National Institute for Health and Care Excellence

Final

Vaccine uptake in the general population

[F] Evidence review for interventions to increase the uptake of routine vaccines for pregnant women

NICE guideline NG218

Evidence review underpinning recommendations 1.2.6, 1.2.17, 1.3.7, 1.3.8, 1.3.11 and 1.3.15 and a research recommendation in the NICE guideline

May 2022

Final

This evidence review was developed by the Guideline Development Team

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1.1 Review question

What are the most effective interventions for increasing the uptake of routine vaccines for pregnant women?

1.1.1 Introduction

The UK has a routine vaccination schedule covering key vaccinations for different stages in life including pregnancy. Current practice is for healthcare practitioners to advise pregnant women to accept these vaccinations at the relevant times unless contraindicated. Although vaccination levels in general in the UK are relatively high, from April 2018 to March 2019 pertussis vaccine coverage in pregnant women was 68.8%. Vaccination rates need to be actively maintained and ideally increased in the face of increasing vaccine scepticism and misinformation. In addition, certain population groups (such as some Gypsy, Roma and Travellers and migrants) have lower levels of vaccination than the general public and additional or different actions may be required to increase their vaccination rates.

Reasons for low uptake may include poor access to healthcare services; inaccurate claims about safety and effectiveness, which are propagated on social media and can lead to doubts about vaccines; and insufficient capacity within the healthcare system for providing vaccinations. In addition, problems with the recording of vaccination status and identification of people who are eligible to be vaccinated may have contributed to this problem. This review aims to identify effective interventions to increase the uptake of pertussis vaccination for pregnant women. It was carried out as an additional piece of work because of the very limited number of studies of pregnant women that were identified as part of the planned work looking at interventions by type (for example, education interventions). The vaccination of interest was also widened to include influenza vaccination for the same reason. It follows the protocol and overarching review question detailed in Appendix A, which has been divided across several review documents by intervention type and is summarised and customised for pregnant women in Table 1. This work was carried out as a review of reviews.

1.1.2 Summary of the protocol for interventions aimed at improving routine vaccine uptake in pregnant women

Table 1 PICO table for interventions to increase routine vaccine uptake in pregnant women

Population	• Pregnant women and their families and carers (if appropriate). • Staff including, but not limited to, those providing advice about or administering vaccines to pregnant women and those people with relevant administrative or managerial responsibilities.
Intervention	Interventions including, but not confined to: 1. Information, education and methods of communicating them Interventions to provide information including: • online campaigns including social media and apps • radio campaigns • letters by mail • printed materials (e.g. leaflets) • multi-media campaigns

- TV and online advertising (including pop up adverts)
- posters
- online information exchange- fill in questionnaire and get information

Educational interventions (delivery methods):

- face-to-face sessions
- telephone conversations
- social media with responses
- interactive multi-media interventions (e.g. case studies on GP websites; e-learning)
- interactive community events (e.g. talks with question and answer sessions)
- peer education (carried out by a community member who shares similar life experiences to the community they are working with)
- lay education (carried out by community members working in a non-professional capacity)
- multicomponent interventions targeting education
- vaccine hotlines and special advisory clinics for health professionals

Who provides the information and/or advice and how they do so, including:

- Vaccine champions:
  - Practitioners
  - Peers
  - Community leaders
- Interventions to train staff and other people on how best to communicate the information/ run educational sessions.
- Recommendations to vaccinate from people/groups including:
  - Medical and other staff (for example, GPs, nurse, health visitors, midwives,)
  - Social workers
  - Community leaders
  - Religious leaders
  - Peers
  - Teachers

Information and education can be provided during home visits, during interactions with health and social care workers, at support group meetings for people using other services etc. This may involve providing a contact point for more information.

Types of information include PHE bulletins and local bulletins for providers.

2. Vaccination reminders aimed at providers or individuals including:

Reminder and recall systems (aimed at provider)

- clinical alerts and prompts
- national alerts to local teams
- local recall initiatives

Personal invitation to be vaccinated from:

- GP
- community pharmacist
- health or social care worker
- from several professionals

Reminders to individuals/ eligible groups by:

- text messages
- electronic invitations (via apps)
- emails
- letter
- phone calls
- posters

- postcards

3. Interventions targeting acceptability:
   - Alternative forms of vaccinations (e.g. injections, formulations)
   - Alternative settings
   - Alternative vaccine providers (e.g. doctor administering vaccine instead of nurse)

4. Interventions to improve access including:

Expanding access in healthcare, such as:
- Reducing distance/time to access vaccinations
- Out of hour or drop-in services
- Delivering vaccines in clinical settings in which they were previously not provided

Vaccination clinics in community settings:
- community pharmacies
- antenatal clinics
- specialist clinics (e.g. drug and alcohol services, mental health services)
- community venues (e.g. libraries, children's centres)

Dedicated clinics for specific/ all routine vaccinations:
- Mass vaccination clinics in community or other settings (e.g. schools)
- Walk in or open access immunisation clinics

Extended hours clinics
- weekends evenings (after 6 pm)
- early mornings (before 8 am)
- 24-hour access

Outreach interventions or mobile services:
- home or domiciliary or day centre visits
- support group meeting visits
- residential or care home visits
- special school visits
- inpatient visits
- custodial visits
- immigration settings
- mobile clinics (e.g. in community)

Parallel clinics
- Offer vaccination in parallel with regular appointments (e.g. with midwives, clinicians, inpatient and outpatient clinics, long stay wards, etc.)
- coordinated timing of other programmes (such as child developmental checks)

Opportunistic vaccinations:
- visits to GP, practice nurse or consultant for other medical conditions including STI clinics, drug and alcohol programmes
- having vaccinations provided in hospitals or accident and emergency departments
- may involve a dedicated person to administer the vaccines.

5. Interventions to improve infrastructure (targeting processes, staffing and settings):

Booking systems
- dedicated vaccination lines or online systems

	Organisation of local provider-based systems: • Local area approaches • Systems and processes in place to work with the community • Practice level approaches • Assigned lead for a specific vaccination programme • Having staff who are competent to deliver vaccinations available in multiple settings • Having staff with responsibilities for training practitioners, answering complex questions, co-ordinating immunisations etc. Systems involved in the recording and identification of eligibility and status Incentives based interventions: • Incentive (and disincentives for not vaccinating) schemes (for individuals) ○ voucher schemes (not to cover cost of vaccination or healthcare) ○ payment to cover travel costs ○ fines/ penalties for not vaccinating ○ entry to childcare settings/ schools blocked in the absence of proof of vaccination status • Mandatory vaccination • Incentive schemes (for providers) ○ targets ○ quality and outcomes framework ○ voucher schemes Audit and feedback on uptake rates for providers • Weekly statistics • Content and delivery of feedback • Practical relevance (e.g. how many more people need to be vaccinated to achieve a target number) • Comparison data (e.g. between GP practices) 6. Multicomponent interventions: • Interventions which include more than one component and target multiple issues (for example the intervention could include an educational component and changes in the timing of clinics) will be analysed separately, but with other similar multicomponent interventions where possible. • Multicomponent interventions which include more than one component that is targeting a single issue will be included in the relevant category instead.
Comparators	• Usual approaches to increase vaccine uptake • Other interventions to increase vaccine uptake • Other interventions targeting same issue/ theme (for example education) • Other interventions targeting different issues/ theme (for example education versus infrastructure)
Outcomes	• Changes in: • Vaccine uptake (overall for a specific vaccine or vaccines and for each dose where a vaccine is administered in multiple doses) • the proportion of people offered vaccinations • the numbers of people who develop the disease the vaccination was aimed at preventing • Cost/resource use associated with the intervention
Additional requirements	• Study type: systematic reviews • Vaccinations of interest: pertussis or influenza vaccination.

1.1.3 Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are

described in the review protocol in appendix A and the methods document. Declarations of interest were recorded according to NICE's conflicts of interest policy.

This review is one of a series of reviews looking at interventions to increase uptake (see appendix A for the full protocol covering all of the intervention types). Some of the following text has been duplicated as it applies to all reviews, but other sections are specific to this review.

The following additional methods apply to this review and shared with some/ all of the reviews by intervention type:

1. This review refers to the UK routine vaccination schedule. The November 2019 schedule was used when these reviews were carried out and is available with the current version of the complete routine immunisation schedule. Influenza vaccination is not covered by this guideline because there is a separate NICE guideline on Flu vaccination: increasing uptake.
2. In this guideline, the term pregnant woman is used to include women who are pregnant as well as transgender or non-binary people who are pregnant. This terminology is used to maintain consistency with NHS websites.
3. A date limit of 1990 was used for all reviews because the vaccination schedule for babies changed in 1990. This will include papers published after the MMR scandal of 1998 when attitudes to vaccinations changed in the UK and the numbers of vaccine related studies increased greatly.
4. A search for systematic reviews (SRs) of interventions to increase routine vaccine uptake was carried out. This was used to identify any SRs that could be used to answer the review questions directly with/ without additional searching being required to update them. However, all but 4 of them were subsequently excluded because they did not map sufficiently well to our review protocols. The most recent SRs were used to help design the search strategies to identify relevant primary intervention studies, and as a source of references.
5. Targeted searches were carried out to fill the gaps focusing on identifying primary studies that corresponded to each type of intervention as listed in the PICO in Table 1. These searches used RCT study type limits where it had been determined by reference to the SRs that there were many RCTs for this intervention type (for example, reminders). Where there was less certainty no study type limits were used during the search. These primary searches were pooled with the SR search results in a single database for sifting and included studies were divided by intervention type for analysis.
6. The committee agreed not to include grey literature in the search for this topic because they thought it would be time consuming to identify and that it would be hard to find relevant literature. They agreed that if insufficient evidence is identified from the included study types, they would consider a focused call for evidence instead or look at indirect evidence.
7. Where no or limited direct evidence was available, indirect evidence was obtained by looking at the NICE guideline on Flu vaccination: increasing uptake. This evidence was limited that covering routine flu vaccination, not vaccination of high-risk groups (that are not covered by the routine schedule) or vaccinations that are purchased privately. Where the flu guideline did not address the review question directly, we referred to any relevant recommendations the flu committee made instead.
8. The countries of interest were limited to those in the Organisation for Economic Co-operation and Development (OECD) because less economically developed countries are likely to have different reasons for low levels of vaccine uptake associated with less well-developed healthcare systems. As a result, interventions to improve uptake in these countries are less likely to be relevant for the UK.
9. For studies looking at specific vaccines to be considered for inclusion, the vaccinations included in the study must be in the routine vaccination schedule of the UK and the country where the study was conducted. Routine vaccination schedules of countries other than the UK were checked using the WHO vaccine-preventable diseases:

monitoring system unless a more up -to-date, approved, national/regional immunisation schedule was identified online.

10. If a study presented data on multiple vaccines, that are not all on the UK routine schedule and we cannot extract data separately for the vaccines on the UK schedule then the study was excluded.
11. Studies using vaccine formulations that differ from those used in the UK have not been excluded if the vaccines included in the formulation target the same diseases as the UK versions and are used at the same time as on the UK routine schedule. The committee agreed that it was the presence of a vaccination against a disease on the routine schedule rather than the formulation of the vaccination that was important.
12. Interventions may be generic or targeted (tailored to the needs of the individual/ group.) They may target individuals or groups of individuals (ie. a community). Interventions targeting individuals may be provided at the individually or as a group.
13. Where the comparator in an analysis is listed as the usual approach this defined as whatever is the standard approach to vaccination in at the time that an eligible study was carried out. If further details are available, then they are provided in the evidence tables.
14. Studies looking at catch-up campaigns were included if the campaigns were as follows:
    - opportunistic in those that missed a vaccination, and
    - catch-up campaigns in under-vaccinated groups.

    Catch-up campaigns following a disease outbreak were not included.
15. Outcomes:
    - Vaccine uptake is defined as the proportion of people being vaccinated with individual vaccines or overall (for all eligible vaccines). It is a dichotomous outcome.
    - Occurrence of disease is defined however the study reports it at the end of the intervention.
    - Any studies that only reported change in offers and not uptake were excluded from the review because the committee are only interested in how changes in the numbers of offers relate to changes in uptake. Increased uptake may be caused by increased offers or an increase in offers may not translate into increased uptake.
16. Network meta-analyses were not prioritised for the intervention reviews due to the expected variability between interventions, populations and types of vaccine. Instead, additional analysis time was used to try to triangulate the findings from the quantitative and qualitative reviews using a mixed methods approach. (See below in the pregnancy specific methods for more details about the approach used in this review.)
17. Since non-randomised trials and cohort studies are assessed for risk of bias using ROBINS-I they could be combined in a meta-analysis with RCTs in GRADE (starting at high quality). However, although the inclusion of these NRS could be used to provide more precise estimates in summary effects they were not combined in the intervention reviews because the NRS are expected to be much larger and may dominate such estimates.
18. Different risk of bias checklists may use different terminology to represent the overall risk of bias judgements and for domain summaries. Where they differ from those used in the methods chapter for this review the following applies:
    - Some concerns = moderate risk of bias
    - Serious = high risk of bias
19. Where primary studies are concerned, when RCT or cluster RCT evidence is available it has been prioritised over other study types and other study types may not have been included in the review. Where insufficient RCT or cluster RCT evidence was identified then non-randomised controlled studies, cohort studies or interrupted time series studies were included. Where there was still a very limited evidence base then controlled before-and-after studies and finally uncontrolled before-and-after studies were included. Decisions were made in consultation with the committee.
20. No clinically meaningful differences were identified by the committee, and they were unwilling to define MIDs here because they thought the clinically meaningful change in

uptake may differ between vaccinations. Therefore, the line of no effect was used to downgrade for imprecision.

21. The interpretations in the GRADE summary tables of evidence are as follows:
    - We state that the evidence showed that there is an effect (e.g., increase or decrease) if the 95% confidence interval (CI) does not cross the line of no effect.
    - The evidence could not differentiate between comparators if the 95% CI crosses the line of no effect.

Qualitative evidence

The qualitative evidence for this review was taken from evidence review B. Please see the methods detailed there for more information about how the findings were derived.

Pregnancy review or reviews specific methods

1. Limited numbers of primary studies that looked at pertussis vaccination in pregnant women were identified in the series of searches that were previously carried out to look at reminders, education, access and infrastructure interventions. The committee therefore decided to widen their evidence base to include studies looking at interventions to increase flu vaccination in pregnant women. Since the searches had also identified 2 systematic reviews (SRs) about vaccinating pregnant women (including one with both flu and pertussis vaccination) it was decided that a review of systematic reviews would be carried out to allow the evidence specific to pregnant women to be presented to the committee most efficiently.
2. The review protocol pre-specified that in the absence of evidence/ where there was limited evidence for a particular group, evidence for increasing flu vaccination in that group could be considered by referring to NICE guideline NG103: Flu vaccination: increasing uptake. This guideline and the references within in that referred to vaccination of pregnant women were also checked as part of this review, but no additional references or additional relevant information was identified. The relevant flu guideline searches were not rerun because we had already identified a recent SR that included flu vaccination of pregnant women and our searches were updated prior to submission of this work. The committee agreed that this approach was pragmatic given our time constraints.
3. Most of the studies included in this review on vaccinating pregnant women were not included in the reviews looking at interventions by type because they didn't meet the inclusion criteria for these reviews based on study type or vaccination of interest (studies looking at flu vaccination were only included in this review.)
4. The committee agreed to examine whether the interventions and findings from these studies could be generalised to pertussis vaccination. However, unlike the pertussis vaccination, the flu vaccination is seasonal, and not necessarily given in the same settings or by the same healthcare staff as the pertussis vaccination. Evidence for the flu vaccination for pregnant women was therefore included but only considered a source of partially direct evidence, and the quality of outcomes from these studies were downgraded accordingly. This is covered in more detail in the committee's discussion of the evidence.
5. If a study had both pertussis and influenza vaccine uptake data only the pertussis vaccine uptake data was included.
6. The included systematic reviews were used as follows:
    - Their sifts and searches were used to identify relevant studies.
    - Evidence tables were used for the details of any studies that were included, and these are referred to in the evidence tables (Appendix D).
    - The existing analyses in the included SRs were not presented in a format that matched our other reviews and so the data was reanalysed. Where possible, data on vaccination uptake was extracted from the systematic review. If this data was not clear from the systematic review, then it was extracted directly from the original studies to ensure continuity with methods of data extraction used in the other reviews

that make up this guideline. For example, where cluster RCTs were included, adjusted data was used if it was provided, otherwise data from the original study was adjusted for clustering if information on the intraclass correlation coefficient and the number of clusters for each arm was provided.
- No other aspects of these systematic reviews, such as inclusion and exclusion criteria were used. Instead, inclusion was decided based on the information in the review protocol for this guideline (Appendix A).

7. Before and after studies were analysed separately from RCTs and cluster RCTs because they are at much higher risk of bias due to their study design.
8. Risk of bias for each primary study was assessed using the methods outlined in the methods document (see document L). This was to ensure continuity with other reviews in this guideline as the systematic reviews used different bias assessment tools.
9. Assessment of confidence in the findings at the outcome level was carried out using GRADE in accordance with the methods document (see document L).
10. Where the data was derived from RCTs the study type is not mentioned in the forest plot titles or footnotes, but the before and after study evidence is marked so this distinction is preserved.
11. For this review a modified methodology was used for the mixed-methods analysis compared to the reviews looking at interventions by type. The barriers to and facilitators for routine vaccine uptake in pregnant women had been the focus of part of a separate review (see evidence review B) and they are not reproduced fully here. Instead, a diagram summarising the key themes raised by the qualitative evidence is reproduced here from evidence review B for reference and some of the key findings are reproduced in a summary table. Similar to the intervention reviews the themes from the main review have been summarised into a small number of key barriers or facilitators, which have been connected where they relate to each other (even if the connection is not. For example, a lack of time for discussions (barrier) is linked to a finding that pregnant women would like the opportunity to discuss vaccinations with midwife (facilitator). The quantitative results have then been mapped onto the barriers and facilitators.

1.1.4 Effectiveness evidence

1.4.1 Included studies

A series of searches were carried out to identify evidence to answer the overall review question about effective interventions to increase uptake. Firstly, a search for systematic reviews (SRs) of interventions to increase routine vaccine uptake was carried out. This search returned 2190 references.

Additional searches were carried out to identify primary studies for all the intervention types listed in the full review protocol (see Appendix A). These searches were pooled with the SR search results in a single eppi 5 database for sifting to enable deduplication of results because the search results for particular intervention groups also frequently returned references for other intervention groups. As a result, it is harder to assign individual references to particular search results than would normally be the case. The numbers provided below refer to the pooled searches unless stated otherwise.

In total 19254 studies were screened at title and abstract level against the review protocol and 738 were included for screening at full text. Of these 215 matched the inclusion criteria and were divided into SRs or separate intervention types (education, infrastructure, access, reminders, acceptability) or multicomponent to match the evidence reviews.

Of the SRs that met the inclusion criteria all but 4 were subsequently excluded (see methods for more details of this process; the numbers above have taken this process into account and only include the 4 SRs). The 4 SRs were sufficiently well matched to a particular review question to be included as directly applicable evidence and were judged to be high-quality (following a ROBIS quality assessment). Two (Bisset 2018 and Mohammed 2019) were

relevant for this review. From these SRs, 18 primary studies met the criteria for inclusion in the pregnancy review. The NICE guideline NG103: Flu vaccination: increasing uptake and the references within in that referred to vaccination of pregnant women were also checked as part of this review, but no additional references or additional relevant information was identified.

The systematic review search and the primary searches were rerun at the end of the guideline development process to identify any newly published references that were relevant for this and other reviews. Of the 1752 new references, 67 were ordered at full text to screen for inclusion in the intervention reviews. Of these, no SRs matched the inclusion criteria closely enough to be included in any of the reviews. 4 additional primary studies were included at this stage. No additional primary studies were identified that were relevant for this review. Therefore, this review consisted of 18 studies.

Bisset 2018 included 16 primary studies and Mohammed 2019 included 4 primary studies (they had 2 studies in common). The 18 included studies targeted pregnant women and/or healthcare providers. A range of study designs were used with 11 RCTs, 1 cluster RCT and 6 before-and-after studies. Studies compared either interventions versus controls (usual practice) or interventions compared to other interventions to increase vaccine uptake.

The primary studies were as follows:

- Six RCTs looked at interventions aimed at pregnant women compared to control. These studies looked at: pamphlets, text messages, videos, information apps, and videos compared to control.
- Five RCTs looked at interventions aimed at pregnant women compared to other interventions aimed at pregnant women. These studies looked at comparing a plain language information leaflet to a standard information leaflet, an interactive electronic book to video information, modular education to video information, information pamphlet plus benefit statement to an information pamphlet, tailored educational text messages to general information text messages, and 2 text message reminders to 1 text message reminder.
- Five before-and-after studies looked at pregnancy interventions aimed at healthcare providers compared to control. These studies looked at: reminders, education, education plus reminders, midwife-delivered programme plus standing order, nurse standing order, education plus vaccine accessibility plus nurse screening, and education plus vaccine accessibility plus nurse screening plus standing order.
- Two studies (1 cluster RCT and 1 before-and-after study) looked at interventions aimed at pregnant women and healthcare providers compared to control. These studies looked at: provider education and education/ information for pregnant women, education plus vaccine availability, and education plus reminders

For the evidence study selection, please see Appendix C. The studies are summarised in section 1.1.5 below.

1.1.4.2 Excluded studies

The use of our inclusion and exclusion criteria led to the exclusion of 6 studies from one systematic review (Bisset 2018) and 2 studies from the other systematic review (Mohammed 2019). The reasons for exclusion of these primary studies are provided in the evidence tables of the relevant systematic reviews Appendix D.

The list of all excluded systematic reviews with reasons for their exclusion are available in Appendix J.

Four studies in the NICE guideline NG103: Flu vaccination: increasing uptake looked at influenza vaccine uptake for pregnant women (Atkins 2016, Frew 2014, Skedgel 2011, Wong

2016). However, none met the inclusion criteria for this review and reasons for their exclusion are listed in Table 18 in Appendix J.

1.1.5 Summary of studies included in the effectiveness evidence

Systematic reviews

Table 2 Summary of the characteristics of the systematic reviews for interventions for pregnant women.

