an absorption rate of between 182 days and 238 days. This suture can be used for general soft tissue approximation, including use in paediatric cardiovascular surgery, and other surgery types that need up to 6 weeks of wound support.	PDS Plus Antibacterial (polydioxanone) Suture is a monofilament suture ***(solid and smooth thread) indicated for general soft tissue approximation and ligation. PDS Plus retains 60-80% of its original tensile strength at 2 weeks, 40-70% at 4 weeks, and 35-60% at 6 weeks. Complete absorption occurs between 182 days and 238 days.***	Make consistent with the PDS Plus IFU. Clinicians need to know about tensile strength retention for appropriate selection.	Thank you for your comment. These details have been added in 2 parts so to avoid repetition. With editorial change to ranges for accessibility. Overarching paragraph: 'Three sutures were considered in this evaluation, are indicated for general soft tissue approximation and ligation.' Further detail added in Section 2.1 Bullet 3: 'PDS Plus Antibacterial (polydioxanone) Suture is a monofilament suture (solid and smooth thread). PDS Plus Antibacterial retains 60% to 80% of its original tensile strength at 2 weeks, 40% to 70% at 4 weeks, and 35% to 60% at 6 weeks. Complete absorption happens between 182 days and 238 days.'
Section 2.1 Bullet 3 (PDS) This suture is also available in a barbed design for knotless suturing but this version of the	This suture is also available in a barbed design for knotless suturing ***(STRATAFIX Plus)*** but this version of the technology was not included in the evaluation.	Make consistent with the statement in the Monocryl bullet.	Thank you for your comment. Accepted and amended as suggested.

technology was not included in the evaluation.			

Issue 4

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 2.3, sentence 3 Clinical experts reported that the performance of Plus Sutures was identical to non-triclosan sutures.	Clinical experts reported that ***the handling properties*** of Plus Sutures ***were*** identical to non-triclosan sutures.	Increase specificity to ensure that performance reflects user experience and is not interpreted to include SSI risk reduction.	Thank you for your comment. Accepted and amended as suggested.

Issue 5

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 2.4 The cost of Plus Sutures is around £4.25 per person, based on average prices of the 3 suture types.	The cost of Plus Sutures is around £4.25 per **suture** based on average prices of the 3 suture types.	Cost is per strand of suture; a patient may require multiple strands depending on procedure.	Thank you for your comment. Accepted and amended as suggested.

Issue 6

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 3.8 Last sentence The EAC concluded that the model assumptions were appropriate and supported by the evidence.	The EAC concluded that the model assumptions were appropriate, **conservative** and supported by the evidence.	Make more consistent with the EAC report which stated that the assumptions were conservative, and clearly did not lead to bias in favour of Plus Sutures in the economic analysis.	Thank you for your comment. Accepted and amended as suggested.

Issue 7

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 3.9 Sentence 2 The EAC reported that the company's estimation of the cost was not sufficiently transparent or reproducible, and also considered that STRATAFIX Plus were out of scope.	The EAC reported that the company's estimation of the cost was not sufficiently transparent or reproducible, ***and included STRATAFIX Plus, which the EAC did not include in their analysis.***	This statement is factually inaccurate, as the FINAL NICE SCOPE does include both PDS Plus Antibacterial (polydioxanone) Sutures and MONOCRYL Plus Antibacterial (poliglecaprone 25) Sutures, specifically stating for both "This suture is also available in a barbed design for knotless suturing ". Make statement more accurate in relation to NICE's FINAL SCOPE.	Thank you for your comment, accepted and amended as suggested.

Issue 8

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 3.9 Sentence 3 The EAC amended the cost of the technology by calculating a mean cost of £3.63 to £4.94 depending on suture type.	The EAC amended the cost of the technology by calculating a mean cost of £3.63 to £4.94 depending on **Plus** suture type.	Added for clarity.	Thank you for your comment. Accepted and amended as suggested.