Short Title	Population	Interventions and comparators	Relevant outcomes
Bisset 2018	• 22 studies[1] [Of these, our review included 8 RCTs and 8 cohort studies that matched our inclusion criteria.] • The databases were searched from their inception to August 2017. • Participants included pregnant women. • Vaccinations included pertussis and seasonal influenza.	• Any intervention to increase vaccine uptake for pregnant women. • No comparators were specified.	• Vaccine uptake
Mohammed 2019	• 6 studies[1] [Of these, our review included 2 RCTs, 1 cluster RCT and 1 before and after study that matched our inclusion criteria.] • The databased were searched from their inception to January 2019. • Participants included pregnant women. • Vaccinations included the pertussis vaccination.	• Any intervention to increase pertussis vaccine uptake for pregnant women. • The comparator was specified as “standard care”.	• Vaccine uptake

1. The included studies are listed in the detailed evidence tables in Appendix D and in Table 3 below.

Primary studies

Table 3 Primary studies included within the systematic reviews that met our inclusion criteria

Systematic review	Relevant primary studies	Components of interventions in the primary studies (classification based on our review protocol)
Bisset 2018		
	Frew 2016	Education/information aimed at pregnant women
	Goodman 2015	Education/information aimed at pregnant women
	Jordan 2015	Education/information or reminders aimed at pregnant women
	Klatt 2012	Reminders aimed at providers
	Kriss 2017	Education/information aimed at pregnant women
	McCarthy 2012	Education/information and reminders aimed at pregnant women and providers
	McCarthy 2015	Education/information and infrastructure (vaccine availability) aimed at pregnant women and providers
	Meharry 2014	Education/information aimed at pregnant women
	Moniz 2013	Education/information aimed at pregnant women
	Mouzoon 2010	Education/information aimed at providers
	Ogburn 2007	Education/information and infrastructure (vaccine availability) aimed at providers
	Panda 2011	Education/information and reminders aimed at providers
	Payakachat 2016	Education/information and infrastructure (vaccine availability) aimed at pregnant women and providers
	Pierson 2015	Reminders aimed at providers
	Sherman 2012	Reminders aimed at providers
	Stockwell 2014	Education/information and reminders aimed at pregnant women
Mohammed 2019		
	Chamberlain 2015	Education/information aimed at pregnant women and providers
	Kriss 2017	Education/information aimed at pregnant women
	Mohammed 2018	Infrastructure aimed at providers
	Payakachat 2016	Education/information aimed at pregnant women

Interventions aimed at pregnant women

Table 4 Summary of the characteristics of the primary studies for interventions aimed at pregnant women taken from the included systematic reviews

Author (year)	Country	Sample size	Study design	Setting	Target population for vaccination	Interventions	Comparators	Vaccine(s)	Relevant outcomes
Frew 2016	USA	95	RCT	Antenatal clinics	Pregnant women	**Intervention 1:** Usual care plus 9-minute information video on an iPad.[2] **Intervention 2:** Usual care plus modular education using an iPad where patient can select what aspect(s) they want to learn about.[3]	Usual care	Influenza	Vaccine uptake
Goodman 2015	USA	105	RCT	Antenatal clinics	Pregnant women	3 ½ minute CDC educational video.[4]	Control (3 ½ minute CDC handwashing video)	Influenza	Vaccine uptake
Jordan 2015[6]	USA	3905	RCT	Community (text messages)	Pregnant women	**For pregnant women who agreed to be vaccinated**: 1 text message reminder with an optional additional reminder. **For pregnant women who did not agree to be vaccinated**: tailored text message education.[5]	**For pregnant women who agreed to be vaccinated**: 1 text message reminder. **For pregnant women who did not agree to be vaccinated**: general information text message.[5]	Influenza	Vaccine uptake
Kriss 2017[1]	USA	106	RCT	Antenatal clinic waiting rooms	Pregnant women aged 18 to 50 years	**Intervention 1:** Interactive electronic book. **Intervention 2:** Video information.	Written advice from CDC about vaccines in general (not specific to relevant vaccines)	Pertussis (Tdap)	Vaccine uptake

Author (year)	Country	Sample size	Study design	Setting	Target population for vaccination	Interventions	Comparators	Vaccine(s)	Relevant outcomes
Meharry 2014	USA	133	RCT	Prenatal clinics and classes	Pregnant women	**Intervention 1:** Usual care plus patient-centred pamphlet, focusing on risks associated with flu, benefits of vaccination to mother and child, safety. **Intervention 2:** Usual care plus pamphlet and benefit statement found to be helpful in pilot.[7]	Usual care	Influenza	Vaccine uptake
Moniz 2013	USA	204	RCT	Community (text messages)	Pregnant women	Usual care and general pregnancy health text message and vaccine and flu text messages sent	Usual care and general pregnancy health text messages	Influenza	Vaccine uptake
Payakachat 2016[1]	USA	279	RCT	Women's clinics at medical centres	Pregnant women at least 18 years of age	A plain language version of the CDC's information on pertussis (Tdap) vaccine.	A standard version of the CDC's information on pertussis (Tdap) vaccine.	Pertussis (Tdap)	Vaccine uptake
Stockwell 2014	USA	1153	RCT	Community -based clinics	Pregnant women	Usual care plus 5 weekly automated text messages, including reminders, recommendation from doctor to vaccinate and educational messages (e.g. risks of flu, vaccine safety). Also included appointment reminders and prompt for pregnant woman to ask about vaccination at next antenatal appointment	Usual care	Influenza	Vaccine uptake

1. This study was also included in the education evidence review.

Author (year)	Country	Sample size	Study design	Setting	Target population for vaccination	Interventions	Comparators	Vaccine(s)	Relevant outcomes

2. A 9-minute film on a study iPad. This story centred on a pregnant woman's dilemma to get an influenza vaccine. The film depicted physician-actors giving the woman their recommendation to obtain the influenza immunization while acknowledging and discussing her concerns, including those of her mother whose anti-vaccination beliefs ran counter to the recommendation.
3. This intervention on an iPad encouraged women to watch short videos of physicians providing detailed, question-and-answer information on influenza vaccines. This format contained short modules covering topics such as the importance of these vaccines for both the mother and child, the severity of the diseases, how the vaccines work to protect pregnant women and their babies, vaccine safety information, and information on current guidelines. Thus, this interactive educational tutorial enabled women to choose the topic(s) that they were most interested in and enabled them to complete each tutorial separately.
4. The video addressed vaccination health belief concepts found to be predictive of vaccination and was intended to have a clear and easy to understand format.
5. Here is a link to a diagram that explains this study.
6. This study also included data for mothers. This data was excluded because this evidence review only covers pregnant women.
7. The statement read: "If you have flu shot during pregnancy, you will help to protect your baby against influenza from birth to 6 months."

Interventions aimed at healthcare providers

Table 5 Summary of the characteristics of the primary studies for interventions aimed at healthcare providers

Author (year)	Country	Sample size	Study design	Setting	Target population for vaccination	Interventions	Comparators	Vaccine(s)	Relevant outcomes
Klatt 2012	USA	1284	Before and after	Obstetrics and gynaecology clinic	Pregnant women	**After**: usual care plus alert on prenatal Electronic Health Record if patient had not received influenza vaccination. Administering the vaccination would cease the alert.	**Before**: usual care	Influenza	Vaccine uptake
Mohammed 2018	Australia	180	Before and after	Obstetric hospital	Pregnant women	**After**: midwife delivered immunisation programme and had a standing order to administer vaccine.	**Before**: unspecified usual care before introduction of the midwife delivered programme.	Pertussis (Tdap), influenza[1]	Vaccine uptake
Mouzoon 2010[3]	USA	10852	Before and after	Hospital clinic	Pregnant women	**After**: usual care plus 3 strategies involving provider education.[2, 3]	**Before**: usual care	Influenza	Vaccine uptake
Ogburn 2007	USA	602	Before and after	Perinatal clinic	Pregnant women	**After intervention 1:** Education for clinic personnel, the vaccine was available, and nurses screened pregnant women. **After intervention 2:** intervention 1 plus a standing order allowing nurses to administer vaccine without a doctor's prescription	**Before**: usual care	Influenza	Vaccine uptake

Author (year)	Country	Sample size	Study design	Setting	Target population for vaccination	Interventions	Comparators	Vaccine(s)	Relevant outcomes
Panda 2011	USA	1000	Before and after	Prenatal care clinics	Pregnant women	**After**: physician education program plus posters advertising flu vaccine to offices providing prenatal care to increase patient awareness. Email reminder to physicians that the flu vaccine is recommended for all pregnant women.	**Before**: usual care	Influenza	Vaccine uptake
Pierson 2015	USA	8019	Before and after	Obstetrics and gynaecology clinic	Pregnant women	**After**: usual care plus brightly coloured form attached to clinic notes. Form included vaccination status and whether patient would like to receive vaccination during appointment.	**Before**: usual care	Influenza	Vaccine uptake
Sherman 2012	USA	1367	Before and after	Hospital prenatal clinic	Pregnant women	**After**: usual care and reminder on patient charts for staff/provider about vaccination	**Before**: usual care	Influenza	Vaccine uptake

1. When data was provided for both influenza and pertussis vaccination, only the pertussis vaccination data was used.
2. The 3 strategies were: 1. The chief obstetrics and gynaecology doctor acted as immunisation champion and aimed to be model for behaviour. Updates on influenza vaccination in pregnancy and rate assessments were provided. 2. Training provided to obstetrics and gynaecology doctors, obstetric nurses and immunisation nurses on vaccine administration. 3. Obstetric nurses (midwives) offered training on vaccination and encouraged to identify eligible patients.
3. For both arms, health care providers were informed that the vaccine was available, they were also reminded of the importance of vaccinating every pregnant woman, without a contraindication, at her next prenatal care visit regardless of gestational age.

Interventions aimed at pregnant women and healthcare providers

Table 6 Summary of the characteristics of the primary studies that have components of the intervention aimed at pregnant women and healthcare providers

Author (year)	Country	Sample size	Study design	Setting	Target population for vaccination	Interventions	Comparators	Vaccine(s)	Relevant outcomes
Chamberlain 2015[1]	USA	325	Cluster RCT	Obstetric practices	Pregnant women aged 18 to 50 years	Face-to-face peer education. Printed educational material and interactive multimedia on iPads for staff to show pregnant women.	Usual care: they were requested to maintain their standard of care regarding influenza and/or Tdap vaccine promotion and administration.	Influenza and Pertussis (Tdap)[2]	Vaccine uptake
McCarthy 2012	Australia	439	Before and after	Antenatal clinic	Pregnant women	**After**: usual care and educational campaign for patients and staff (including safety, efficacy and the benefits of influenza vaccination in pregnancy). Lecture for staff. Reminder stamps placed in patient notes. Patient information booklet.	**Before**: usual care	Influenza	Vaccine uptake
McCarthy 2015	Australia	390	Before and after	Antenatal clinic	Pregnant women	**After**: education for staff. Patient information brochures in antenatal clinics. Increased availability of vaccine supply	**Before**: usual care	Influenza	Vaccine uptake

1. This study was also included in the education evidence review.
2. When data was provided for both influenza and pertussis vaccination, only the pertussis vaccination data was used.

For the full evidence tables, please see Appendix D.

1.1.6 Summary of the evidence

Summary of the quantitative evidence

See 1.1.3 Methods and process for an explanation of the interpretation column.

Interventions aimed at pregnant women: interventions compared to control

All studies below have influenza vaccine data with the exception of Kriss 2017 which has pertussis vaccine data.

Table 7 Summary of effectiveness findings for interventions aimed at pregnant women: interventions compared to control

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality
Interventions by type versus control- no pooled result (RR >1 favours the intervention)							
Information: pamphlet							
1 (Meharry 2014)[3]	RCT	133	RR 1.67 (1.22, 2.3)	47 per 100	78 per 100 (57, 100)	Increased with information pamphlet.	Moderate
Information: text message							
1 (Moniz 2013)	RCT	204	RR 1.05 (0.71, 1.58)	31 per 100	33 per 100 (22, 49)	The study could not differentiate change in vaccine uptake between information text message or control.	Low
Information: video							
3 (Frew 2016, Goodman 2015, Kriss 2017)	RCT	243	RR 1.29 (0.80, 2.07)	19 per 100	25 per 100 (15, 39)	The studies could not differentiate change in vaccine uptake between information video or control.	Very low
Information and reminders: text messages							

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality
1 (Stockwell 2014)	RCT	1153	RR 1.06 (0.94, 1.19)	47 per 100	49 per 100 (44, 55)	The study could not differentiate change in vaccine uptake between information and reminders via text message or control.	Very low
Information: app that provides a choice of modules							
1 (Frew 2016)	RCT	64	RR 0.57 (0.11, 2.88)	12 per 100	7 per 100 (1, 34)	The study could not differentiate change in vaccine uptake between an information app that provides a choice of modules or control.	Very low
Education: app that is interactive							
1 (Kriss 2017)	RCT	73	RR 2.94 (1.39, 6.23)	18 per 100	51 per 100 (24, 100)	Increased with education app that is interactive.	Moderate
Education/information versus control							
Education/information interventions by type versus control (subgrouped by intervention type) (RR >1 favours the intervention)[2]							
5[a]	RCT	579	RR 1.42 (0.97, 2.06)	28 per 100	40 per 100 (28, 58)	The studies could not differentiate change in vaccine uptake between education/information interventions or controls.	Very low
Information: video[1]							
1 (Goodman 2015)	RCT	105	RR 1.13 (0.6, 2.14)	25 per 100	28 per 100 (15, 54)	The study could not differentiate change in vaccine uptake between information video or control.	Very low
Information pamphlet with or without statement versus control (RR >1 favours pamphlet with or without statement)							
Pamphlet							
1 (Meharry 2014)[4]	RCT	97	RR 1.55 (1.10, 2.19)	47 per 100	73 per 100 (52, 100)	Increased with pamphlet.	Moderate
Pamphlet plus statement							
1 (Meharry 2014)[4]	RCT	85	RR 1.83 (1.33, 2.54)	47 per 100	86 per 100 (62, 100)	Increased with pamphlet plus statement.	Moderate

1. Frew 2016 and Kriss 2017 were removed from the education/information versus control meta-analysis to avoid double-counting the control arms.

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality

2. . Double-counting of control arms has been avoided by removing the video versus control comparisons from Kriss 2017 and Frew 2016. The 2 intervention arms of Meharry 2014 have been combined as they show a very similar intervention.
3. The 2 intervention arms of Meharry 2014 have been combined for the pooled forest plot because the interventions are very similar.
4. The 2 separate intervention arms for Meharry 2014.

a. Meharry 2014, Moniz 2013, Goodman 2015, Frew 2016, Kriss 2017

Interventions aimed at pregnant women: interventions compared to interventions

All of the studies below have influenza vaccine data with the exception of Payakach 2016 and Kriss 2017, which have pertussis vaccine data.

Table 8 Summary of effectiveness findings for interventions aimed at pregnant women: interventions compared to interventions

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality
Education/ information interventions compared to other education/ information interventions							
Plain language information leaflet versus standard information leaflet (RR >1 favours the plain language information leaflet)							
1 (Payakachat 2016)	RCT	279	RR 1.08 (0.84, 1.39)	45 per 100	49 per 100 (38, 63)	The study could not differentiate change in vaccine uptake between plain language information leaflet or standard information leaflet.	Low
Interactive electronic book versus video information (RR >1 favours the interactive electronic book)							
1 (Kriss 2017)	RCT	66	RR 1.70 (0.92, 3.14)	30 per 100	52 per 100 (28, 95)	The study could not differentiate change in vaccine uptake between interactive electronic book or video information.	Very low
Modular education versus video information (RR >1 favours modular education)							
1 (Frew 2016)	RCT	61	RR 0.52 (0.10, 2.61)	13 per 100	7 per 100 (1, 34)	The study could not differentiate change in vaccine uptake between modular education or video information.	Very low
Information pamphlet plus benefit statement versus information pamphlet (RR >1 favours the information pamphlet plus benefit statement)							
1 (Meharry 2014)	RCT	84	RR 1.18 (0.95, 1.47)	73 per 100	86 per 100 (69, 100)	The study could not differentiate change in vaccine uptake between information pamphlet plus benefit statement or information pamphlet.	Very low
Tailored educational text message versus general information text message (data for those planning to not be vaccinated) (RR >1 favours tailored educational text message)							
1 (Jordan 2015)	RCT	2253	RR 0.98 (0.84, 1.15)	22 per 100	21 per 100 (18, 25)	The study could not differentiate change in vaccine uptake between a tailored educational text message or a general information text message.	Very low
Reminder intervention compared to another reminder intervention							
2 text message reminders versus 1 text message reminder (data for those planning to be vaccinated) (RR >1 favours 2 text message reminders)							

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality
1 (Jordan 2015)	RCT	1652	RR 0.97 (0.87, 1.08)	60 per 100	59 per 100 (53, 65)	The study could not differentiate change in vaccine uptake between 2 text message reminders or 1 text message reminder	Very low

Interventions aimed at healthcare providers: interventions compared to control

All of the studies below have influenza vaccine data with the exception of Mohammed 2018, which has pertussis vaccine data.

Table 9 Summary of effectiveness findings for interventions aimed at healthcare providers: interventions compared to control

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality
NON-RCT: interventions by delivery method versus control (RR >1 favours the intervention)							
Reminders							
3 (Klatt 2012, Pierson 2015, Sherman 2012)	Before and after study	10670	RR 3.20 (1.15, 8.94)	8 per 100	25 per 100 (9, 69)	Increased with reminders.	Very low
Education							
1 (Mouzoon 2010)	Before and after study	10852	RR 18.48 (16.10, 21.21)	3 per 100	47 per 100 (41, 53)	Increased with education.	Very low
Education plus reminders							
1 (Panda 2011)	Before and after study	1000	RR 1.63 (1.31, 2.04)	19 per 100	31 per 100 (25, 39)	Increased with education plus reminders.	Very low
Midwife-delivered programme plus standing order							
1 (Mohammed 2018)	Before and after	180	RR 4.52 (2.06, 9.91)	20 per 100	90 per 100 (41, 100)	Increased with midwife-delivered programme with standing order.	Low
Nurse standing order							
1 (Ogburn 2007)	Before and after	412	RR 11.62 (5.48, 24.65)	3 per 100	37 per 100 (17, 78)	Increased with nurse standing order.	Very low
Education plus vaccine availability plus nurse screening							
1 (Ogburn 2007)	Before and after	410	RR 6.05 (0.75, 48.70)	1 per 100	3 per 100 (0, 26)	The study could not differentiate change in vaccine uptake between education plus vaccine availability plus nurse screening or control.	Very low

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality
Education plus vaccine availability plus nurse screening plus standing order							
1 (Ogburn 2007)	Before and after	382	RR 70.26 (9.86, 500.55)	1 per 100	37 per 100 (5, 100)	Increased with education plus vaccine availability plus nurse screening plus standing order.	Very low

interventions aimed at pregnant women and healthcare providers compared to control

Table 10 Summary of effectiveness findings for interventions aimed at pregnant women and healthcare providers: interventions compared to control

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)		Quality
Education/ information versus control							
Provider education and education/ information for pregnant women versus control (RR >1 favours provider education/ information for pregnant women)							
1 (Chamberlain 2015)	Cluster RCT	60	RR 1.43 (0.35, 5.83)	10 per 100	14 per 100 (3, 56)	The study could not differentiate change in vaccine uptake between face-to-face education plus information and an educational tool to show pregnant women or control.	Very low
Education plus a different intervention versus control (RR >1 favours intervention)							
Education plus vaccine availability							
1 (McCarthy 2015)	Before and after	390	RR 1.73 (1.34, 2.23)	30 per 100	51 per 100 (40, 66)	Increased with education plus availability.	Very low
Education plus reminders							
1 (McCarthy 2012)	Before and after	439	RR 1.33 (1.02, 1.72)	30 per 100	40 per 100 (31, 51)	Increased with education plus reminders.	Very low

Sensitivity analysis

This analysis shows the results of meta-analyses with any studies graded as high risk of bias removed from the analysis.

Frew has influenza vaccine data and Kriss 2017 has pertussis vaccine data.

Table 11 Summary of effectiveness findings for interventions aimed at pregnant women: interventions compared to control

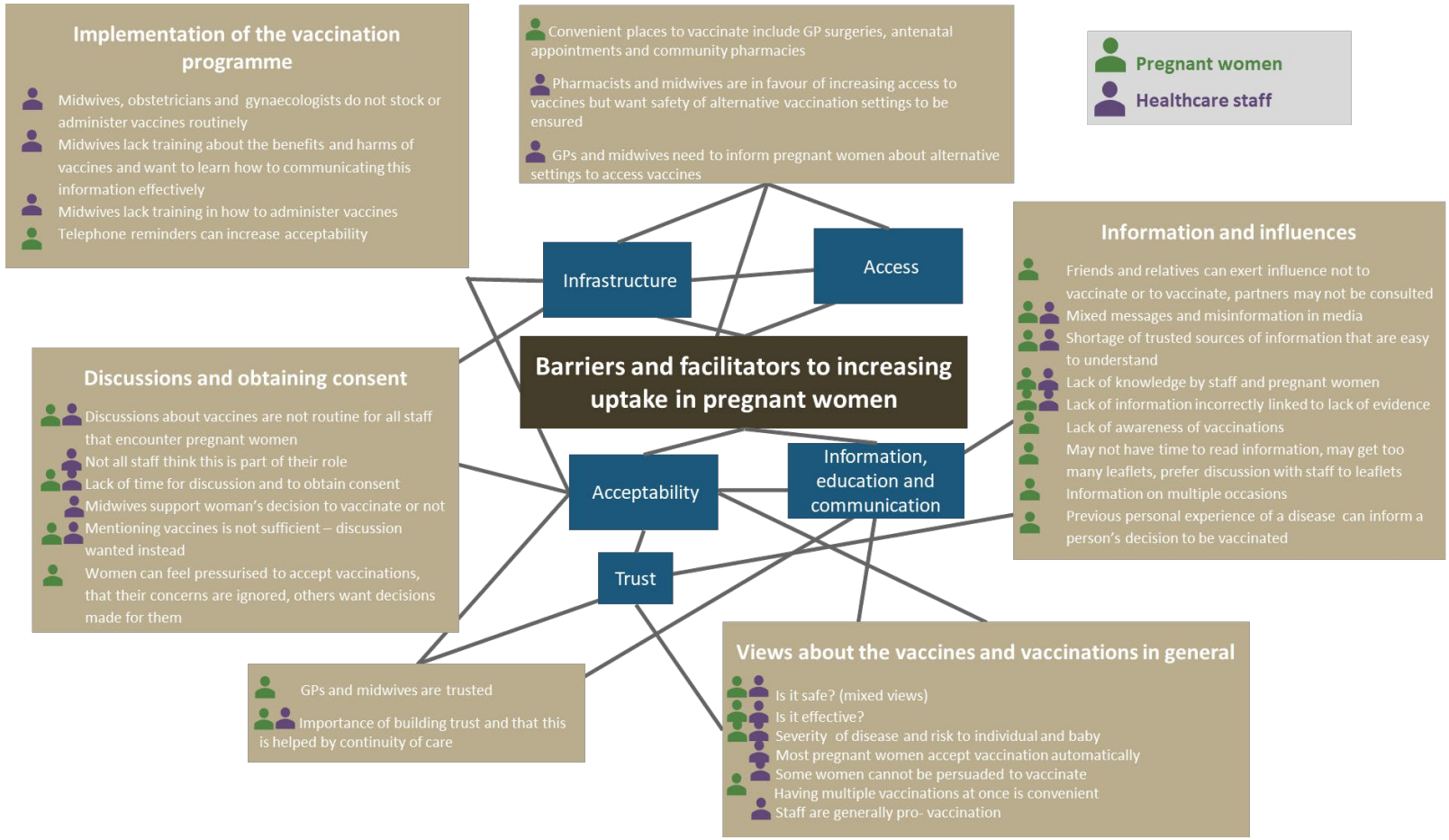
No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Interpretation	Quality
Interventions by delivery method versus control (RR >1 favours the intervention)[1]							
Information: video							
2 (Frew 2016, Kriss 2017)	RCT	138	RR 1.51 (0.74, 3.07)	15 per 100	22 per 100 (11, 46)	The study could not differentiate change in vaccine uptake between video information or control.	Very low

1. The other subgroups for this meta-analysis are not shown because they were unchanged compared to the original meta-analysis.

See Appendix F for full GRADE tables

Summary of the qualitative evidence

Figure 1 Summary of the qualitative findings relating to pertussis vaccine uptake in pregnant women. See below and review B for more details.



Summary of the key findings for barriers to and facilitators for pertussis uptake in pregnant women. These findings are taken directly from the qualitative evidence review (for the full table of findings and details of analysis methods see evidence review B).

Table 12 Summary of key findings for pregnant women

Finding	Confidence
Access	
Some pregnant women say that getting vaccinated at their GP's surgery is convenient because they attend for other reasons too. Other pregnant women say that having the vaccinations at antenatal appointments or at a community pharmacy would be more convenient than attending a GP surgery, but not all women believe that vaccines can be delivered at community pharmacies.	Moderate
Acceptability	
Pregnant women say that telephone reminders from midwives are influential in convincing them to accept vaccines.	Very low
Midwives say that most pregnant women automatically accept the vaccines that they discuss and/or offer.	Very low
Having more than 1 vaccination at once during pregnancy is more convenient and could increase uptake.	Low
Midwives say that nothing will persuade some pregnant women to accept vaccinations if they have already made up their mind. This is the case even when there is continuity of care and advice is given by a midwife who the pregnant woman is used to seeing.	Low
Trust	
Pregnant women say that they trust their GP and their midwives. Midwives and pregnant women say that continuity of care is beneficial in building trust which helps with discussing vaccines and having them administered. Midwives say this is the most persuasive method they are aware of. A lack of continuity of care can waste time by repeating discussions or reducing time for discussions and this can make midwives feel rushed.	High
Vaccine safety, effectiveness and assessment of risk	
Some pregnant women believe that vaccines could harm their unborn child. In addition, some staff had reservations about the safety of the dTaP/IPV vaccine. However, other women, maternity assistants, midwives, and neonatal care nurses trust that vaccines would not be offered to pregnant women unless they were safe.	High
Some pregnant women, maternity assistants, midwives, paediatric nurses, obstetricians and gynaecologists think vaccines are effective and were concerned that if pregnant women did not get vaccinated, their unborn child might come to harm. Midwives, obstetricians and gynaecologists agree that vaccines are effective Some pregnant women think that there is insufficient evidence for vaccine effectiveness. In addition, some pregnant women think that vaccines affect different populations of people differently.	High
Parents, obstetricians, gynaecologists, maternity assistants, midwives, and neonatal care nurses agree that pertussis infection is potentially lethal, but some physicians thought that the prevalence of pertussis was low within their communities and therefore did not warrant the same degree of attention as other vaccinations.	Low
Gaining consent and vaccination delivery	
Midwives and pregnant women agree that time pressures make it harder to discuss, gain consent for and carry out vaccinations. Some midwives say they lack dedicated time for obtaining consent.	Moderate

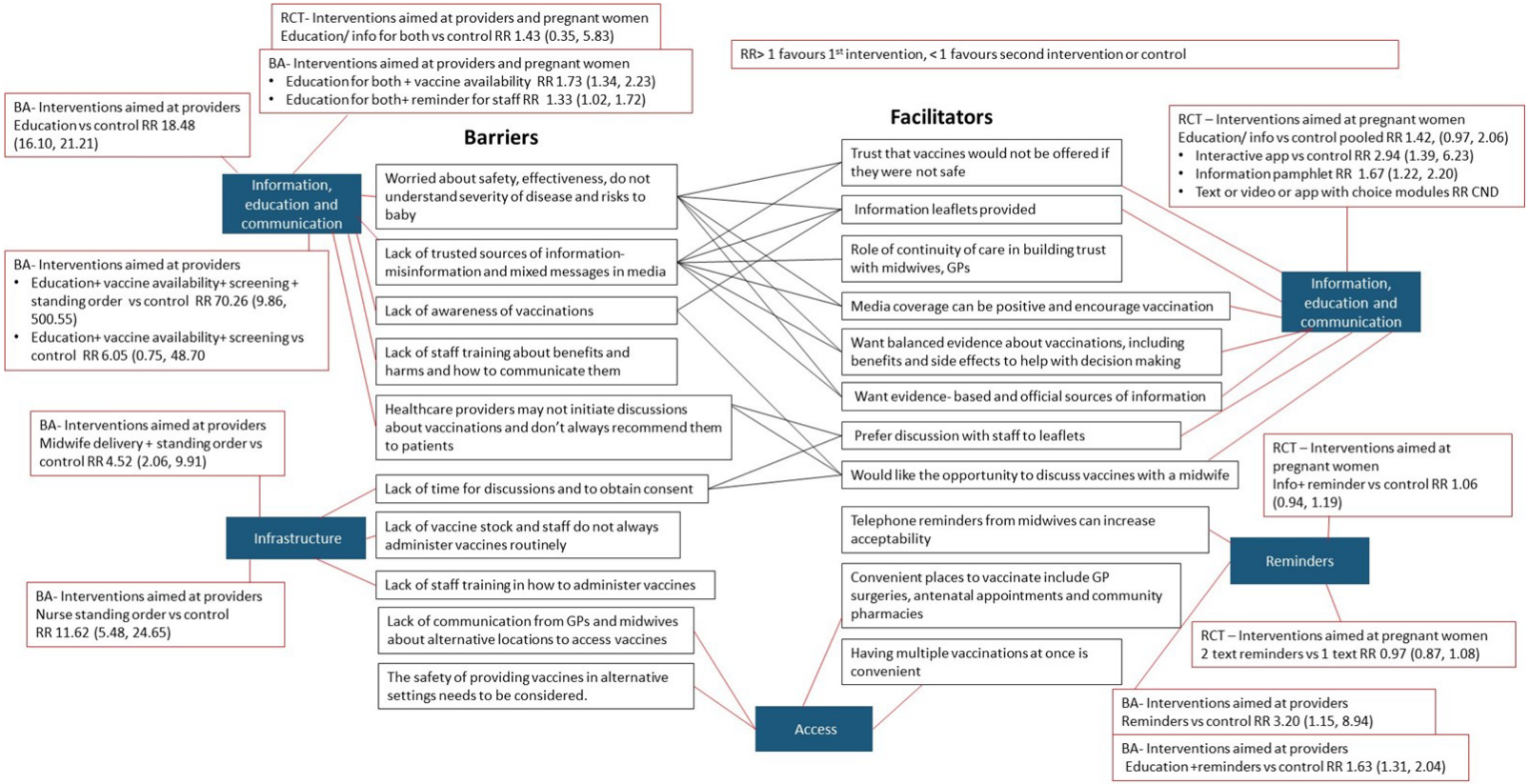
Finding	Confidence
Midwives are not equipped to routinely vaccinate pregnant women and obstetricians and gynaecologists do not stock and administer vaccines. The obstetricians and gynaecologists refer pregnant women to GPs to get vaccinated	Very low
In some cases, midwives and GPs wrongly assume that another healthcare practitioner has administered the vaccine.	Low
Training needs	
Midwives believe that discussing vaccines with pregnant women requires good knowledge and communication skills. They feel that they are not adequately trained with regards to the benefits and potential harms of vaccines and that communication skills training would be useful in helping them effectively communicate this information.	Low
Midwives say that they are not trained to administer vaccines.	Low
Lack of information, timing and information overload	
Some pregnant women are not aware that vaccines are part of routine healthcare during pregnancy.	Moderate
Some maternity assistants, midwives, and paediatric nurses say they lack knowledge about maternal vaccines including the diseases they prevent and side effects, and do not have access to easily understandable information to give to pregnant women. Some pregnant women also think that midwives do not know enough about vaccines in order to adequately discuss them or answer questions.	High
Some obstetricians and gynaecologists, maternity assistants, midwives and paediatric nurses believe that there is not enough evidence to recommend vaccines to pregnant women and some pregnant women believe that the reason healthcare practitioners do not give information about vaccines is because there is not much information on vaccines to be had.	Low
Some pregnant women say that information on vaccines should be given to them throughout pregnancy, so they have time to read them and organise vaccinations, while others say that they are so busy that they often do not have time to look at information on vaccines that is given to them. Some midwives say that pregnant women are given a lot of information during pregnancy.	Low
Sources of information: official sources	
Midwives say that they direct pregnant women to evidence-based information on vaccines and that they would like an official website to be created that has appropriate information on vaccines for pregnant women. Some pregnant women say they trust official sources of information more than others.	Moderate
Sources of information: the media and online, including social media and apps	
Midwives and pregnant women agree that the TV and news reports can be a source of positive messages to encourage vaccination. However, some pregnant women say that other media stories suggest vaccines do harm and discourage vaccination.	Moderate
Pregnant women say that they use Google to search for information about vaccines, but they do not trust advice on the internet that appears to be biased too heavily either in favour or against vaccines. They would prefer a balanced account.	Low
Some midwives say that there is a lot of misinformation on vaccines that saturates social media, while others are unaware of this problem.	Very low
Sources of information: printed materials, such as leaflets	
Midwives say that being able to give leaflets about vaccines to pregnant women is useful and that they have they have leaflets and other materials. However, some midwives do not give these leaflets out because pregnant woman are given many other leaflets.	Moderate
Not all pregnant women say that they read the leaflets they have been given and some would prefer the opportunity to discuss vaccines with healthcare practitioners rather than being given information.	Low

Finding	Confidence
Sources of information and influence: discussing vaccination with healthcare providers	
Some midwives agree that discussing maternal vaccines are an important part of their role and are willing to spend time doing this, while others think this is a topic for doctors to deal with or that discussing vaccines with pregnant women made them appear less trustworthy. Pregnant women say that they would like the opportunity to discuss vaccines with a midwife.	Moderate
Some obstetricians and gynaecologists do not routinely discuss vaccinations with pregnant women and say that vaccines are not on their list of top priorities or that they do not feel responsible for vaccinating pregnant women.	Low
Pregnant women say that midwives and obstetricians do not discuss vaccines enough in hospitals.	Low
Pregnant women say that healthcare practitioners do not initiate conversations about vaccines or discuss vaccines, including the pertussis vaccine, with them very much or at all.	High
Healthcare practitioners mention vaccines to pregnant women rather than discuss them but pregnant women who did not discuss vaccines with a healthcare practitioner were unlikely to be vaccinated.	Low
Midwives say that they discuss vaccines many times throughout each woman's pregnancy and they also discuss childhood vaccines. However, they discuss vaccines for childhood less frequently because they feel that mothers will have further opportunities to discuss childhood vaccines.	Very low
GPs, midwives, and practice nurses said that they are generally pro-vaccine. Obstetricians and gynaecologists recommend vaccines to pregnant women. However, some midwives believe that other midwives are against vaccines. Pregnant women agree that midwives encourage them to be vaccinated.	Moderate
Midwives say that they support the decisions that pregnant woman make – even if they do not want to be vaccinated.	Low
Pregnant women say that midwives can discourage them from being vaccinated by being too relaxed about the importance of being vaccinated.	Low
Sources of information and influence: friends and relatives	
Pregnant women say that friends and relatives sometimes recommend vaccination, but in other cases they can influence them not to vaccinate. The reasons for this include the belief that pertussis is a harmless disease, the vaccines are untested or poorly tested and may do harm, or cultural reasons.	Moderate
Pregnant women sometimes say that they are unlikely to discuss vaccines with their male partner and that he is too busy to discuss vaccines with them.	Low

Mixed methods summary of the quantitative and qualitative evidence

The barriers and facilitators in the diagram are summarised versions of the findings that were considered to be the most important from the qualitative evidence relating to pregnancy presented in Table 12. Possible links between barriers and corresponding facilitators are shown in the diagram, with the quantitative evidence mapped onto the related qualitative themes. See section 1.1.3 Methods and process for more details.

Figure 2 Diagrammatic summary of the barriers and facilitators to vaccine uptake in pregnant women with interventions mapped onto them. RR= risk ratio, CND= could not differentiate, BA= before and after study.



1.1.7 Economic evidence

A single systematic review was conducted to identify economic evaluations relevant to any of the quantitative review questions in the guideline. The search returned 5,716 records which were sifted against the review protocol. Of these publications 5,669 were excluded based on title and abstract. On full paper inspection 43 studies did not meet the inclusion criteria for any review question. Inclusion was restricted to cost-utility analyses from OECD countries comparing interventions to increase vaccine uptake for vaccines in the UK immunisation schedule as described in the green book. Four published economic analyses were included in the evidence synthesis.

Due to a lack of cost-utility evidence in children, an additional inclusion set was used to identify studies in children and adolescents (0-18 years), where outcomes were not restricted to QALYs only (and therefore cost-effectiveness studies were also included). An additional six studies from the search were included on this basis to provide evidence in the younger population.

The search was rerun in April 2021 to identify any newly published papers and returned 544 publications, of which 541 were excluded based on title and abstract and two were excluded at the full text inspection. One additional published cost-utility analysis from this search was included in the evidence synthesis.

1.1.7.1 Included studies

None of the 11 studies identified in the systematic review looked at interventions for pregnant women.

1.1.7.2 Excluded studies

A list of studies excluded at full text from the cost-effectiveness review can be found in Appendix J.

1.1.8 Summary of included economic evidence

No economic evidence was identified for interventions for pregnant women.

1.1.9 Economic model

No economic modelling was carried out for this review.

1.1.10 The committee's discussion and interpretation of the evidence

This discussion includes consideration of the qualitative evidence that specifically covers vaccinations for pregnant women from evidence review B (summarised above) as well as the quantitative evidence presented in this review.

1.1.10.1. The outcomes that matter most

The protocol's primary outcome was vaccine uptake. The committee agreed that this outcome was the most important for pregnant women and healthcare practitioners because the aim of this guideline is to increase vaccine uptake. None of the included studies reported the protocol's secondary outcomes, which were the proportion of people offered vaccinations and the numbers of people who develop the diseases the vaccines are aimed at preventing. Offers of vaccination was not considered as important as uptake because an offer may not necessarily result in a vaccination.

1.1.10.2 The quality of the evidence

This review was carried out as a review of systematic reviews (SRs) and therefore did not include any additional primary studies that were published after the search date of the included reviews. Any such studies identified by the primary study searches for specific intervention types (for example, for education or reminders interventions) have been included in the relevant intervention reviews where they meet the study type inclusion criteria.

The SR evidence consisted of 2 SRs that were judged to be at low risk of bias and fully applicable to the current review question. The primary studies within the SRs involved interventions aimed at increasing uptake of pertussis and/ or influenza vaccination. Although, influenza vaccination is not within the scope of this guideline (there is a separate NICE guideline, Flu vaccination: increasing uptake), the committee decided to include influenza vaccination of pregnant women in this review due to the limited number of studies identified for pertussis vaccination. However, they stated that this evidence should be downgraded once for applicability due to differences between the influenza and pertussis vaccination programmes (discussed further below).

The studies were RCTs, cluster RCTs (cRCTs) and before and after studies. These studies were associated with differing risk of bias. In general, the before and after studies were at higher risk of bias than the RCTs/ cRCTs because by design they were not randomised trials and lacked a contemporary control group for the intervention; instead, they used the uptake results from before the intervention as the comparator.

The quality of the evidence from the included primary studies ranged from very low to moderate. Reasons for downgrading included risk of bias issues (such as lack of information about the randomisation process for RCTs, the lack of randomisation and control groups for the before and after studies, and poor reporting or inadequate methods of data collection for both study types), and partial applicability for the influenza studies.

One possible limitation of this evidence review is that the 2 SRs did not say that they specifically looked for intervention versus intervention comparisons. However, the searches for primary studies for the other intervention reviews (e.g., for education or reminders interventions) were broad and all the relevant studies for pertussis vaccination from the search were also included in the identified SRs up to the date of their searches. The primary searches and SR search did not look for influenza specific primary studies or SRs and so the evidence review in the NICE flu guideline (Flu vaccination: increasing uptake), that examined vaccination of pregnant women was also checked. The primary studies identified in the flu guideline were also included in the Bissett 2018 SR that looked at both pertussis and influenza vaccination. There was an additional SR in the flu guideline (Wong 2016) but this contained the same influenza studies as Bissett 2018 and was excluded from this review as a result.

1.1.10.3 Advantages and disadvantages

Due to the limited number of primary studies looking at pertussis vaccination of pregnant women, based on their clinical expertise and experience, the committee agreed to expand the evidence search to include influenza vaccination of pregnant women. This was based on the assumption that some aspects of interventions designed to increase the uptake of influenza vaccination in pregnant women could also be applied to pertussis vaccinations. However, the committee agreed that there were significant differences between these vaccinations that would need to be considered when examining the evidence and making recommendations. Key differences are the aims of the vaccination, with the influenza vaccine seen as protecting the mother primarily (although it also protects the baby as well passively and indirectly), while pertussis vaccination is primarily aimed at protecting the baby after birth. Influenza vaccination is a seasonal vaccination that can be offered from the beginning of pregnancy, while pertussis vaccination is targeted to later in foetal development (between 16-32 weeks as recommended in the Green book.) In addition, influenza

vaccinations can be carried out in multiple settings by many different providers while pertussis vaccination is usually administered by midwives during antenatal visits in the UK, or less frequently by GPs in primary care.

The committee discussed the evidence from interventions aimed at pregnant women to increase uptake compared to control and observed that the results were unable to differentiate between intervention and control in all the comparisons apart from the studies which used an information pamphlet (Meharry 2014) or an interactive education app (Kriss 2017). In many of the studies the sample sizes were small (100 people or less per arm) and this may have meant that these studies were underpowered and so unlikely to be able to detect differences between the interventions. The committee also noted that a recommendation about what information to include in vaccine invitations already mentioned including references to additional information about the vaccines (including videos or interactive information) from trusted sources (see evidence review E). They decided that this covered the use of an interactive education app (Kriss 2017), and so no additional changes to this recommendation were needed.

The committee discussed the information pamphlet intervention (Meharry 2014). This study consisted of 3 arms and both intervention arms include the information pamphlet, but one also included statement of benefit. This statement read: 'If you have the flu shot during pregnancy, you will also help protect your baby against influenza from birth to 6 months.' The committee noted that the presence of this statement emphasised this point which might otherwise have been missed when reading the pamphlet. However, the evidence could not differentiate between the pamphlet alone or pamphlet plus benefit statement, so it did not appear to increase vaccine uptake. Despite this the committee agreed that it could be helpful to include a statement emphasising the benefit of pertussis vaccination to the baby in the information provided with the invitation for the vaccine because they were concerned that not all pregnant women are made sufficiently aware of this important point. They therefore added this point to an existing recommendation about what should be included in vaccine invites from the education and reminders evidence review (see review E for more details about this recommendation).

The committee discussed the remaining evidence and noted that the results were unable to differentiate between interventions aimed at pregnant women compared to each other. In contrast, most of the interventions aimed at providers increased vaccine uptake but the evidence was very low to low quality because it came from before and after studies that were at high risk of bias. The committee agreed that this evidence was of insufficient quality to support specific recommendations for these interventions. Instead, they reviewed the existing draft recommendations for the identification of eligibility and status interventions (review A), invitations and reminders (review C), improving access (review D) and education/ information (review E) to determine whether any additions or changes needed to be made to cover pertussis vaccination of pregnant women.

The committee agreed that most of the existing recommendations from the reminders review (evidence review C) and education and reminders review (evidence review E) were applicable to pertussis vaccination of pregnant women. However, there were some process differences that needed to be considered. In most cases, pregnant women are not invited to be vaccinated by letter, text or email, but instead they are invited by midwives and reminders are provided as needed in person during antenatal appointments. To reflect this point, 'during consultation' was added as an option to the existing draft recommendation about invitation methods. Maternity services have responsibility for ensuring that pregnant women are invited for or signposted to appropriate vaccination services and this was already covered by an existing recommendation. However, GPs may be involved in chasing up pregnant women who are not vaccinated by midwives. For this reason, the recommendation was updated to highlight that both maternity services and other healthcare practitioners who have contact with pregnant women should ensure that pregnant women are invited for vaccinations (see evidence review C for more details).

The committee agreed that most pertussis vaccinations would be carried out around the 20 week scan, but the timings of appointments after the scan varied between first and subsequent pregnancies and may differ between areas. As a result, a recommendation about the timing of identifying pregnant women who have not been vaccinated was amended to clarify that providers of antenatal care should identify pregnant women who have not been vaccinated against pertussis at the first appointment after the 20 week foetal anomaly scan with reminders and offers of vaccination being provided at subsequent appointments or during any contact with their GPs (see evidence review C for more details). They also noted that pertussis vaccination can be given to pregnant women at the same time as flu vaccination, which could be convenient for the pregnant woman and is mentioned as a facilitator in the qualitative evidence (see Figure 2). In contrast, pertussis should not be given earlier than 16 weeks as this may compromise the passive protection of the infant against pertussis. However, pertussis vaccination can also be provided to the mother postnatally to provide indirect protection to the baby if she has not been vaccinated during pregnancy. This point was added to the recommendation to opportunistically identify people for vaccination under the bullet point referring to pregnant women to cover postnatal reviews as well as antenatal reviews (see evidence review A for more details).

The committee discussed the qualitative evidence for barriers and facilitators to vaccine uptake in pregnant women (see Figure 1). They noted that midwives and GPs are trusted healthcare practitioners and that this trust is established over time when there is continuity of care enabling the healthcare provider and pregnant women to develop a relationship. They agreed that in their experience, pregnant women often ask these providers for advice about accepting pertussis vaccination and that a recommendation to vaccinate could increase uptake. However, they were also in agreement that it is important to support and empower women to make their own informed decisions rather than direct them to be vaccinated in a paternalistic manner. The recommendations already cover providing information and opportunities for discussion if needed as part of the initial invitation for vaccination (see evidence review E). The committee added a bullet point to this recommendation to make it clear that the NHS recommends the vaccination. They envisaged that the healthcare practitioner would be able to make a professional recommendation in support of vaccination based on this point rather than a personal recommendation.

The committee noted that additional barriers to uptake were similar to those for other groups, such as parents and carers of children and young people, and people aged 65 years and over. These included a lack of time during appointments to discuss vaccinations and obtain consent; a lack of staff training in how to administer the vaccines, a lack of storage in some antenatal settings, a lack of staff training in the benefits and harms of vaccination and how to communicate them. The lack of training in communicating the benefits and harms of vaccination and in giving vaccinations was considered as part of the education/ information review (evidence review E) under staff education and recommendations that this is included as part of staff training were made. The lack of time to discuss vaccinations and obtain consent was also considered as part of the qualitative review (evidence review B) and the education review (evidence review E). The evidence highlighted that healthcare providers and individuals, parents and carers think that there is not enough time to discuss vaccination, obtain consent, administer vaccinations and complete the necessary documentation, leading to appointments feeling rushed. The committee therefore made a recommendation highlighting the importance of providers allowing sufficient time for all of this to take place in vaccination appointments (see evidence review E for more details). The committee were unable to specify how much time should be allowed because they did not look at any evidence on this and the length of consultations were outside of their remit. There was also some consideration in the access review (evidence review D) of what should happen in settings where healthcare practitioners are unable to provide vaccinations, such as those that lack facilities to store the vaccines. A recommendation was made as part of that review to ensure that in these situations people are signposted to places where the vaccinations are available. Each of these recommendations are applicable to vaccinations for all population

groups, including pregnant women, and help to address some of the barriers to vaccinations identified by the qualitative evidence and the committee.