Issue 9

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 4.4 Sentence 2 However, the experts stated that using Plus Sutures alone will not reduce surgical site infections and that it must be used alongside an appropriate care bundle for surgical site infection prevention, including antibiotic use, appropriate hair removal, glycaemic control, and normothermia.	However, the experts stated that ***while using Plus Sutures has been demonstrated to reduce SSI risk, to maximize their impact, they should be used*** alongside an appropriate care bundle for surgical site infection prevention, including antibiotic use, appropriate hair removal, glycaemic control, and normothermia.	This reflects the medical literature covered in the company submission, EAC report and expert commentary from Dr. Giles Bond-Smith during the hearing sharing his experience. He implemented a care bundle without Plus suture, which reduced SSI, then added Plus suture and recognized a significant additional benefit.	Thank you for your comment. Accepted and amended as suggested.

Issue 10

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 4.6 Sentence 3 Clinical experts reported that practice and performance of Plus Sutures was identical to non-triclosan sutures and no modification of existing procedures is needed.	Clinical experts reported that ***the handling properties*** of Plus Sutures ***were*** identical to non-triclosan sutures and no modification of existing procedures is needed.	Increase specificity to ensure that performance is not interpreted to include SSI risk reduction.	Thank you for your comment. Accepted and amended as suggested.

Issue 11

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Not a factual inaccuracy per se, but a suggestion to add a section on Environmental Sustainability	Based on the Sustainable Care Pathways Guidance, J&J provided an analysis of the environmental impact of SSIs to NHS England. Environmental impact is presented in the guidance document in terms of three main environmental metrics: greenhouse gas (GHG) emissions, fresh water use and waste generation. By	HTA can play an important part in highlighting sustainability, suggest adding to recognize the importance of this work.	Thank you for your comment. We have accepted this suggestion, with a minor amendment, in additional bullet 3.6 on page 6. Proposed amendment accepted as is, with minor addition to the final sentence for clarity that this

	preventing SSIs, the use of Plus Sutures results in potential environmental benefits to English NHS.		conclusion is from the report rather than NICE or EAC evaluation. 'The report indicates that by preventing surgical site infections, the use of Plus Sutures results in potential environmental benefits to the NHS in England.'

Issue 12

Description of factual inaccuracy	**Description of proposed amendment**	**Justification for amendment**	**NICE response**
Section 1.2 Paragraph 2 Plus Sutures is a range of synthetic, absorbable sutures with triclosan, a medical grade antimicrobial.	Plus Sutures is a range of synthetic, absorbable sutures with **Irgacare MP (purified medical grade triclosan)**	Identifying the specific brand of triclosan that used on Plus suture. This will create transparency to users.	Thank you for your comment, we have accepted the added detail of specific brand of triclosan however formatting was amended to fit with NICE style. 'Plus Sutures is a range of synthetic, absorbable sutures with triclosan (Irgacare MP), a purified medical grade triclosan antimicrobial.'

Issue 13

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 2.1 Paragraph 1 Plus Sutures (Ethicon, Johnson & Johnson Medical) is a range of synthetic, absorbable sutures that are either impregnated with or coated with medical grade triclosan, depending on the suture type.	Plus Sutures (Ethicon, Johnson & Johnson Medical) is a range of synthetic, absorbable sutures that are either impregnated with or coated with **Irgacare MP (purified medical grade triclosan)**, depending on the suture type.	Identifying the specific brand of triclosan that used on Plus suture. This will create transparency to users.	Thank you for your comment, we have accepted the added detail of specific brand of triclosan however formatting was amended to fit with NICE style. 'Plus Sutures (Ethicon, Johnson & Johnson Medical) is a range of synthetic, absorbable sutures that are either impregnated with or coated with triclosan (Irgacare MP), a purified medical grade antimicrobial, depending on the suture type.'

Issue 14

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response
Section 2.2 Plus Sutures is innovative because sutures are coated or impregnated with triclosan	Plus Sutures is innovative because sutures are coated or impregnated with **Irgacare MP (purified medical grade triclosan)**	Identifying the specific brand of triclosan that used on Plus suture. This will create transparency to users.	Thank you for your comment, we have accepted the added detail of specific brand of triclosan however formatting was amended to fit with NICE style. 'Plus Sutures is innovative because sutures are coated or impregnated

			with triclosan (Irgacare MP). Triclosan is a broad-spectrum antibacterial agent.'

Issue 15

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response

Issue 16

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response

Issue 17

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response

Issue 18

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response

Issue 19

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response

Issue 20

Description of factual inaccuracy	Description of proposed amendment	Justification for amendment	NICE response