However, given that most of the evidence included in this review was not carried out in the UK, and was only partially applicable to this research question, the committee thought that it was important to include a research recommendation aimed at increasing the evidence base for interventions to increase pertussis vaccine uptake in pregnant women. This rationale for this research is explained in more detail in Appendix K. By including both quantitative and qualitative components in the research recommendation the committee aimed to provide information about the most effective interventions and their acceptability to pregnant women to try to maximise uptake.

1.1.10.4 Cost effectiveness and resource use

No economic evidence was identified for interventions to increase uptake of maternal vaccinations. The committee used the clinical evidence presented and their experience to add detail to the recommendations already made to make them applicable to maternal vaccinations. None of the modifications made to the recommendations discussed by the committee in relation to this evidence review are expected to incur any additional resources to implement.

1.1.11 Recommendations supported by this evidence review

This evidence review supports the research recommendation on increasing pertussis vaccine uptake in pregnant women. It provides additional support to recommendations 1.2.6, 1.2.13, 1.3.7, 1.3.8, 1.3.11 and 1.3.17 in the following reviews: evidence review C: reminders interventions to increase the uptake of routine vaccines; evidence review D: interventions to increase the uptake of routine vaccines by improving access and evidence review E: education interventions to increase the uptake of routine vaccines.

1.1.12 References – included studies

1.1.12.1 Effectiveness evidence

Systematic reviews

Bisset, Kate Alexandra; Paterson, Pauline; Strategies for increasing uptake of vaccination in pregnancy in high-income countries: A systematic review.; Vaccine; 2018; vol. 36 (no. 20); 2751-2759

Mohammed, Hassen; McMillan, Mark; Roberts, Claire T; Marshall, Helen S; A systematic review of interventions to improve uptake of pertussis vaccination in pregnancy.; PloS one; 2019; vol. 14 (no. 3); e0214538

Primary studies from within the systematic reviews

Frew PM; Kriss JL; Chamberlain AT; Malik F; Chung Y; Cortés M; Omer SB; A randomized trial of maternal influenza immunization decision-making: A test of persuasive messaging models.; Human vaccines & immunotherapeutics; 2016 vol. 12 (no. 8)

Chamberlain, A T; Seib, K; Ault, K A; Rosenberg, E S; Frew, P M; Cortes, M; Whitney, E A S; Berkelman, R L; Orenstein, W A; Omer, S B; Improving influenza and Tdap vaccination during pregnancy: A cluster-randomized trial of a multi-component antenatal vaccine promotion package in late influenza season.; Vaccine; 2015; vol. 33 (no. 30); 3571-9

Goodman K; Mossad SB; Taksler GB; Emery J; Schramm S; Rothberg MB; Impact of Video Education on Influenza Vaccination in Pregnancy.; The Journal of reproductive medicine; 2015; vol. 60 (no. 11-12)

Jordan ET; Bushar JA; Kendrick JS; Johnson P; Wang J; Encouraging Influenza Vaccination Among Text4baby Pregnant Women and Mothers.; American journal of preventive medicine; 2015; vol. 49 (no. 4)

Klatt TE; Hopp E; Effect of a best-practice alert on the rate of influenza vaccination of pregnant women.; Obstetrics and gynecology; 2012; vol. 119 (no. 2 Pt 1)

Kriss, Jennifer L; Frew, Paula M; Cortes, Marielysse; Malik, Fauzia A; Chamberlain, Allison T; Seib, Katherine; Flowers, Lisa; Ault, Kevin A; Howards, Penelope P; Orenstein, Walter A; Omer, Saad B; Evaluation of two vaccine education interventions to improve pertussis vaccination among pregnant African American women: A randomized controlled trial.; Vaccine; 2017; vol. 35 (no. 11); 1551-1558

McCarthy EA; Pollock WE; Nolan T; Hay S; McDonald S; Improving influenza vaccination coverage in pregnancy in Melbourne 2010-2011.; The Australian & New Zealand journal of obstetrics & gynaecology; 2012; vol. 52 (no. 4)

McCarthy EA; Pollock WE; Tapper L; Sommerville M; McDonald S; Increasing uptake of influenza vaccine by pregnant women post H1N1 pandemic: a longitudinal study in Melbourne, Australia, 2010 to 2014.; BMC pregnancy and childbirth; 2015; vol. 15

Meharry PM; Cusson RM; Stiller R; Vázquez M; Maternal influenza vaccination: evaluation of a patient-centered pamphlet designed to increase uptake in pregnancy.; Maternal and child health journal; 2014; vol. 18 (no. 5)

Mohammed, Hassen; Clarke, Michelle; Koehler, Ann; Watson, Maureen; Marshall, Helen; Factors associated with uptake of influenza and pertussis vaccines among pregnant women in South Australia.; PloS one; 2018; vol. 13 (no. 6); e0197867

Moniz MH; Hasley S; Meyn LA; Beigi RH; Improving influenza vaccination rates in pregnancy through text messaging: a randomized controlled trial.; Obstetrics and gynecology; 2013; vol. 121 (no. 4)

Mouzoon ME; Munoz FM; Greisinger AJ; Brehm BJ; Wehmanen OA; Smith FA; Markee JA; Glezen WP; Improving influenza immunization in pregnant women and healthcare workers.; The American journal of managed care; 2010; vol. 16 (no. 3)

Ogburn T; Espey EL; Contreras V; Arroyo P; Impact of clinic interventions on the rate of influenza vaccination in pregnant women.; The Journal of reproductive medicine; 2007; vol. 52 (no. 9)

Panda B; Stiller R; Panda A; Influenza vaccination during pregnancy and factors for lacking compliance with current CDC guidelines.; The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians; 2011; vol. 24 (no. 3)

Payakachat, Nalin; Hadden, Kristie B; Ragland, Denise; Promoting Tdap immunization in pregnancy: Associations between maternal perceptions and vaccination rates.; Vaccine; 2016; vol. 34 (no. 1); 179-86

Pierson RC; Malone AM; Haas DM; Increasing Influenza Vaccination Rates in a Busy Urban Clinic.; Journal of nature and science; 2015; vol. 1 (no. 3)

Sherman MJ; Raker CA; Phipps MG; Improving influenza vaccination rates in pregnant women.; The Journal of reproductive medicine; 2012; vol. 57 (no. 9-10)

Stockwell MS; Westhoff C; Kharbanda EO; Vargas CY; Camargo S; Vawdrey DK; Castaño PM; Influenza vaccine text message reminders for urban, low-income pregnant women: a randomized controlled trial.; American journal of public health; 2014

1.1.12.2 Economic evidence

None

Appendices

Appendix A – Review protocols

Review protocol to identify effective interventions to improve uptake of routine vaccines

ID	Field	Content
0.	PROSPERO registration number	Not applicable
1.	Review title	Identifying effective interventions to improve uptake of routine vaccines.
2.	Review questions	What are the most effective interventions for increasing the uptake of routine vaccines?
3.	Objectives	To identify effective strategies to improve routine vaccine uptake.
4.	Searches	The following databases will be searched: • Cochrane Central Register of Controlled Trials (CENTRAL) • Cochrane Database of Systematic Reviews (CDSR) • Embase • MEDLINE • Medline in process • Medline epubs ahead of print • Emcare • Psycinfo • Sociological Abstracts • ASSIA • DARE • Econlit (economic searches) • NHS EED (economic searches) • HTA (economic searches) • Other subject specific databases as appropriate for the quantitative review Searches will be restricted by: • Studies published since 1990 • English language • Human studies • Qualitative, Systematic Review, RCT, OECD geographic filters as appropriate Other searches: • Reference searching where appropriate

		• Citation searching where appropriate • Inclusion lists of systematic reviews • Websites where appropriate The searches will be re-run 6 weeks before final submission of the review and further studies retrieved for inclusion. The full search strategies for MEDLINE database will be published in the final review.
5.	Condition being studied	Uptake of vaccines on the routine NHS schedule
6.	Population	Inclusion: • All people who are eligible for vaccines on the routine UK immunisation schedule and their families and carers (if appropriate). • Staff including, but not limited to, those providing advice about or administering vaccines and those people with relevant administrative or managerial responsibilities. Exclusion: None
7.	Interventions and factors of interest	Interventions including, but not confined to: 7. Information, education and methods of communicating them: Interventions to provide information including: • online campaigns including social media and apps • radio campaigns • letters by mail • printed materials (e.g. leaflets) • multi-media campaigns • TV and online advertising (including pop up adverts) • posters • online information exchange- fill in questionnaire and get information Educational interventions (delivery methods): • face-to-face sessions • telephone conversations • social media with responses • interactive multi-media interventions (e.g. case studies on GP websites; e-learning) • interactive community events (e.g. talks with question and answer sessions) • peer education (carried out by a community member who shares similar life experiences to the community they are working with)

		• lay education (carried out by community members working in a non- professional capacity)
		• multicomponent interventions targeting education
		• vaccine hotlines and special advisory clinics for health professionals
		
		Who provides the information and/or advice and how they do so, including:
		• Vaccine champions:
		  ○ Practitioners
		  ○ Peers
		  ○ Community leaders
		• Interventions to train staff and other people on how best to communicate the information/ run educational sessions.
		• Recommendations to vaccinate from people/groups including:
		  ○ Medical and other staff (for example, GPs, nurse, health visitors, midwives,)
		  ○ Social workers
		  ○ Community leaders
		  ○ Religious leaders
		  ○ Peers
		  ○ Teachers
		
		Information and education can be provided during home visits, during interactions with health and social care workers, at support group meetings for people using other services etc. This may involve providing a contact point for more information.
		
		Types of information include PHE bulletins and local bulletins for providers.
		
		8. Vaccination reminders aimed at providers or individuals including:
		
		Reminder and recall systems (aimed at provider)
		• clinical alerts and prompts
		• national alerts to local teams
		• local recall initiatives
		
		Personal invitation to be vaccinated from:
		• GP
		• community pharmacist
		• health or social care worker
		• from several professionals
		
		Reminders to individuals/ eligible groups by:
		• text messages
		• electronic invitations (via apps)

		• emails • letter • phone calls • posters • postcards 9. Interventions targeting acceptability: • Alternative forms of vaccinations (e.g. injections, formulations) • Alternative settings • Alternative vaccine providers (e.g. doctor administering vaccine instead of nurse) 10. Interventions to improve access including: Expanding access in healthcare, such as: • Reducing distance/time to access vaccinations • Out of hour or drop-in services • Delivering vaccines in clinical settings in which they were previously not provided Vaccination clinics in community settings: • community pharmacies • antenatal clinics • specialist clinics (e.g. drug and alcohol services, mental health services) • community venues (e.g. libraries, children's centres) Dedicated clinics for specific/ all routine vaccinations: • Mass vaccination clinics in community or other settings (e.g. schools) • Walk in or open access immunisation clinics Extended hours clinics • weekends evenings (after 6 pm) • early mornings (before 8 am) • 24-hour access Outreach interventions or mobile services: • home or domiciliary or day centre visits • support group meeting visits • residential or care home visits • special school visits • inpatient visits • custodial visits • immigration settings • mobile clinics (e.g. in community) Parallel clinics

		• Offer vaccination in parallel with regular appointments (e.g. with midwives, clinicians, inpatient and outpatient clinics, long stay wards, etc.) • coordinated timing of other programmes (such as child developmental checks) Opportunistic vaccinations: • visits to GP, practice nurse or consultant for other medical conditions including STI clinics, drug and alcohol programmes • having vaccinations provided in hospitals or accident and emergency departments • may involve a dedicated person to administer the vaccines. 11. Interventions to improve infrastructure (targeting processes, staffing and settings): Booking systems • dedicated vaccination lines or online systems Organisation of local provider-based systems: • Local area approaches • Systems and processes in place to work with the community • Practice level approaches • Assigned lead for a specific vaccination programme • Having staff who are competent to deliver vaccinations available in multiple settings • Having staff with responsibilities for training practitioners, answering complex questions, co-ordinating immunisations etc. Systems involved in the recording and identification of eligibility and status (covered in RQ1- see this review protocol for a list of potential interventions) Incentives based interventions: • Incentive (and disincentives for not vaccinating) schemes (for individuals) o voucher schemes (not to cover cost of vaccination or healthcare) o payment to cover travel costs o fines/ penalties for not vaccinating o entry to childcare settings/ schools blocked in the absence of proof of vaccination status • Mandatory vaccination • Incentive schemes (for providers) o targets

		○ quality and outcomes framework ○ voucher schemes Audit and feedback on uptake rates for providers • Weekly statistics • Content and delivery of feedback • Practical relevance (e.g. how many more people need to be vaccinated to achieve a target number) • Comparison data (e.g. between GP practices) 12. Multicomponent interventions: • Interventions which include more than one component and target multiple issues (for example the intervention could include an educational component and changes in the timing of clinics) will be analysed separately, but with other similar multicomponent interventions where possible. • Multicomponent interventions which include more than one component that is targeting a single issue will be included in the relevant category instead.
8.	Comparators	• Usual approaches to increase vaccine uptake • Other interventions to increase vaccine uptake ○ Other interventions targeting same issue/ theme (for example education) ○ Other interventions targeting different issues/ theme (for example education versus infrastructure)
9.	Types of study to be included	Systematic reviews of included study designs. Then as needed: • Randomised controlled trials • Non-randomised controlled trials • Controlled before-and-after studies • Interrupted time series • Cohort studies • Before and after studies • Mixed method study designs (quantitative evidence that matches the above study designs only) For the mixed methods synthesis, published mixed methods studies will also be included if the study does not present quantitative and qualitative evidence separately, but only if the individual study designs meet the inclusion criteria for both the qualitative and quantitative reviews as detailed above.
10.	Other exclusion criteria	Interventions to increase uptake of these vaccines/ conditions: • Selective immunisation programmes, as defined in the Green Book and additional vaccines for people with underlying medical conditions because they do not form part of the routine schedule.

		• Seasonal vaccinations because they are not part of the routine vaccination schedule, apart from Flu, which is covered by a separate NICE guideline and excluded for this reason (see section 14 for reasons underlying a possible deviation from this exclusion). • Travel vaccines- not on routine schedule • Areas covered by NICE's guideline on tuberculosis. • Catch-up campaigns alongside the introduction of a new vaccine Only papers published in the English language will be included. Where studies from the USA (or other countries with similar health insurance-based systems) are included in the qualitative reviews any barriers/ facilitators relating to financial incentives (such as payment for vaccines or affording health insurance) will not be recorded as these are not relevant for the UK. In addition, in countries where vaccines or health care are paid for by the user studies looking at any financial incentive-based interventions are excluded.
11.	Context	The Department of Health and Social Care in England has asked NICE to produce a guideline on vaccine uptake in the general population. In recent years, UK vaccination rates have declined, resulting in increases in vaccine preventable diseases, particularly measles. There were 991 confirmed cases in England in 2018 compared with 284 in 2017 and the World Health Organization no longer considers measles 'eliminated' in the UK. Reasons for low uptake include poor access to healthcare services; inaccurate claims about safety and effectiveness, which can lead to doubts about vaccines; and insufficient capacity within the healthcare system for providing vaccinations. In addition, problems with the recording of vaccination status and poor identification of people who are eligible to be vaccinated may have contributed to this problem.
12.	Primary outcomes (critical outcomes)	Changes in: • Vaccine uptake (overall for a specific vaccine or vaccines and for each dose where a vaccine is administered in multiple doses)
13.	Secondary outcomes (important outcomes)	Changes in: • the proportion of people offered vaccinations • the numbers of people who develop the disease the vaccination was aimed at preventing

14.	Data extraction (selection and coding)	All references identified by the searches and from other sources will be uploaded into EPPI reviewer and de-duplicated. 10% of the abstracts will be reviewed by two reviewers, with any disagreements resolved by discussion or, if necessary, a third independent reviewer. The quantitative systematic review search results will be sifted using the EPPI reviewer priority screening functionality, but the whole data base will still be screened in each case. However, when sifting for primary studies for specific sections of the quantitative review priority screening may be used to terminate screening before the end of the search is reached. In this case, at least 50% of the identified abstracts will be screened. After this point, screening will only be terminated if a pre-specified threshold of 500 references is met for a number of abstracts being screened without a single new include being identified. A random 10% sample of the studies remaining in the database when the threshold is met will be additionally screened, to check if a substantial number of relevant studies are not being correctly classified by the algorithm, with the full database being screened if concerns are identified. The full text of potentially eligible studies will be retrieved and will be assessed in line with the criteria outlined above. Data will be extracted from the included studies into a standardised form (see Developing NICE guidelines: the manual section 6.4) for assessment of study quality and evidence synthesis. Extracted information for the quantitative review will include: study type; study setting; study population and participant demographics and baseline characteristics; details of the intervention and comparator used; study methodology; inclusion and exclusion criteria; recruitment and study completion rates; outcomes and times of measurement and information for assessment of the risk of bias. If insufficient evidence is identified to make recommendations, we will consult the committee and consider a call for evidence (as detailed in the NICE manual) or include more indirect evidence from other relevant guidelines (for example, the NICE flu guideline).
15.	Risk of bias (quality) assessment	Risk of bias will be assessed using appropriate checklists as described in Developing NICE guidelines: the manual. Systematic reviews will be assessed using the ROBIS checklist. For the quantitative review, randomised controlled trials will be assessed using the Cochrane risk of bias v2.0 checklist. Non-randomised controlled trials and cohort studies will be assessed using the Cochrane ROBINS-I checklist. Controlled/ uncontrolled before and after

		studies, and interrupted time series will be assessed using the EPOC tool. Any mixed methods studies with quantitative data that can be extracted separately will be assessed using ROBINS-I, Cochrane risk of bias v2.0, or EPOC appropriate. Mixed methods studies where separate quantitative and qualitative data cannot be assessed separately will be assessed using the mixed methods appraisal tool (2018 version).
16.	Strategy for data synthesis	A mixed methods approach will be used to address this topic area. The quantitative and qualitative reviews (evidence review B) will be conducted separately (segregated study design) but at the same time. The evidence from the reviews will then be analysed in relation to each other (convergent synthesis of results). (See below for more details. The findings will **not** be integrated by transforming one type of evidence into the other (e.g. quantitative findings into qualitative findings). Where possible, meta-analyses of outcome data will be conducted for all comparators that are reported by more than one study, with reference to the Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al. 2011). Data will be separated into the groups identified in section 17. Continuous outcomes will be analysed as mean differences, unless multiple scales are used to measure the same factor. In these cases, standardised mean differences will be used instead. Pooled relative risks will be calculated for dichotomous outcomes (using the Mantel–Haenszel method) reporting numbers of people having an event. Absolute risks will be presented where possible. Fixed- and random-effects models (der Simonian and Laird) will be fitted for all comparators, with the presented analysis dependent on the degree of heterogeneity in the assembled evidence. Fixed-effects models will be deemed to be inappropriate if one or both of the following conditions is met: • Significant between study heterogeneity in methodology, population, intervention or comparator was identified by the reviewer in advance of data analysis. • The presence of significant statistical heterogeneity in the meta-analysis, defined as $I^2 \geq 50\%$.

		In any meta-analyses where some (but not all) of the data comes from studies at high risk of bias, a sensitivity analysis will be conducted, excluding those studies from the analysis. Results from both the full and restricted meta-analyses will be reported. Similarly, in any meta-analyses where some (but not all) of the data comes from indirect studies, a sensitivity analysis will be conducted, excluding those studies from the analysis. GRADE will be used to assess the quality of the outcomes. Outcomes using evidence from RCTs, non-randomised trials and cohort studies will be rated as high quality initially and downgraded from this point. Controlled before and after studies and interrupted time series will be rated as low quality initially. Reasons for upgrading the certainty of the evidence will also be considered. Where 10 or more studies are included as part of a single meta-analysis, a funnel plot will be produced to graphically assess the potential for publication bias. Meta-analyses will be carried out separately for each study type per outcome, but the similarities and differences between the results obtained from the different study types will be noted. <u>Synthesising the findings of mixed method reviews.</u> Where mixed methods studies are identified that present data in a form that cannot be extracted and analysed separately as quantitative and qualitative data (in evidence review B), the results of the studies will be reported separately for each study. Any correlations or discrepancies between the findings of the mixed methods studies and the syntheses of the quantitative and qualitative findings of the above analyses will be noted. <u>Mixed method synthesis of findings from the quantitative and qualitative reviews</u> Where appropriate, a synthesis matrix will be produced to combine results from the different individual analysis methods. Findings from one analytical approach will be compared to findings from the second approach, and outcomes paired up if they provided relevant information on the same underlying topic. The agreement between the findings of the two approaches will be qualitatively assessed, with each paired set of findings put into one of the three categories relating to the strength of the identified correlation. The results may be presented as a concept diagram with quantitative findings mapped onto the qualitative ones if this is thought to be informative.

17.	Analysis of sub-groups	Results will be separated into the following for analysis:
		
		• Age/time when vaccine is due:
		  o During pregnancy
		  o 0-5 years
		  o 11 to 18 years
		  o 65 years and older
		
		• Population groups with potential equality issues:
		  o Children excluded from mainstream education (including pupil referral units) and non-attenders.
		  o Care home residents or people in long-term care
		  o Looked after children
		  o Religious groups or groups with special beliefs (e.g. anthroposophical views)
		  o Travellers/ gypsies
		  o Migrants and asylum seekers
		
		• Settings:
		  o care homes (covered above for residents)
		  o hospitals
		  o community versus healthcare
		  o educational settings
		
		• Mandatory versus partially mandatory, opt-outs allowed or completely optional vaccine schedules
		
		• Numbers of doses of vaccines
		
		• Study type: RCT, non-randomised studies (NRTs, CBA, ITS)
		
		• Interventions that are part of a catch-up campaign versus interventions that are not part of a catch-up campaign
		
		• System levels:
		  o health system level (for example clinical commissioning group [CCG], local authority, regional and national level)
		  o service provider level (for example GP practices, practitioners)
		  o individual level (for example patients or service users including carers)
		  o mixed levels
		
		• For interventions that use information/ education to increase uptake the results will also be presented for generic versus tailored interventions.

		☐ Intervention

18.	Type and method of review	☐ Diagnostic ☐ Prognostic ☐ Qualitative ☐ Epidemiologic ☐ Service Delivery ☒ Mixed method		
19.	Language	English		
20.	Country	England		
21.	Anticipated or actual start date	January 2020		
22.	Anticipated completion date	October 2021		
23.	Stage of review at time of this submission	**Review stage**	**Started**	**Completed**
		Preliminary searches	☐	☐
		Piloting of the study selection process	☐	☐
		Formal screening of search results against eligibility criteria	☑	☐
		Data extraction	☐	☐
		Risk of bias (quality) assessment	☐	☐
		Data analysis	☐	☐

24.	Named contact	**5a. Named contact** Guideline Updates Team **5b Named contact e-mail** VaccineUptake@nice.org.uk **5e Organisational affiliation of the review** National Institute for Health and Care Excellence (NICE)
25.	Review team members	From the Guideline Updates Team: • Marie Harrisingh • Toby Mercer • Stephen Sharp • Hannah Lomax • Joshua Pink • Elizabeth Barrett
26.	Funding sources/sponsor	This systematic review is being completed by the Guideline Updates Team which receives funding from NICE.
27.	Conflicts of interest	All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a member's declaration of interests will be recorded in the minutes of the meeting. Declarations of interests will be published with the final guideline.
28.	Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website: https://www.nice.org.uk/guidance/indevelopment/gid-ng10139
29.	Other registration details	None
30.	Reference/URL for published protocol	None

31.	Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as: • notifying registered stakeholders of publication • publicising the guideline through NICE's newsletter and alerts • issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels, and publicising the guideline within NICE.
32.	Keywords	Vaccine uptake, NHS routine vaccination schedule, interventions and barriers and facilitators.
33.	Details of existing review of same topic by same authors	None
34.	Current review status	☒ Ongoing ☐ Completed but not published ☐ Completed and published ☐ Completed, published and being updated ☐ Discontinued
35..	Additional information	None
36.	Details of final publication	www.nice.org.uk

Appendix B – Literature search strategies

Systematic review search

An initial search to find systematic reviews identifying interventions to improve uptake of routine vaccinations was run on 23rd and 24th March 2020 and re run on 5th and 6th May 2021. The following databases were searched: Medline, Medline in Process, Medline epubs ahead of print, Embase, Emcare and Psycinfo (all via the Ovid platform), Cochrane Database of Systematic Reviews (via the Wiley platform), Database of Abstracts of Reviews of Effects (DARE, via the Centre for Reviews and Dissemination platform), Applied Social Sciences Index and Abstracts (ASSIA), British Nursing Index, Sociological Abstracts and Educational Resources Information Center (ERIC, all via the Proquest platform). The Medline strategy is shown below. health-evidence.ca study design filters were applied where appropriate. The search was limited to studies published after 1990 in the English language.

1 exp Vaccination/
2 exp vaccines/
3 exp Immunization programs/
4 vaccin*.tw.
5 exp Immunization/
6 (immunis* or immuniz*).tw.
7 (immunologic* adj4 (sensitiz* or sensitis* or stimulation*)).tw.
8 (immunostimul* or variolation*).tw.
9 or/1-8
10 (uptake or ((increas* or improv* or rais* or higher) adj8 (rate* or immuni* or vaccin* or complian*))).tw.
11 9 and 10
12 (MEDLINE or pubmed).tw.
13 systematic review.tw.
14 systematic review.pt.
15 meta-analysis.pt.
16 intervention$.ti.
17 or/12-16
18 11 and 17
19 animals/ not humans/
20 18 not 19
21 limit 20 to english language
22 limit 21 to ed=19900101-20200323

Common terms for primary studies searches

Focussed searches were run to identify evidence on themed groups of interventions between June 2020 and February 2021 to supplement systematic reviews retrieved by the overarching systematic review search. These were rerun in April 2021.

The Medline version of the population terms used in all searches is shown below.

1 Diphtheria/
2 diphtheria*.tw.
3 Tetanus/
4 (tetanus or tetani).tw.
5 Whooping Cough/

6 (pertuss* or "whooping cough").tw.
7 Haemophilus influenzae type b/
8 ("Haemophilus influenza* type b" or "Hemophilus influenza* type b" or hib).tw.
9 Hepatitis B/
10 "hepatitis b".tw.
11 exp Poliomyelitis/
12 (Polio* or (infantile adj1 paralysis)).tw.
13 exp Pneumococcal Infections/
14 (Pneumococcal adj4 (disease* or infection*)).tw.
15 (streptococcus pneumoniae adj4 Infection*).tw.
16 exp Meningococcal Infections/
17 (Meningococcal adj4 (disease* or infection*)).tw.
18 Rotavirus Infections/ or Rotavirus/
19 rotavirus.tw.
20 Measles/
21 (measles or rubeola or mmr).tw.
22 Mumps/
23 (mumps or (epidemic adj2 (parotitides or parotitis))).tw.
24 Rubella/ or Rubella virus/
25 (rubella or ((german or "three day") adj2 measle*)).tw.
26 human papillomavirus 16/ or human papillomavirus 18/ or exp papillomavirus Infections/ or exp human papillomavirus 11/
27 (hpv or papillomavirus).tw.
28 Condylomata Acuminata/
29 (condyloma* adj1 acuminat*).tw.
30 ((genital or veneral) adj2 wart*).tw.
31 exp Herpes Zoster/
32 (shingles or herpes zoster or zona).tw.
33 or/1-32
34 exp Vaccination/
35 Vaccines/ or exp bacterial vaccines/ or cancer vaccines/ or exp toxoids/ or exp viral vaccines/
36 exp Immunization programs/
37 vaccin*.tw.
38 exp Immunization/
39 (immunis* or immuniz*).tw.
40 (immunologic* adj4 (sensitiz* or sensitis* or stimulation*)).tw.
41 (immunostimul* or variolation*).tw.
42 or/34-41
43 33 and 42
44 exp Diphtheria toxoid/ or exp tetanus toxoid/ or Haemophilus Vaccines/ or meningococcal Vaccines/ or exp Pertussis Vaccine/ or exp Streptococcal vaccines/ or exp Vaccines Combined/ or exp Measles vaccine/ or exp Mumps Vaccine/ or exp papillomavirus vaccines/ or exp Poliovirus Vaccines/ or Rotavirus Vaccines/ or exp Rubella Vaccine/ or Hepatitis B vaccines/ or Herpes Zoster Vaccine/ (65237)
45 43 or 44

A NICE in house geographic filter to limit studies to OECD countries was applied where appropriate. The Medline version is shown below

1. afghanistan/ or exp africa/ or albania/ or andorra/ or antarctic regions/ or argentina/ or exp asia, central/ or exp asia, northern/ or exp asia, southeastern/ or exp atlantic islands/ or bahrain/ or bangladesh/ or Bhutan/ or bolivia/ or borneo/ or "bosnia and herzegovina"/ or brazil/ or bulgaria/ or exp central america/ or exp china/ or "commonwealth of independent states"/ or croatia/ or "democratic people's republic of korea"/ or ecuador/ or gibraltar/ or guyana/ or exp india/ or indonesia/ or iran/ or iraq/ or jordan/ or kosovo/ or kuwait/ or

lebanon/ or liechtenstein/ or macau/ or "macedonia (republic)"/ or exp melanesia/ or moldova/ or monaco/ or mongolia/ or montenegro/ or nepal/ or netherlands antilles/ or new guinea/ or oman/ or pakistan/ or paraguay/ or peru/ or philippines/ or qatar/ or "republic of belarus"/ or romania/ or exp russia/ or saudi arabia/ or serbia/ or sri lanka/ or suriname/ or syria/ or taiwan/ or exp transcaucasia/ or ukraine/ or uruguay/ or united arab emirates/ or exp ussr/ or venezuela/ or yemen/
2. "organisation for economic co-operation and development"/
3. australasia/ or exp australia/ or austria/ or exp baltic states/ or belgium/ or exp canada/ or chile/ or czech republic/ or colombia/ or europe/ or exp france/ or exp germany/ or greece/ or hungary/ or ireland/ or israel/ or exp italy/ or exp japan/ or korea/ or luxembourg/ or mexico/ or netherlands/ or new zealand/ or north america/ or poland/ or portugal/ or exp "republic of korea"/ or exp "scandinavian and nordic countries"/ or slovakia/ or slovenia/ or spain/ or switzerland/ or turkey/ or exp united kingdom/ or exp united states/
4. european union/
5. developed countries/
6. or/2-5
7. 1 not 6

The following study designs were applied where appropriate. Medline versions are shown below.

Randomised controlled trials

McMaster balanced filter

1. randomized controlled trial.pt.
2. randomi?ed.mp.
3. placebo.mp.
4. or/1-3

Systematic reviews

health-evidence.ca filter

1. (MEDLINE or pubmed).tw.
2. systematic review.tw.
3. systematic review.pt.
4. meta-analysis.pt.
5. intervention$.ti.
6. or/1-5

Observational studies

Adapted from the NICE in house filter

1. Observational Studies as Topic/
2. Observational Study/
3. Epidemiologic Studies/
4. exp Cohort Studies/
5. Controlled Before-After Studies/
6. Interrupted Time Series Analysis/
7. Comparative Study.pt.
8. (cohort adj (study or studies)).tw.
9. cohort analy$.tw.
10. (follow up adj (study or studies)).tw.

11. (observational adj (study or studies)).tw.
12. longitudinal.tw.
13. prospective.tw.
14. retrospective.tw.
15. or/1-14

Searches were limited to studies published after 1990 in the English language.

Reminder Interventions search

Searches were run on various dates between 26th June and 28th July 2020 and re run on 9th April 2021 in the following databases: Medline, Medline in Process, Medline epubs ahead of print, Embase, Emcare and Psycinfo (all via the Ovid platform), CENTRAL and the Cochrane Database of Systematic Reviews (via the Wiley platform), Database of Abstracts of Reviews of Effects (DARE, via the Centre for Reviews and Dissemination platform), Applied Social Sciences Index and Abstracts (ASSIA), British Nursing Index, and Sociological Abstracts (all via the Proquest platform). The Medline version of the intervention terms are shown below. Population terms, the OECD geographic filter, RCT, systematic review and observational study design filters as described above were used.

1. Reminder Systems/
2. (recall or remind* or prompt* or nudge).tw.
3. (electronic* adj4 invit*).tw.
4. Mobile Applications/
5. exp Internet/
6. exp Cell Phone/
7. exp Computers, Handheld/
8. (app or apps).ti,ab.
9. (online or web or internet or digital*).ti.
10. ((online or web or internet or digital*) adj3 (based or application* or intervention* or program* or therap*)).ab.
11. (phone* or telephone* or smartphone* or cellphone* or smartwatch*).ti.
12. ((phone* or telephone* or smartphone* or cellphone* or smartwatch*) adj3 (based or application* or intervention* or program* or therap*)).ab. (8053)
13. (mobile health or mhealth or m-health or ehealth or e-health or emental or e-mental).ti.
14. ((mobile health or mhealth or m-health or ehealth or e-health or emental or e-mental) adj3 (based or application* or intervention* or program* or therap*)).ab.
15. (mobile* adj3 (based or application* or intervention* or device* or technolog*)).ti,ab.
16. text messaging/
17. (text messag* or sms or short messag* service).tw.
18. electronic mail/
19. (email* or e-mail* or e mail* or electronic mail).tw.
20. Correspondence as Topic/
21. (letter* or correspondence or mail).tw.
22. (iphone* or mobile phone*).tw.
23. pamphlets/
24. (pamphlet* or leaflet* or brochure*).tw.
25. Posters as Topic/
26. poster*.tw.
27. (postcard* or post-card*).tw.
28. or/1-27

Access interventions search

Searches were run between 11 and 17th June 2020 and re run on 9th April 2021 in the following databases: Medline, Medline in Process, Medline epubs ahead of print, Embase, Emcare and Psycinfo (all via the Ovid platform), CENTRAL and the Cochrane Database of Systematic Reviews (via the Wiley platform), Database of Abstracts of Reviews of Effects (DARE, via the Centre for Reviews and Dissemination platform), Applied Social Sciences Index and Abstracts (ASSIA), British Nursing Index, and Sociological Abstracts (all via the Proquest platform). The Medline version of the intervention terms are shown below. Population terms, the OECD geographic filter, RCT, systematic review and observational study design filters as described above were used.

1. exp Health Services Accessibility/
2. (access* or available or availability or convenien* or opportuni*).tw.
3. ((out or extended) adj2 hour*).tw.
4. (drop adj2 in).tw.
5. Community health centers/
6. ((community or public or civic or communal or municipal) adj4 (setting* or venue* or locat* or building* or facilit* or clinic* or hall* or centre* or center* or space*)).tw.
7. Pharmacies/
8. ((community or retail) adj4 pharmac*).tw.
9. Prenatal Care/ or Perinatal care/ or Maternal Child Health centers/
10. ((prenatal or antenatal or pregnan*) adj4 (care or service* or clinic*)).tw.
11. ((drug or alcohol or specialist or dedicated or "substance abuse") adj4 (service* or clinic* or care)).tw.
12. exp Community Mental Health Services/ or Substance Abuse Treatment Centers/
13. Libraries/
14. (library or libraries).tw.
15. ((child or children* or leisure or resource or day) adj4 (centre* or center*)).tw.
16. schools/ or schools, nursery/
17. (school* or nursery or nurseries or kindergarten* or "pre school*" or "play group*").tw.
18. (walk adj1 in adj4 (centre* or center* or clinic* or service*)).tw.
19. ((extend* or weekend or early or evening or commuter) adj4 (clinic* or service* or appointment* or session*)).tw.
20. ("24 hour* " or "twenty four hour*" or "all day" or "seven day" or "7 day").tw.
21. exp Home Care Services/
22. adult day care centers/ or exp child day care centers/ or Senior Centers/
23. ((home or domiciliary or day) adj4 (care or visit*)).tw.
24. Self-Help Groups/
25. ((support or self-help) adj4 (group* or meeting*)).tw.
26. Homes for the Aged/
27. exp Nursing Homes/
28. ((residential or nursing or care) adj4 home*).tw.
29. exp Education, Special/
30. (special adj4 (education or school*)).tw.
31. Inpatients/
32. inpatient*.tw.
33. Prisons/ or Prisoners/
34. (prison* or jail).tw.
35. (young adj4 (Offender* or detention)).tw.
36. (youth adj4 (detention or custody)).tw.
37. (juvenile adj4 (offender* or hall or detention)).tw.
38. (HMYOI* or YOI* or STC* or "secure training centre*").tw.
39. ((secure or correction* or detention) adj4 (accommodation or care or home or centre* or center* or facilit*)).tw.

40. exp "Emigrants and Immigrants"/
41. ((immigration or immigrant*) adj4 (removal or detention or detain* or accomodat* or hous* or home* or rent*)).tw.
42. 87 Mobile Health Units/
43. 88 ((mobile or outreach) adj4 (clinic* or unit* or service*)).tw.
44. 89 ("making every contact count" or MECC).tw.
45. 90 or/1-45

Education interventions search

Searches were run on 29th October 2020 and re run on 9th April 2021 in the following databases: Medline, Medline in Process, Medline epubs ahead of print, Embase, Emcare and Psycinfo (all via the Ovid platform), CENTRAL and the Cochrane Database of Systematic Reviews (via the Wiley platform), Database of Abstracts of Reviews of Effects (DARE, via the Centre for Reviews and Dissemination platform), Applied Social Sciences Index and Abstracts (ASSIA), British Nursing Index, Sociological Abstracts and ERIC (Educational Resources Information Center) (all via the Proquest platform). The Medline version of the intervention terms are shown below. Population terms, the OECD geographic filter and RCT study design filter as described above were used.

1. exp Communication/
2. ((Vaccin* or immuni*) adj4 (Communic* or messag* or listen* or negotiat* or persua* or dialogu* or conversation* or question* or discuss*)).tw.
3. ((universal or population or national* or public health or nationwide* or statewide* or countrywide* or citywide* or national* or nation wide* or state wide* or country wide* or city wide* or government*) adj4 (promotion* or campaign* or intervention* or toolkit* or strateg*)).tw.
4. (rais* adj2 awareness adj4 (promotion* or campaign* or intervention* or toolkit* or strateg*)).tw.
5. exp Consumer Health Information/
6. Social Media/
7. electronic mail/
8. Mobile Applications/
9. exp Internet/
10. exp Cell Phone/
11. exp Computers, Handheld/
12. Medical Informatics Applications/
13. Therapy, Computer-Assisted/
14. (app or apps).ti,ab.
15. (online or web or internet or digital*).ti.
16. ((online or web or internet or digital*) adj3 (based or application* or intervention* or program* or therap*)).ab.
17. (phone* or telephone* or smartphone* or cellphone* or smartwatch* or tablet*).ti.
18. ((phone* or telephone* or smartphone* or cellphone* or smartwatch or tablet*) adj3 (based or application* or intervention* or program* or therap*)).ab.
19. (mobile health or mhealth or m-health or ehealth or e-health or emental or e-mental).ti.
20. ((mobile health or mhealth or m-health or ehealth or e-health or emental or e-mental) adj3 (based or application* or intervention* or program* or therap*)).ab.
21. (mobile* adj3 (based or application* or intervention* or device* or technolog*)).ti,ab.
22. (twitter or tweet* or blog* or pinterest or instagram or facebook or snapchat).tw.
23. ((text or multimedia) adj messag*).tw.
24. (sms or whatsapp* or email* or "e-mail*" or "electronic mail*" or "e mail*").tw.
25. exp Mass Media/

26. (media or radio* or television* or tv* or broadcast* or podcast* or newspaper* or magazine* or display* or presentation*).tw.
27. Correspondence as Topic/
28. (correspond* or letter* or mail).tw.
29. Pamphlets/
30. (leaflet* or pamphlet* or booklet* or flyer* or brochure* or handout* or newsletter* or factsheet* or postcard* or banner* or bulletin*).tw.
31. ((print* or written*) adj4 (media or material*)).tw.
32. Health Promotion/
33. ((health or media) adj4 (campaign* or promot*)).tw.
34. Health Knowledge, Attitudes, Practice/
35. Advertising/
36. advert*.tw.
37. Posters as Topic/
38. poster*.tw.
39. Government Publications as Topic/
40. exp Education/
41. ((vaccin* or immuni*) adj4 (educ* or teach* or instruct* or learn* or "e-learn*" or " e learn*" or coach* or train* or aware* or inform*)).tw.
42. ((train* or development*) adj4 (inservice or staff or professional)).tw.
43. exp Interpersonal Relations/
44. Hospital Patient Relations/
45. Community Institutional Relations/
46. Community Networks/
47. ((communit* or social) adj4 network*).tw.
48. peer influence/
49. ((peer* or family or families or friend* or professional* or GP* or doctor* or physician* or nurse* or "health visitor*" or midwife or midwives or "social worker*" or leader* or community or communities or teacher* or faith) adj4 (influence* or pressure* or recommend* or advice or advise* or led or support* or educ* or advocat*)).tw.
50. Mentors/
51. (mentor* or "role model*").tw.
52. hotlines/
53. (champion* or hotline*).tw.
54. House calls/
55. ((house or home) adj4 (call* or visit*)).tw.
56. Self-Help Groups/
57. (group* adj2 (support* or self-help*)).tw.
58. exp Treatment Refusal/
59. Choice Behavior/
60. (decision* adj4 (making or support or aid*)).tw.
61. exp Informed Consent/
62. (informed adj4 (consent or choice* or decision*)).tw.
63. ((vaccin* or immuni*) adj4 (hesitan* or refus* or trust* or distrust* or accept* or confiden* or reject* or doubt* or decline*)).tw.

Infrastructure Interventions search

Searches were run on 28th September 2020 and re run on 9th April 2021 in the following databases: Medline, Medline in Process, Medline epubs ahead of print, Embase, Emcare ,Psycinfo and HMIC (Health Management and Policy Database) (all via the Ovid platform), CENTRAL and the Cochrane Database of Systematic Reviews (via the Wiley platform), Database of Abstracts of Reviews of Effects (DARE, via the Centre for Reviews and Dissemination platform), Applied Social Sciences Index and Abstracts (ASSIA), British Nursing Index, and Sociological Abstracts (all via the Proquest platform). The Medline

version of the intervention terms are shown below. Population terms, the OECD geographic filter and RCT study design filter as described above were used.

1. "Appointments and Schedules"/
2. (appointment* or schedul* or book* or rebook* or follow-up or follow up).tw.
3. "Organization and Administration"/
4. Health Planning/
5. "Delivery of Health Care"/og or "Delivery of Health Care"/st
6. Organizational Objectives/
7. Community Health Services/og or Community Health Services/st
8. ((service* or system* or team* or practice* or provider*) adj4 (administ* or organis* or organiz* or coordin* or co ordin* or co-ordin* or logistic* or plan* or structur*)).tw.
9. Statistics as Topic/
10. Data Collection/ or Datasets as Topic/ or Data Analysis/ or Data interpretation, Statistical/ or Data Management/ or Electronic Data Processing/
11. exp Clinical Audit/
12. Feedback/
13. (data* or audit* or statistic* or feedback or intelligence or dashboard* or analytics or analysis).tw.
14. Quality Indicators, Health Care/
15. Quality Improvement/og or Quality Improvement/st
16. Quality Assurance, Healthcare/og or Quality Assurance, Healthcare/st
17. (qof* or (quality adj4 (indicator* or outcome* or framework*))).tw.
18. "Facility Design and Construction"/
19. Built Environment/
20. Architecture/
21. ((building* or facilit* or premises or office* or room* or surger* or environment* or clinic or clinics or setting*) adj4 (design* or construct* or layout* or configur*)).tw.
22. "Treatment Adherence and Compliance"/ or Patient Compliance/
23. Motivation/
24. (incentive* or disincentive* or motivat*).tw.
25. Punishment/
26. (punish* or fine* or penal* or sanction* or deter* or discourage*).tw.
27. Reward/
28. (reward* or encourage* or attract* or reimburse* or pay or payment).tw.
29. Reimbursement, Incentive/ or Physician Incentive Plans/
30. Mandatory Programs/
31. (mandat* or compulsory or obligat*).tw.
32. infrastructure*.tw.

Acceptability Interventions search

Searches were run on 4th and 5th February 2021 and re run on 12th April 2021 in the following databases: Medline, Medline in Process, Medline epubs ahead of print, Embase, Emcare and Psycinfo (all via the Ovid platform), CENTRAL and the Cochrane Database of Systematic Reviews (via the Wiley platform), Database of Abstracts of Reviews of Effects (DARE, via the Centre for Reviews and Dissemination platform), Applied Social Sciences Index and Abstracts (ASSIA), British Nursing Index, and Sociological Abstracts (all via the Proquest platform). The Medline version of the intervention terms are shown below. Population terms, the OECD geographic filter, RCT, systematic review and observational study design filters as described above were used

1. acceptab*.kw.
2. exp "Patient Acceptance of Health Care"/

3. exp Patient Satisfaction/
4. Choice Behavior/
5. (accept* or prefer* or option* or choice* or choose* or chose* or satisf* or tolera*).tw.
6. or/1-5
7. exp Drug Administration Routes/
8. ((subcutaneous* or cutaneous* or intravenous* or inhal* or nasal* or intranasal* or intramuscular* or topical* or oral* or infus* or intradermal*) adj4 (administ* or route* or appli* or dispens* or deliver* or method*)).tw.
9. (inject* or shot* or jab* or patch* or liquid* or drop* or spray* or needle* or syringe*).tw.
10. (dose* or dosage or formulation*).tw.
11. or/7-10
12. exp Physicians/
13. (doctor* or gp* or "general practitioner*" or physician*).tw.
14. exp Nurses/
15. (nurse* or midwife or midwives).tw.
16. Nursing Assistants/
17. ((nurse or nursing) adj2 (aide* or assistant*)).tw.
18. ((healthcare or "health care") adj2 assistant*).tw.
19. hca*.tw.
20. Pharmacists/ or Pharmacy Technicians/
21. (pharmacist* or (pharmacy adj2 technician*)).tw.
22. or/12-21
23. 11 or 22
24. (uptake or ((increas* or improv* or rais* or higher) adj8 (rate* or immuni* or vaccin* or complian*))).tw.
25. 23 and 24
26. 6 or 25

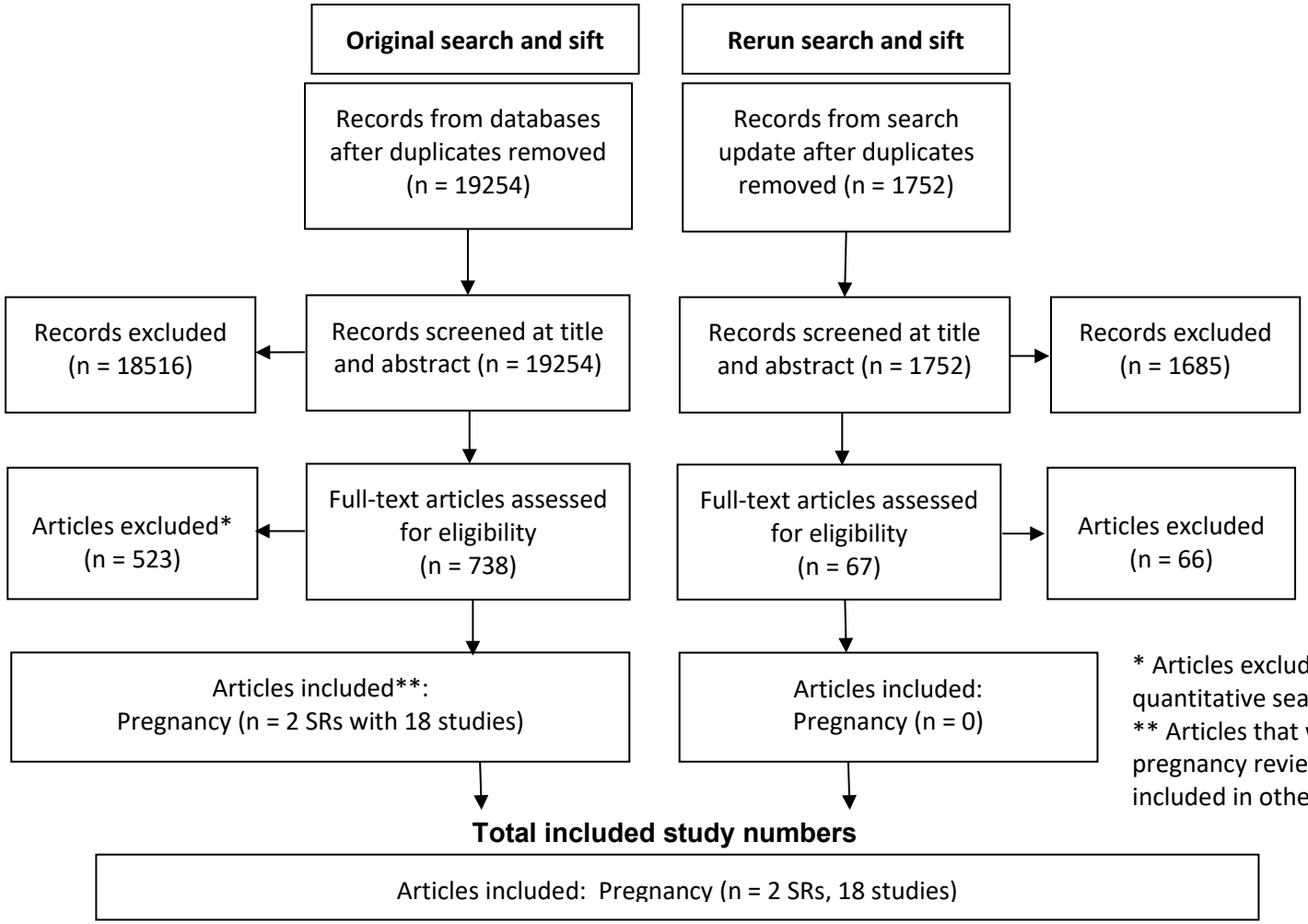
A single search to identify economic evidence for all review questions was run on 12th February 2020.The following databases were searched: Medline, Medline in Process, Embase, Econlit (all via the Ovid platform) NHS Economic Evaluation Database (NHS EED) and the Health Technology Assessment Database (HTA) (via the CRD platform). The searches were re run on 13th April 2021 with the HTA database replaced by the International Health Technology Database (INAHTA). The Medline strategy is presented below

1 Diphtheria/
2 diphtheria*.tw.
3 Tetanus/
4 (tetanus or tetani).tw.
5 Whooping Cough/
6 (pertuss* or "whooping cough").tw.
7 Haemophilus influenzae type b/
8 ("Haemophilus influenza* type b" or "Hemophilus influenza* type b" or hib).tw.
9 Hepatitis B/
10 "hepatitis b".tw.
11 exp Poliomyelitis/
12 (Polio* or (infantile adj1 paralysis)).tw.
13 exp Pneumococcal Infections/
14 (Pneumococcal adj4 (disease* or infection*)).tw.
15 (streptococcus pneumoniae adj4 Infection*).tw. (
16 exp Meningococcal Infections/
17 (Meningococcal adj4 (disease* or infection*)).tw.

18 Rotavirus Infections/ or Rotavirus/
19 rotavirus.tw.
20 Measles/
21 (measles or rubeola or mmr).tw.
22 Mumps/
23 (mumps or (epidemic adj2 (parotitides or parotitis))).tw.
24 Rubella/ or Rubella virus/
25 (rubella or ((german or "three day") adj2 measle*)).tw.
26 human papillomavirus 16/ or human papillomavirus 18/ or exp papillomavirus Infections/ or exp human papillomavirus 11/
27 (hpv or papillomavirus).tw.
28 Condylomata Acuminata/
29 (condyloma* adj1 acuminat*).tw.
30 ((genital or veneral) adj2 wart*).tw.
31 exp Herpes Zoster/
32 (shingles or herpes zoster or zona).tw.
33 or/1-32
34 exp Vaccination/
35 Vaccines/ or exp bacterial vaccines/ or cancer vaccines/ or exp toxoids/ or exp vaccines combined/ or exp viral vaccines/
36 exp Immunization programs/
37 vaccin*.tw.
38 exp Immunization/
39 (immunis* or immuniz*).tw.
40 (immunologic* adj4 (sensitiz* or sensitis* or stimulation*)).tw.
41 (immunostimul* or variolation*).tw.
42 or/34-41
43 33 and 42
44 exp Diphtheria toxoid/ or exp tetanus toxoid/ or Haemophilus Vaccines/ or meningococcal Vaccines/ or exp Pertussis Vaccine/ or exp Streptococcal vaccines/ or exp Vaccines Combined/ or exp Measles vaccine/ or exp Mumps Vaccine/ or exp papillomavirus vaccines/ or exp Poliovirus Vaccines/ or Rotavirus Vaccines/ or exp Rubella Vaccine/ or Hepatitis B vaccines/ or Herpes Zoster Vaccine/
45 43 or 44
46 animals/ not humans/
47 45 not 46
48 limit 47 to english language/
49 limit 48 to ed=19900101-20200212
50 afghanistan/ or exp africa/ or albania/ or andorra/ or antarctic regions/ or argentina/ or exp asia, central/ or exp asia, northern/ or exp asia, southeastern/ or exp atlantic islands/ or bahrain/ or bangladesh/ or Bhutan/ or bolivia/ or borneo/ or "bosnia and Herzegovina"/ or brazil/ or bulgaria/ or exp central america/ or exp china/ or colombia/ or "Commonwealth of Independent States"/ or croatia/ or "Democratic People's Republic of Korea"/ or ecuador/ or gibraltar/ or guyana/ or exp india/ or indonesia/ or iran/ or iraq/ or jordan/ or kosovo/ or kuwait/ or lebanon/ or liechtenstein/ or macau/ or "macedonia (republic)"/ or exp melanesia/ or moldova/ or monaco/ or mongolia/ or montenegro/ or nepal/ or Netherlands Antilles/ or New Guinea/ or oman/ or pakistan/ or paraguay/ or peru/ or philippines/ or qatar/ or "republic of Belarus"/ or romania/ or exp russia/ or saudi arabia/ or serbia/ or sri lanka/ or suriname/ or syria/ or taiwan/ or exp transcaucasia/ or ukraine/ or uruguay/ or united arab emirates/ or exp ussr/ or venezuela/ or yemen/ (1062747)
51 australasia/ or exp australia/ or austria/ or exp Baltic States/ or belgium/ or exp canada/ or chile/ or czech republic/ or europe/ or European Union/ or exp france/ or exp germany/ or greece/ or hungary/ or ireland/ or Israel/ or exp italy/ or exp japan/ or korea/ or luxembourg/ or mexico/ or netherlands/ or new zealand/ or north america/ or poland/ or portugal/ or exp "republic of korea"/ or exp "Scandinavian and Nordic Countries"/ or slovakia/ or slovenia/ or

spain/ or switzerland/ or turkey/ or exp united kingdom/ or exp united states/ or "Organisation for Economic Co-Operation and Development"/ or Developed Countries/
52 50 not (50 and 51)
53 49 not 52 (53810)
54 Cost-Benefit Analysis/
55 Quality-Adjusted Life Years/
56 Markov Chains/
57 exp Models, Economic/
58 cost*.ti.
59 (cost* adj2 utilit*).tw.
60 (cost* adj2 (effective* or assess* or evaluat* or analys* or model* or benefit* or threshold* or quality or expens* or saving* or reduc*)).tw.
61 (economic* adj2 (evaluat* or assess* or analys* or model* or outcome* or benefit* or threshold* or expens* or saving* or reduc*)).tw.
62 (qualit* adj2 adjust* adj2 life*).tw.
63 QALY*.tw.
64 (incremental* adj2 cost*).tw.
65 ICER.tw.
66 utilities.tw.
67 markov*.tw.
68 (dollar* or USD or cents or pound or pounds or GBP or sterling* or pence or euro or euros or yen or JPY).tw.
69 ((utility or effective*) adj2 analys*).tw.
70 (willing* adj2 pay*).tw.
71 (EQ5D* or EQ-5D*).tw.
72 ((euroqol or euro-qol or euroquol or euro-quol or eurocol or euro-col) adj3 ("5" or five)).tw.
73 (european* adj2 quality adj3 ("5" or five)).tw.
74 or/54-73
75 53 and 74

Appendix C – Effectiveness evidence study selection



* Articles excluded as part of the combined quantitative search for all reviews
** Articles that were included specifically for the pregnancy review. The rest of the 215 articles were included in other reviews.

Appendix D – Effectiveness evidence tables

Systematic reviews

Bisset, 2018

Bibliographic Reference	Bisset, Kate Alexandra; Paterson, Pauline; Strategies for increasing uptake of vaccination in pregnancy in high-income countries: A systematic review.; Vaccine; 2018; vol. 36 (no. 20); 2751-2759

Study Characteristics

Study design	Systematic review
Study details	Dates searched: All dates - there was no date limit. The date of the search was 4 August 2017. Databases searched: Medline, Embase, PsychInfo, PubMed, CINAHL and Web of Science. Sources of funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
Inclusion criteria	Location: High-income countries (as defined by the World Bank). Pregnant women Vaccines: Pertussis and seasonal influenza. Specific outcome measure(s): Vaccination status (received vaccine during pregnancy or not), which could be self-reported, confirmed by clinical staff or taken from medical records. Types of studies: All types of studies were included.
Exclusion criteria	Studies that did not report relevant data: Papers relating to vaccine safety, efficacy or economic analysis, cocooning (post-natal vaccination), pandemic flu vaccination, or intention to vaccinate as the outcome measurement. Non-peer reviewed articles: Such as editorials, conference abstracts and letters.
Number of studies included in the systematic review	22
Studies from the systematic review that are relevant for use in the current review	Frew 2016 Goodman 2015 Jordan 2015 Klatt 2012 Kriss 2017 McCarthy 2012 McCarthy 2015 Meharry 2014 Moniz 2013 Mouzoon 2010 Ogburn 2007 Panda 2011 Payakachat 2016

	Pierson 2015 Sherman 2014 Stockwell 2014
Studies from the systematic review that are not relevant for use in the current review	Baxter 2013, Dexter 2012 and Healy 2015 were not included in this review because the number of participants in each arm was not provided. Therefore, the data was not in an extractable format. Dexter 2012 mentions supplementary tables, but they are not provided on the journal's website. Morgan 2015 was not included because the control cohort was usual care vaccinations during the post-partum period (they were no longer pregnant women and therefore not relevant to this review). Wong 2016 was not included because the study was not carried out in an OECD country. Hong Kong was transferred from the UK to China in 1997 and Wong 2016 took place between 2013 to 2015. Yudin 2010 was not included because it was a single arm study that had no comparison arm.

Section	Question	Answer
Study eligibility criteria	Concerns regarding specification of study eligibility criteria	Low
Identification and selection of studies	Concerns regarding methods used to identify and/or select studies	Low
Data collection and study appraisal	Concerns regarding methods used to collect data and appraise studies	Low
Synthesis and findings	Concerns regarding the synthesis and findings	Low
Overall study ratings	Overall risk of bias	Low
	Applicability as a source of data	Fully applicable

Mohammed, 2019

Bibliographic Reference	Mohammed, Hassen; McMillan, Mark; Roberts, Claire T; Marshall, Helen S; A systematic review of interventions to improve uptake of pertussis vaccination in pregnancy.; PloS one; 2019; vol. 14 (no. 3); e0214538

Study Characteristics

Study design	Systematic review
Study details	Dates searched: All dates - there was no date limit. Last date was January 2019. Databases searched: PubMed, PMC, Medline, Cochrane Library, CINAHL and ClinicalTrials.gov. Other sources include conference proceedings: World Society for Paediatric Infectious Diseases (WSPID) and European Society for Paediatric Infectious Diseases (ESPID). Sources of funding: No specific funding was received for this work.
Inclusion criteria	Pregnant women

	Specific outcome measure(s): Pertussis vaccination uptake during pregnancy (Standard care vs. intervention group). Types of studies: • Studies comparing pertussis vaccine uptake among pregnant women who were exposed to an intervention versus standard care. • Observational studies. • Randomised controlled trials. • Interventions that include pertussis as a compound of the immunisation i.e. Tdap or Tdap-IPV.
Exclusion criteria	Non-English language studies
Number of studies included in the systematic review	6
Studies from the systematic review that are relevant for use in the current review	Chamberlain 2015 Kriss 2017 Mohammed 2018 Payakachat 2016
Studies from the systematic review that are not relevant for use in the current review	Healey 2015 was not included because the number of participants in each arm was not provided. Therefore, the data was not in an extractable format. Morgan 2015 was not included because the control cohort was usual care vaccinations during the post-partum period (they were no longer pregnant women and therefore not relevant to this review).

Section	Question	Answer
Study eligibility criteria	Concerns regarding specification of study eligibility criteria	Low
Identification and selection of studies	Concerns regarding methods used to identify and/or select studies	Low
Data collection and study appraisal	Concerns regarding methods used to collect data and appraise studies	Low
Synthesis and findings	Concerns regarding the synthesis and findings	Low
Overall study ratings	Overall risk of bias	Low
	Applicability as a source of data	Fully applicable

Primary studies from within the systematic reviews

The characteristics of the primary studies are detailed in the 2 systematic reviews above, but risk of bias has been assessed separately using the Cochrane Risk of Bias tools (RoB 2.0) for normal RCTs and cluster RCTs, and the Cochrane Effective Practice and Organisation of Care (EPOC) risk of bias tool for before and after studies. This ensures consistency with the other reviews that make up this guideline. The methods used to assess risk of bias are reported in the methods document (see document L).

Frew et al, 2016.

Bibliographic Reference	Frew PM; Kriss JL; Chamberlain AT; Malik F; Chung Y; Cortés M; Omer SB; A randomized trial of maternal influenza immunization decision-making: A test of persuasive messaging models.; Human vaccines & immunotherapeutics; 2016 vol. 12 (no. 8)

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Although the randomisation method was not provided, the baseline characteristics for each arm were roughly equal.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(Vaccine uptake was self-reported by participants. This could have introduced bias in favour of the interventions because more effort went into the interventions compared to the usual care control.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns with data collection.)*
	Overall Directness	Partially applicable *(Influenza vaccine data used)*

Chamberlain, 2015

Bibliographic Reference	Chamberlain, A T; Seib, K; Ault, K A; Rosenberg, E S; Frew, P M; Cortes, M; Whitney, E A S; Berkelman, R L; Orenstein, W A; Omer, S B; Improving influenza and Tdap vaccination during pregnancy: A cluster-randomized trial of a multi-component antenatal vaccine promotion package in late influenza season.; Vaccine; 2015; vol. 33 (no. 30); 3571-9

Study details

Study type	Cluster randomised controlled trial (cRCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in the Mohammed 2019 systematic review.

Section	Question	Answer
1a. Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
1b. Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomisation	Risk of bias judgement for the timing of identification and recruitment of individual participants in relation to timing of randomisation	Low *(Participants were recruited after cluster randomisation but eligibility was based on objective factors. Demographic information and beliefs about vaccines were only requested after randomisation)*
2. Bias due to deviations from intended interventions (If your aim is to assess the effect of assignment to intervention, answer the following questions).	Risk of bias judgement for deviations from intended interventions	Low
3. Bias due to missing outcome data	Risk of bias judgement for missing outcome data	Low
4. Bias in measurement of the outcome	Risk of bias judgement for measurement of the outcome	Some concerns *(The outcome was objective where the practice stocked the vaccine, but was based on patient recall where the patient had to go elsewhere for the vaccine)*
5. Bias in selection of the reported result	Risk of bias for selection of the reported result	Low

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Where the practice did not stock the vaccine, the outcome was based on patient recall)*
	Overall Directness	Directly applicable

Goodman, 2015

Bibliographic Reference	Goodman K; Mossad SB; Taksler GB; Emery J; Schramm S; Rothberg MB; Impact of Video Education on Influenza Vaccination in Pregnancy.; The Journal of reproductive medicine; 2015; vol. 60 (no. 11-12)

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

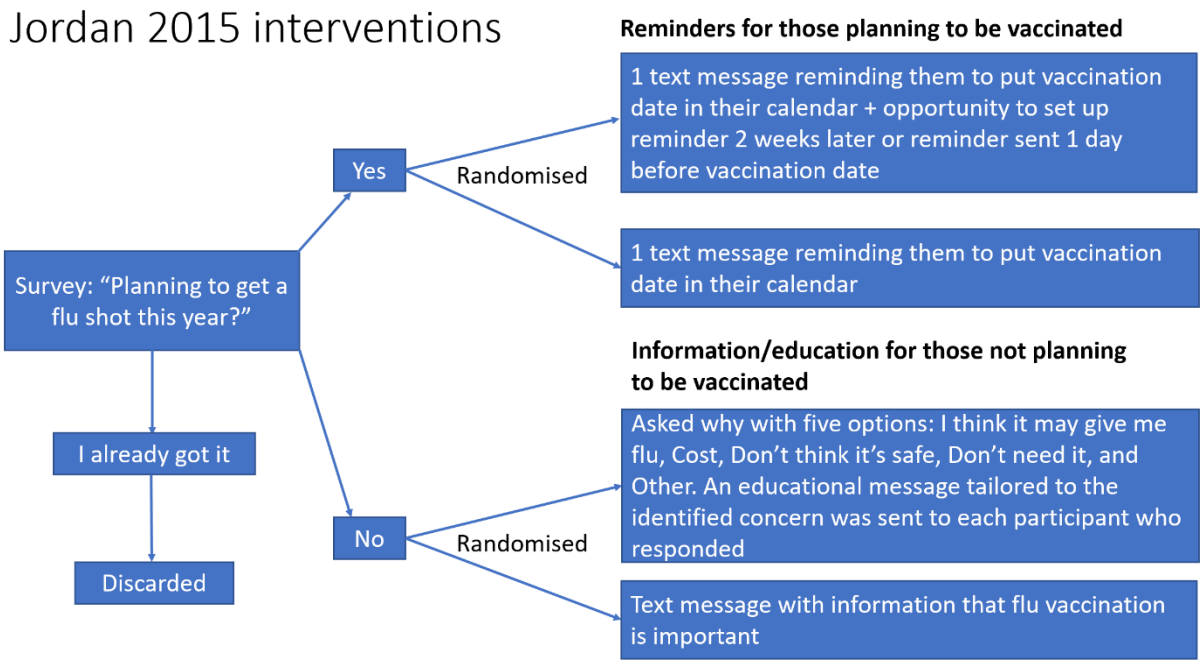
Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Although there was limited information about data collection, all data was collected using the same electronic health record system.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low
Overall bias and Directness	Risk of bias judgement	Low
	Overall Directness	Partially applicable *(Influenza vaccine data used)*

Jordan, 2015

Bibliographic Reference	Jordan ET; Bushar JA; Kendrick JS; Johnson P; Wang J; Encouraging Influenza Vaccination Among Text4baby Pregnant Women and Mothers.; American journal of preventive medicine; 2015; vol. 49 (no. 4)

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.



Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Randomisation based on phone number rather than typical randomisation methods but baseline characteristics suggested that randomisation was effective and the arms were balanced.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(Uptake was self-reported by participants. This bias is more likely to inflate uptake in the intervention arm because more effort went into this arm.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low
Overall bias and Directness	Risk of bias judgement	Some concerns *(There are concerns with randomisation and measurement of uptake.)*
	Overall Directness	Partially applicable *(Influenza vaccine data used)*

Klatt, 2012

Bibliographic Reference	Klatt TE; Hopp E; Effect of a best-practice alert on the rate of influenza vaccination of pregnant women.; Obstetrics and gynecology; 2012; vol. 119 (no. 2 Pt 1)

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No *(No allocation sequence)*
Allocation concealment	Was the allocation adequately concealed?	No *(No allocation concealment.)*
Baseline outcome measurements	Were baseline outcome measurements similar?	Unclear *(Not provided.)*
Baseline characteristics	Were baseline characteristics similar?	Unclear *(Not provided.)*
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	NA
Protection against contamination	Was the study adequately protected against contamination?	NA
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	Yes

Section	Question	Answer
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. No baseline characteristics to assess comparability.)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

Kriss, 2017

Bibliographic Reference Kriss, Jennifer L; Frew, Paula M; Cortes, Marielysse; Malik, Fauzia A; Chamberlain, Allison T; Seib, Katherine; Flowers, Lisa; Ault, Kevin A; Howards, Penelope P; Orenstein, Walter A; Omer, Saad B; Evaluation of two vaccine education interventions to improve pertussis vaccination among pregnant African American women: A randomized controlled trial.; Vaccine; 2017; vol. 35 (no. 11); 1551-1558

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in both the Bisset 2018 and Mohammed 2019 systematic reviews.

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low *(There was no blinding in this study. However, there is nothing written to suggest that the clinicians knew what arm participants had been randomised to.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(There was no blinding in this study and the investigators do not describe how data was collected.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low
Overall bias and Directness	Risk of bias judgement	Some concerns *(No blinding and no details on how uptake was measured.)*

Section	Question	Answer
	Overall Directness	Directly applicable *(Follow-up was at 1 to 2 months after birth. Therefore, some vaccinations may not have been administered during pregnancy. However, we have not downgraded because the follow-up time was reasonably timely.)*

McCarthy, 2012

Bibliographic Reference	McCarthy EA; Pollock WE; Nolan T; Hay S; McDonald S; Improving influenza vaccination coverage in pregnancy in Melbourne 2010-2011.; The Australian & New Zealand journal of obstetrics & gynaecology; 2012; vol. 52 (no. 4)

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Unclear *(Baseline characteristics for each arm were not provided. Therefore, it is difficult to assess the comparability of the arms.)*
Baseline characteristics	Were baseline characteristics similar?	Unclear *(Baseline characteristics for each arm were not provided. Therefore, it is difficult to assess the comparability of the arms.)*
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	NA
Protection against contamination	Was the study adequately protected against contamination?	NA
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes

Section	Question	Answer
Other risks of bias	Was the study free from other risks of bias?	No
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. Some concerns with lack of baseline characteristics and measurement of uptake)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

McCarthy, 2015

Bibliographic Reference	McCarthy EA; Pollock WE; Tapper L; Sommerville M; McDonald S; Increasing uptake of influenza vaccine by pregnant women post H1N1 pandemic: a longitudinal study in Melbourne, Australia, 2010 to 2014.; BMC pregnancy and childbirth; 2015; vol. 15

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Unclear *(No baseline characteristics for each arm were provided. Therefore, it was difficult to assess whether there were any significant differences between the arms.)*
Baseline characteristics	Were baseline characteristics similar?	Unclear *(No baseline characteristics for each arm were provided. Therefore, it was difficult to assess whether there were any significant differences between the arms)*
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	Yes
Protection against contamination	Was the study adequately protected against contamination?	Yes

Section	Question	Answer
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	No *(Uptake was self-reported and was collected by clinical staff for the control and by research assistants for the intervention arm. Both of these could have introduced bias in favour of the intervention arm.)*
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. Concerns with not reporting baseline characteristics and measurement of uptake.)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

Meharry, 2014

Bibliographic Reference	Meharry PM; Cusson RM; Stiller R; Vázquez M; Maternal influenza vaccination: evaluation of a patient-centered pamphlet designed to increase uptake in pregnancy.; Maternal and child health journal; 2014; vol. 18 (no. 5)

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low
Overall bias and Directness	Risk of bias judgement	Low
	Overall Directness	Partially applicable

Section	Question	Answer
		(Influenza vaccine data used)

Mohammed, 2018

Bibliographic Reference	Mohammed, Hassen; Clarke, Michelle; Koehler, Ann; Watson, Maureen; Marshall, Helen; Factors associated with uptake of influenza and pertussis vaccines among pregnant women in South Australia.; PloS one; 2018; vol. 13 (no. 6); e0197867

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Mohammed 2019 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Unclear *(There were no baseline characteristics provided to assess whether both groups were comparable.)*
Baseline characteristics	Were baseline characteristics similar?	Unclear *(There were no baseline characteristics provided to assess whether both groups were comparable.)*
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	Yes
Protection against contamination	Was the study adequately protected against contamination?	Yes
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	No *(Uptake was self-reported by participants. This might have favoured the intervention group. It was unclear as to whether the data collection period for both groups was comparable.)*

Section	Question	Answer
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. Issues with comparability between the 2 groups and data collection.)*
	Overall directness	Directly applicable

Moniz, 2013

Bibliographic Reference	Moniz MH; Hasley S; Meyn LA; Beigi RH; Improving influenza vaccination rates in pregnancy through text messaging: a randomized controlled trial.; Obstetrics and gynecology; 2013; vol. 121 (no. 4)

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low
Overall bias and Directness	Risk of bias judgement	Low
	Overall Directness	Partially applicable *(Influenza vaccine data used)*

Mouzoon, 2010

Bibliographic Reference	Mouzoon ME; Munoz FM; Greisinger AJ; Brehm BJ; Wehmanen OA; Smith FA; Markee JA; Glezen WP; Improving influenza immunization in pregnant women and healthcare workers.; The American journal of managed care; 2010; vol. 16 (no. 3)

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Unclear *(No baseline characteristics were provided for each group. Therefore, it is difficult to assess comparability)*
Baseline characteristics	Were baseline characteristics similar?	Unclear *(No baseline characteristics were provided for each group. Therefore, it is difficult to assess comparability.)*
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	Yes
Protection against contamination	Was the study adequately protected against contamination?	Yes
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	Yes
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. No baseline characteristics were provided for each group. Therefore, it is difficult to assess comparability.)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

Ogburn, 2007

Bibliographic Reference	Ogburn T; Espey EL; Contreras V; Arroyo P; Impact of clinic interventions on the rate of influenza vaccination in pregnant women.; The Journal of reproductive medicine; 2007; vol. 52 (no. 9)

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Unclear *(No baseline characteristics to assess how comparable the 3 groups were.)*
Baseline characteristics	Were baseline characteristics similar?	Unclear *(No baseline characteristics to assess how comparable the 3 groups were.)*
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	Yes
Protection against contamination	Was the study adequately protected against contamination?	Yes
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	No *(The method of data collection was not described.)*
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. No baseline characteristics and the method of data collection was not described.)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

Panda, 2011

Bibliographic Reference	Panda B; Stiller R; Panda A; Influenza vaccination during pregnancy and factors for lacking compliance with current CDC guidelines.; The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians; 2011; vol. 24 (no. 3)

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Yes
Baseline characteristics	Were baseline characteristics similar?	Yes
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	Yes
Protection against contamination	Was the study adequately protected against contamination?	Yes
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	No *(Uptake data was self-reported by participants. This could have biased the results in favour of the intervention because more effort went into the intervention.)*
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. Some concerns with how data was collected.)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

Payakachat, 2016

Bibliographic Reference	Payakachat, Nalin; Hadden, Kristie B; Ragland, Denise; Promoting Tdap immunization in pregnancy: Associations between maternal perceptions and vaccination rates.; Vaccine; 2016; vol. 34 (no. 1); 179-86

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in either the Bisset 2018 or Mohammed 2019 systematic reviews.

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low
Overall bias and Directness	Risk of bias judgement	Some concerns *(Lack of blinding at data collection.)*
	Overall Directness	Directly applicable

Pierson, 2015

Bibliographic Reference	Pierson RC; Malone AM; Haas DM; Increasing Influenza Vaccination Rates in a Busy Urban Clinic.; Journal of nature and science; 2015; vol. 1 (no. 3)

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Unclear *(No baseline characteristics of the 2 arms to assess comparability.)*
Baseline characteristics	Were baseline characteristics similar?	Unclear *(No baseline characteristics of the 2 arms to assess comparability.)*
Incomplete outcome data	Were incomplete outcome data adequately addressed?	Unclear *(No baseline characteristics of the 2 arms to assess comparability.)*
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	Yes
Protection against contamination	Was the study adequately protected against contamination?	Yes
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	Yes
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. No baseline characteristics of the 2 arms to assess comparability.)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

Sherman, 2012

Bibliographic Reference	Sherman MJ; Raker CA; Phipps MG; Improving influenza vaccination rates in pregnant women.; The Journal of reproductive medicine; 2012; vol. 57 (no. 9-10)

Study details

Study type	Before and after study
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Random sequence generation	Was the allocation sequence adequately generated?	No. There was no allocation sequence generation.
Allocation concealment	Was the allocation adequately concealed?	No. There was no allocation concealment.
Baseline outcome measurements	Were baseline outcome measurements similar?	Yes
Baseline characteristics	Were baseline characteristics similar?	Yes
Incomplete outcome data	Were incomplete outcome data adequately addressed?	All outcome data was complete
Knowledge of the allocated interventions	Was knowledge of the allocated interventions adequately prevented during the study?	Yes
Protection against contamination	Was the study adequately protected against contamination?	Yes
Selective outcome reporting	Was the study free from selective outcome reporting?	Yes
Other risks of bias	Was the study free from other risks of bias?	No *(No information was provided on how data was collected.)*
Overall judgements of risk of bias and directness	Overall risk of bias	High risk of bias *(No randomisation. No information was provided on how data was collected.)*
	Overall directness	Partially applicable *(Influenza vaccine data used)*

Stockwell, 2014

Bibliographic Reference	Stockwell MS; Westhoff C; Kharbanda EO; Vargas CY; Camargo S; Vawdrey DK; Castaño PM; Influenza vaccine text message reminders for urban, low-income pregnant women: a randomized controlled trial.; American journal of public health; 2014

Study details

Study type	Randomised controlled trial (RCT)
Evidence table available in an included systematic review	The evidence table for this study can be found in the Bisset 2018 systematic review.

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low
Domain 2b: Risk of bias due to deviations from the intended interventions (effect of adhering to intervention)	Risk of bias judgement for deviations from the intended interventions (effect of adhering to intervention)	Low
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(No information was provided on how data was collected.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns with data collection.)*
	Overall Directness	Partially applicable *(Influenza vaccine data used)*

Appendix E – Forest plots

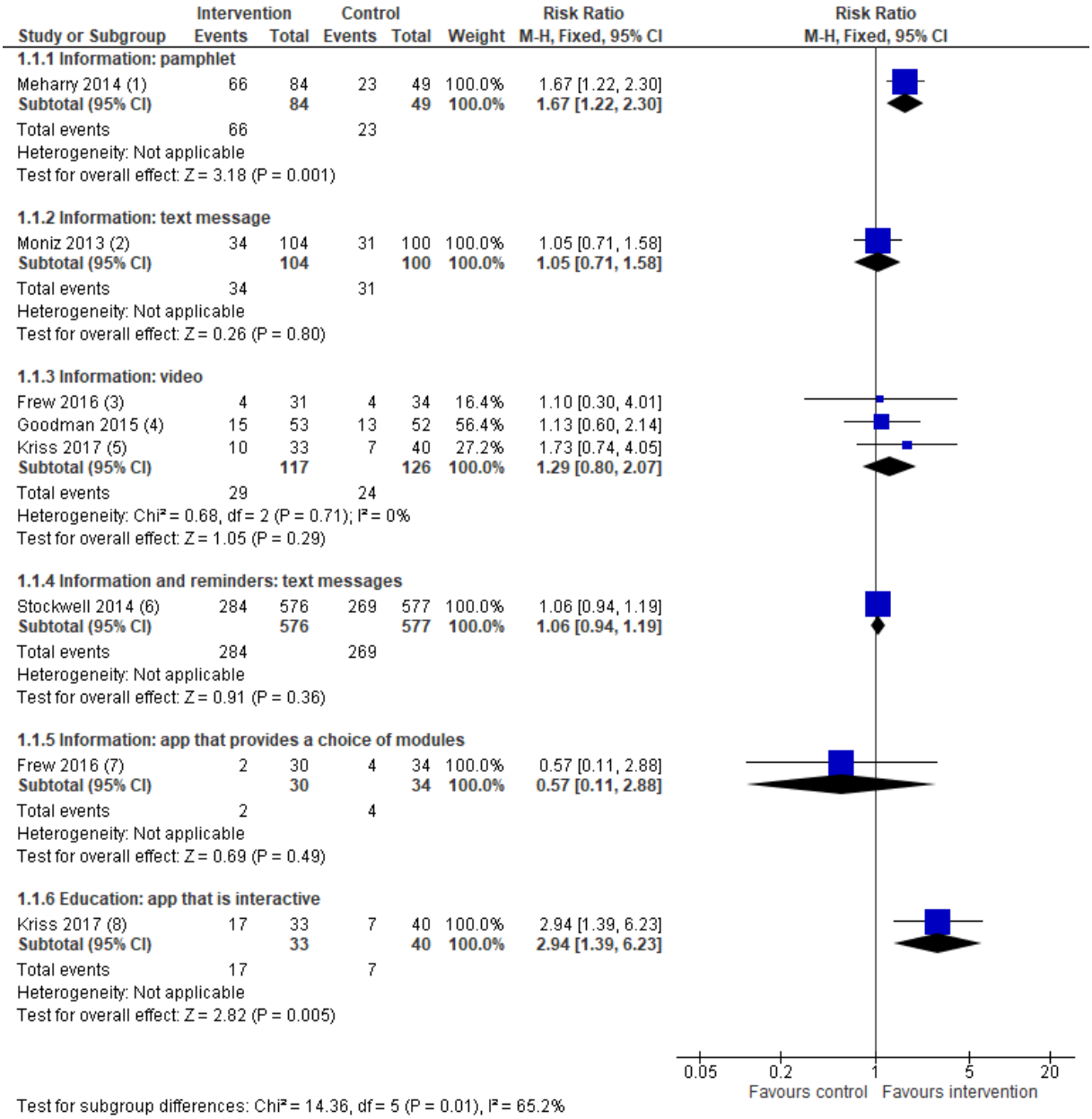
The extracted raw data came from the 2 systematic reviews Bisset 2018 and Mohammed 2019 wherever possible and were reanalysed using our methods.

Interventions aimed at pregnant women: interventions compared to control

Interventions by type versus control

This comparison does not include a pooled total because interventions are very different to each other. Not pooling the data also avoids double-counting of control arms as some studies had 3 arms and therefore appear in different subgroups.

Meharry 2014 includes 2 intervention arms which have been combined in this analysis because both interventions are similar and a meta-analysis comparing the 2 arms could not differentiate effects on vaccine uptake. Combining the two interventions also avoids double counting the control arm. See the section below (Information pamphlet with or without statement versus control) to see the two intervention arms presented separately.



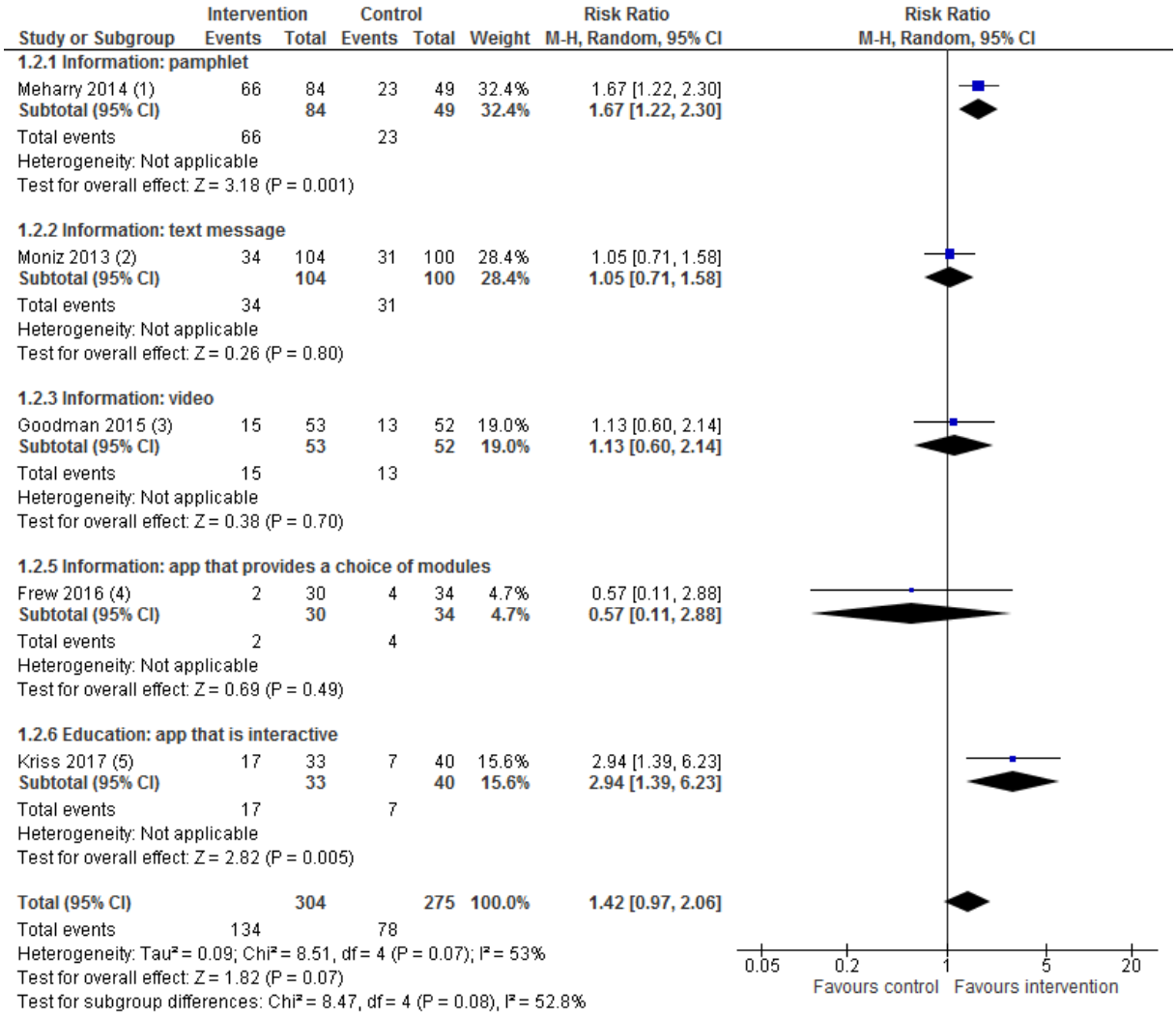
Footnotes

(1) Influenza vaccine. Education/information. Intervention 1: Information pamphlet; Intervention 2: information pamphlet plus benefit statement: ‘‘If you have the flu shot during pregnancy, you will also help protect your baby against influenza from birth to 6 months.’’
(2) Influenza vaccine. Education/information. Text message with vaccine and flu information.
(3) Influenza vaccine. Education/information. Educational 9-minute video on an iPad.
(4) Influenza vaccine. Education/information. 3.5 minute CDC educational video on influenza vaccine.
(5) Pertussis vaccine. Education/information. Video information.
(6) Influenza vaccine. Education/information and reminders. 5 weekly automated text messages including reminders, recommendation from doctor to vaccinate and educational messages. Also included appointment reminders and prompt for pregnant women to ask about vaccination at next antenatal appointment.
(7) Influenza vaccine. Education/information. Modular education using an iPad where pregnant woman could select what aspect(s) they want to learn about.
(8) Pertussis vaccine. Education/information. Interactive electronic book.

Education/information versus control

To enable a pooled total to be calculated without double-counting of control arms, the video versus control comparisons from Kriss 2017 and Frew 2016 have been removed from the analysis. These comparisons are shown in the forest plot above. Meharry 2014 includes 2 intervention arms which have been combined in this analysis because both interventions are similar and a meta-analysis comparing the 2 arms could not differentiate effects on vaccine uptake. Combining the two interventions also avoids double counting the control arm. See the section below (Information pamphlet with or without statement versus control) to see the two intervention arms presented separately.

Education/information interventions by type versus control

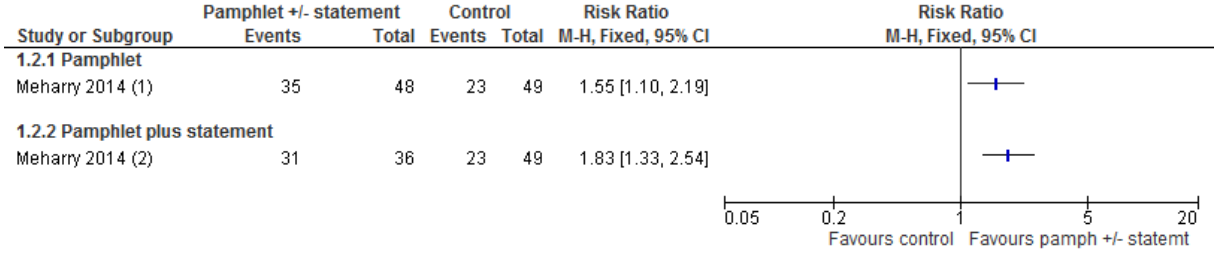


Footnotes

(1) Influenza vaccine. Information pamphlet and pamphlet plus benefit statement.
(2) Influenza vaccine. Text message with vaccine and flu information.
(3) Influenza vaccine. 3.5-minute CDC educational video on influenza vaccine.
(4) Influenza vaccine. Modular education using an iPad where pregnant woman could select what aspect(s) they want to learn about.
(5) Pertussis vaccine. Interactive electronic book.

Information pamphlet with or without statement versus control

This meta-analysis separates the 2 intervention arms from Meharry 2014 that are pooled in the meta-analyses above because they are similar interventions.

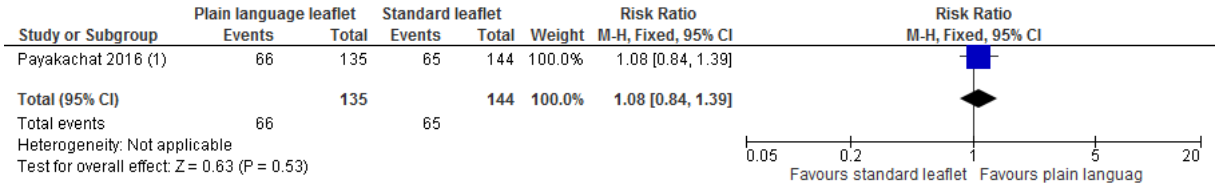


(1) Influenza vaccine. Information pamphlet.
(2) Influenza vaccine. Information pamphlet plus benefit statement. The statement read: 'If you have the flu shot during pregnancy, you will also help protect your baby against influenza from birth to 6 months.'

Interventions aimed at pregnant women: interventions compared to other interventions

Education/ information interventions compared to other education/ information interventions

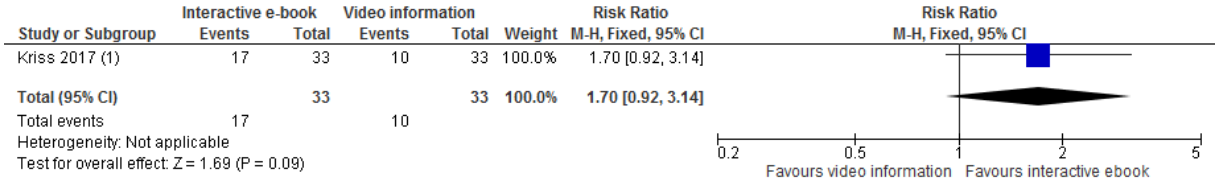
Plain language information leaflet versus standard information leaflet



Footnotes
(1) Pertussis vaccine

(1) Pertussis vaccine.

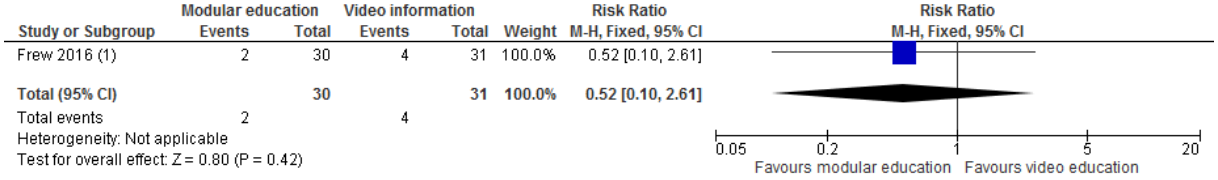
Interactive electronic book versus video information



Footnotes
(1) Pertussis vaccination

(1) Pertussis vaccine.

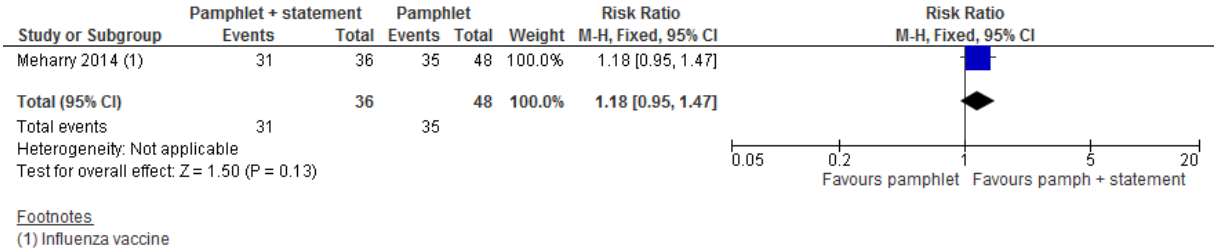
Modular education versus video information



Footnotes

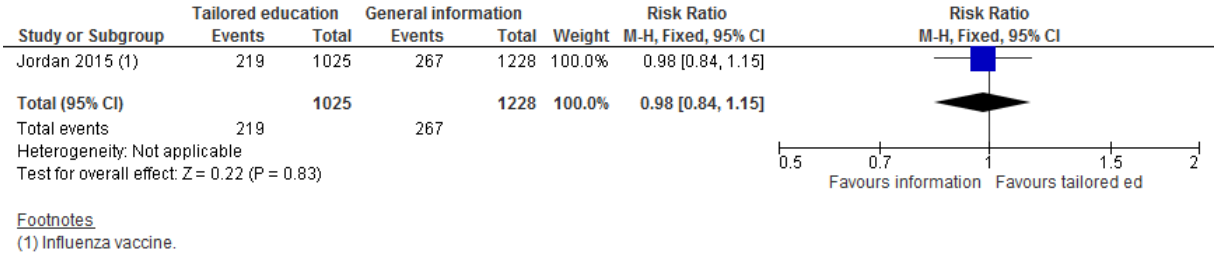
(1) Influenza vaccine. Modular education using an iPad where pregnant woman can select what aspect(s) they want to learn about versus 9-minute information video on an iPad.

Information pamphlet plus benefit statement versus information pamphlet



(1) Influenza vaccine.

Tailored educational text message versus general information text message for women not planning to be vaccinated- 'no' group

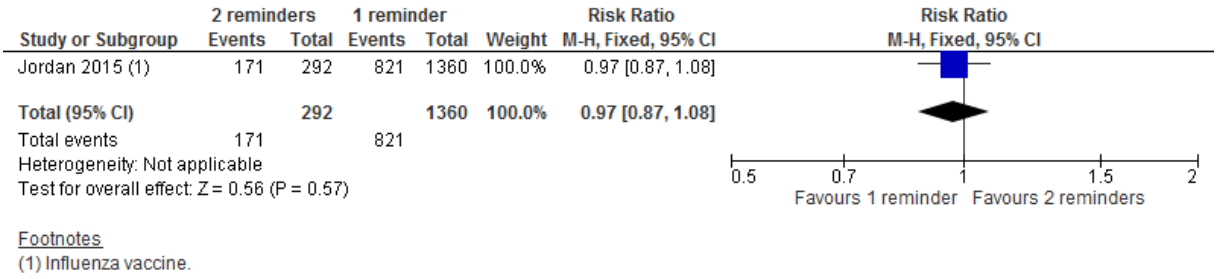


An explanatory diagram for this study can be found here.

(1) Influenza vaccine.

Reminder intervention compared to another reminder intervention

2 text message reminders versus 1 text message reminder (for women planning to be vaccinated- 'yes' group)



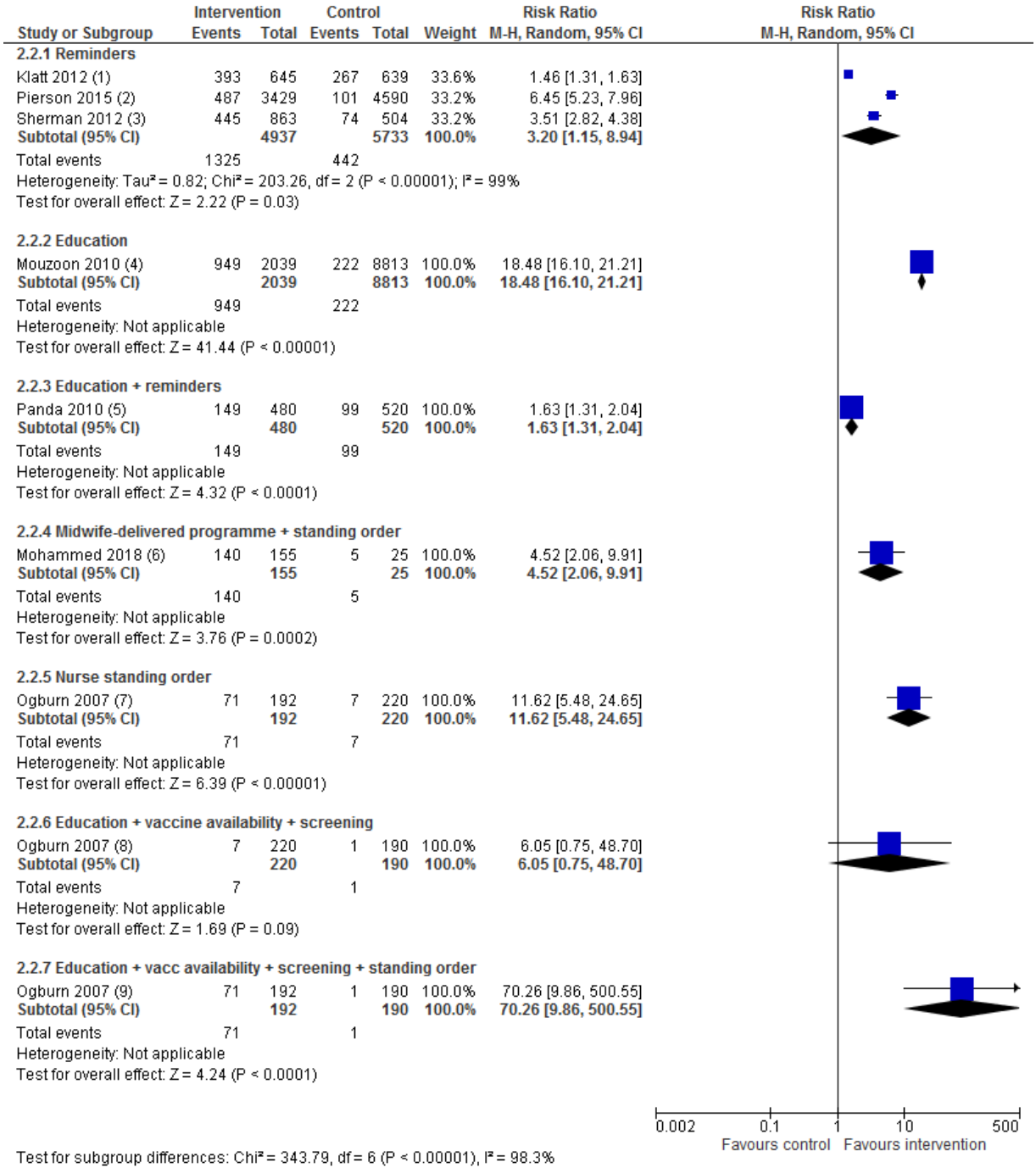
An explanatory diagram for this study can be found here.

(1) Influenza vaccine.

Interventions aimed at healthcare providers: interventions compared to control

NON-RCT: interventions by type versus control

This comparison does not include a pooled total because interventions are very different to each other. Not pooling the data also avoids double-counting of the control arm in Ogburn 2007. All studies included in this comparison used a before and after design.



Footnotes

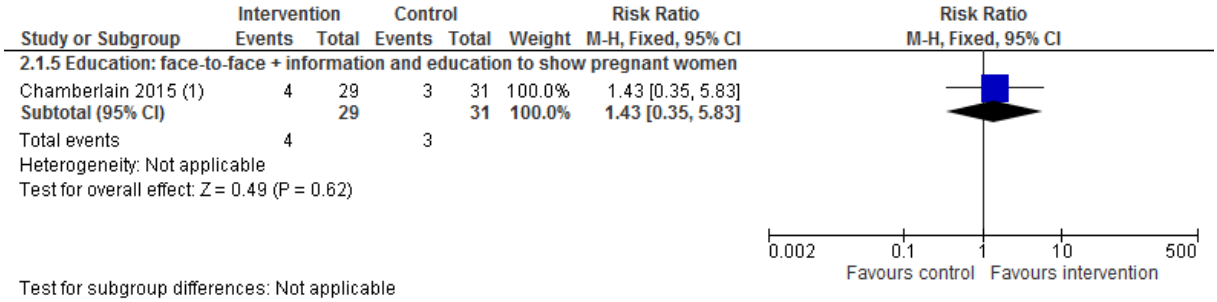
(1) Influenza vaccine. Reminder on prenatal electronic health record. Administering vaccine ceases the alert.

(2) Influenza vaccine. Brightly coloured reminder attached to patient notes. Form included vaccination status and whether the pregnant woman would like to receive a vaccination during the appointment.
(3) Influenza vaccine. Reminder on patient charts for staff/provider about vaccination.
(4) Influenza vaccine. Immunisation champion plus updates on vaccination rates plus training for doctors, nurses, and midwives.
(5) Influenza vaccine. Physician education, posters advertising flu vaccine in clinic for patients, email reminder to physicians that the flu vaccine is recommended for all pregnant women.
(6) Pertussis vaccine. Midwife-delivered vaccination programme. Vaccines were administered without needing a prescription from a doctor. The control occurred before the intervention was introduced.
(7) Influenza vaccine. This comparison compares the 2 'after' intervention arms of the 2 comparisons below (footnotes 8 and 9) against each other. In other words, both arms had staff education, vaccine availability, and nurse screening. The intervention arm here also had a nurse standing order.
(8) Influenza vaccine. Before = before any changes were made. After = education for clinic personnel, vaccine was available in the clinic, nurses screened pregnant women.
(9) Influenza vaccine. Before = before any changes were made. After = education for clinic personnel, vaccine was available in the clinic, nurses screened pregnant women, standing order (nurses did not need a prescription from a doctor).

Interventions aimed at pregnant women and healthcare providers compared to control

Education/ information versus control

Provider education and education/ information for pregnant women versus control



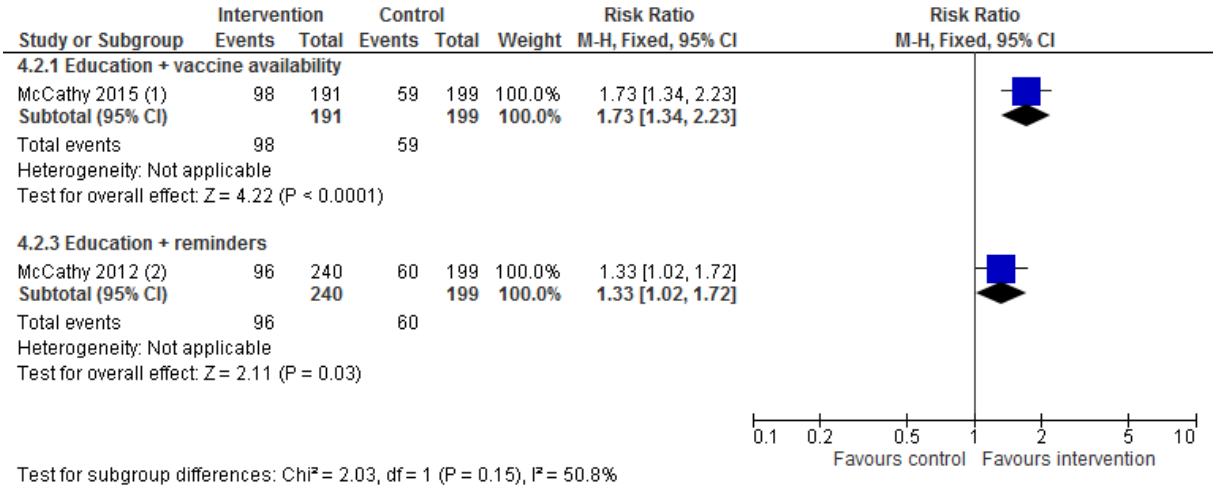
Footnotes

(1) Cluster RCT, pertussis vaccine. Data adjusted for clustering using the intra-cluster correlation coefficient provided by the study. Face-to-face peer education for providers. Printed educational material and interactive multimedia on iPads for staff to show pregnant women.

Education plus a different intervention versus control

NON-RCT: interventions by type versus control

This comparison does not include a pooled total because interventions are very different to each other. Both studies included in this comparison used a before and after design.



Footnotes

(1) Influenza vaccine. Education for staff, patient information brochures in antenatal clinics, increased availability of vaccine supply.
(2) Influenza vaccine. Educational campaign for staff and patients, including lecture for staff. Reminder stamps placed in patient notes. Patient information booklet.

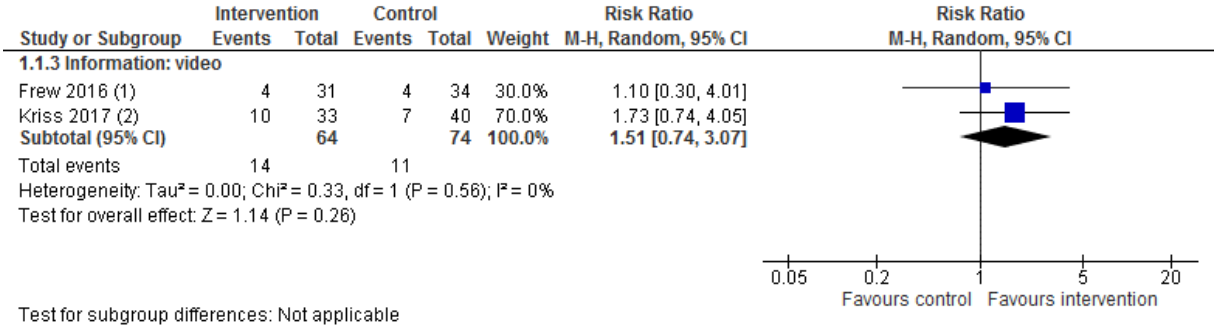
Sensitivity analysis

This analysis shows the results of meta-analyses with any studies graded as high risk of bias removed from the analysis.

Interventions aimed at pregnant women: interventions compared to control

Interventions by type versus control

The other subgroups for this meta-analysis are not shown because they were unchanged from the original meta-analysis.



(1) Influenza vaccine. Educational 9-minute video on an iPad.
(2) Pertussis vaccine. Video information.

Appendix F – GRADE tables

Pertussis and influenza vaccine data

This section has both pertussis and influenza vaccine data together. Before each table there is an explanation of which studies have pertussis or influenza data, and which types of interventions they contain.

Interventions aimed at pregnant women: interventions compared to control

All studies below have influenza vaccine data with the exception of Kriss 2017 which has pertussis vaccine data.

Table 13 GRADE table for interventions aimed at pregnant women: interventions compared to control

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
Interventions by type versus control – no pooled result (RR >1 favours the intervention)										
Information: pamphlet										
1 (Meharry 2014)	RCT	133	RR 1.67 (1.22, 2.3)	47 per 100	78 per 100 (57, 108)	Not serious	Serious[8]	N/A[9]	Not serious	Moderate
Information: text message										
1 (Moniz 2013)	RCT	204	RR 1.05 (0.71, 1.58)	31 per 100	33 per 100 (22, 49)	Not serious	Serious[8]	N/A[9]	Serious[1]	Low
Information: video										
3 (Frew 2016, Goodman 2015, Kriss 2017)	RCT	243	RR 1.29 (0.80, 2.07)	19 per 100	25 per 100 (15, 39)	Very serious[2]	Serious[8]	Not serious	Serious[1]	Very low
Information and reminders: text messages										

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
1 (Stockwell 2014)	RCT	1153	RR 1.06 (0.94, 1.19)	47 per 100	49 per 100 (44, 55)	Serious[3]	Serious[8]	N/A[9]	Serious[1]	Very low
Information: app that provides a choice of modules										
1 (Frew 2016)	RCT	64	RR 0.57 (0.11, 2.88)	12 per 100	7 per 100 (1, 34)	Serious[3]	Serious[8]	N/A[9]	Very serious[4]	Very low
Information: app that is interactive										
1 (Kriss 2017)	RCT	73	RR 2.94 (1.39, 6.23)	18 per 100	51 per 100 (24, 100)	Serious[3]	Not serious	N/A[9]	Not serious	Moderate
Education/information versus control										
Education/information interventions by type versus control- pooled result[6] (RR >1 favours the intervention)										
5[7]	RCT	579	RR 1.42 (0.97, 2.06)	28 per 100	40 per 100 (28, 58)	Serious[3]	Serious[8]	Serious[5]	Serious[1]	Very low
Information: video[6]										
1 (Goodman 2015)	RCT	105	RR 1.13 (0.6, 2.14)	25 per 100	28 per 100 (15, 54)	Very serious[2]	Serious[8]	N/A[9]	Very serious[4]	Very low
Information pamphlet with or without statement versus control (RR >1 favours pamphlet with or without statement)										
Pamphlet										
1 (Meharry 2014)	RCT	97	RR 1.55 (1.10, 2.19)	47 per 100	73 per 100 (52, 100)	Not serious	Serious[8]	N/A[9]	Not serious	Moderate
Pamphlet plus statement										
1 (Meharry 2014)	RCT	85	RR 1.83 (1.33, 2.54)	47 per 100	86 per 100 (62, 100)	Not serious	Serious[8]	N/A[9]	Not serious	Moderate

1. Downgraded once for imprecision: the 95% confidence interval for the effect size crossed the line of no effect.
2. Downgraded twice: greater than 33.3% of the weight of the meta-analysis came from studies at high risk of bias.
3. Downgraded once: greater than 33.3% of the weight of the meta-analysis came from studies at moderate or high risk of bias.

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality

4. Downgraded twice for imprecision: the 95% confidence interval for the effect size crossed the line of no effect and the number of pregnant women was <200.
5. Downgraded once for inconsistency: the I^2 was above 33.3 but below 66.6.
6. To allow a pooled result to be calculated, Frew 2016 and Kriss 2017 were removed from the Information: video subgroup meta-analysis to avoid double-counting the control arms. See results above for the meta-analysis of video interventions that includes these studies. Other interventions are not shown by subgroup here as each intervention type only includes one study and the results are the same as for the interventions by type listed above.
7. Meharry 2014, Moniz 2013, Goodman 2015, Frew 2016, Kriss 2017
8. Downgraded once for applicability: greater than 33.3% of the weight of the meta-analysis came from studies that were partially or indirectly applicable.
9. Single study. Inconsistency not applicable.

Interventions aimed at pregnant women: interventions compared to other interventions

All of the studies below have influenza vaccine data with the exception of Payakachat 2016 and Kriss 2017, which have pertussis vaccine data.

Table 14 GRADE table for interventions aimed at pregnant women: interventions compared to interventions

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: intervention 2	Absolute risk: intervention 1 (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
Education/ information interventions compared to other education/ information interventions										
Plain language information leaflet versus standard information leaflet (RR >1 favours the plain language information leaflet)										
1 (Payakachat 2016)	RCT	279	RR 1.08 (0.84, 1.39)	45 per 100	49 per 100 (38, 63)	Serious[1]	Not serious	N/A[6]	Serious[2]	Low
Interactive electronic book versus video information (RR >1 favours the interactive electronic book)										
1 (Kriss 2017)	RCT	66	RR 1.70 (0.92, 3.14)	30 per 100	52 per 100 (28, 95)	Serious[1]	Not serious	N/A[6]	Very serious[3]	Very low
Modular education versus video information (RR >1 favours modular education)										
1 (Frew 2016)	RCT	61	RR 0.52 (0.10, 2.61)	13 per 100	7 per 100 (1, 34)	Serious[1]	Serious[5]	N/A[6]	Very serious[3]	Very low
Information pamphlet plus benefit statement versus information pamphlet (RR >1 favours the information pamphlet plus benefit statement)										
1 (Meharry 2014)	RCT	84	RR 1.18 (0.95, 1.47)	73 per 100	86 per 100 (69, 100)	Not serious	Serious[5]	N/A[6]	Very serious[3]	Very low
Tailored educational text message versus general information text message (data for those planning to not be vaccinated – 'no' group) (RR >1 favours tailored educational text message)										
1 (Jordan 2015)	RCT	2253	RR 0.98 (0.84, 1.15)	22 per 100	21 per 100 (18, 25)	Serious[4]	Serious[5]	N/A[6]	Serious[2]	Very low
Reminder intervention compared to another reminder intervention										
2 text message reminders versus 1 text message reminder (data for those planning to be vaccinated – 'yes' group) (RR >1 favours 2 text message reminders)										

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: intervention 2	Absolute risk: intervention 1 (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
1 (Jordan 2015)	RCT	1652	RR 0.97 (0.87, 1.08)	60 per 100	59 per 100 (53, 65)	Serious[4]	Serious[5]	N/A[6]	Serious[2]	Very low

1. Downgraded once: greater than 33.3% of the weight of the meta-analysis came from studies at moderate or high risk of bias.
2. Downgraded once for imprecision: the 95% confidence interval for the effect size crossed the line of no effect.
3. Downgraded twice for imprecision: the 95% confidence interval for the effect size crossed the line of no effect and the number of pregnant women was <200.
4. Downgraded once: Single study at moderate risk of bias.
5. Downgraded once: greater than 33.3% of the weight of the meta-analysis came from studies that were partially or indirectly applicable.
6. Single study. Inconsistency not applicable.

Interventions aimed at healthcare providers: interventions compared to control

All of the studies below have influenza vaccine data with the exception of Mohammed 2018, which has pertussis vaccine data.

Table 15 GRADE table for interventions aimed at healthcare providers: interventions compared to control

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
NON-RCT: interventions by delivery method versus control (RR >1 favours the intervention)										
Reminders										
3 (Klatt 2012, Pierson 2015, Sherman 2012)	Before and after study	10670	RR 3.20 (1.15, 8.94)	8 per 100	25 per 100 (9, 69)	Very serious[3]	Serious[6]	Very serious[4]	Not serious	Very low
Education										

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
1 (Mouzoon 2010)	Before and after study	10852	RR 18.48 (16.10, 21.21)	3 per 100	47 per 100 (41, 53)	Very serious[1]	Serious[6]	N/A[2]	Not serious	Very low
Education plus reminders										
1 (Panda 2011)	Before and after study	1000	RR 1.63 (1.31, 2.04)	19 per 100	31 per 100 (25, 39)	Very serious[1]	Serious[6]	N/A[2]	Not serious	Very low
Midwife-delivered programme plus standing order										
1 (Mohammed 2018)	Before and after	180	RR 4.52 (2.06, 9.91)	20 per 100	90 per 100 (41, 100)	Very serious[1]	Not serious	N/A[2]	Not serious	Low
Nurse standing order										
1 (Ogburn 2007)	Before and after	412	RR 11.62 (5.48, 24.65)	3 per 100	37 per 100 (17, 78)	Very serious[1]	Serious[6]	N/A[2]	Not serious	Very low
Education plus vaccine availability plus nurse screening										
1 (Ogburn 2007)	Before and after	410	RR 6.05 (0.75, 48.70)	1 per 100	3 per 100 (0, 26)	Very serious[1]	Serious[6]	N/A[2]	Serious[5]	Very low
Education plus vaccine availability plus nurse screening plus standing order										
1 (Ogburn 2007)	Before and after	382	RR 70.26 (9.86, 500.55)	1 per 100	37 per 100 (5, 100)	Very serious[1]	Serious[6]	N/A[2]	Not serious	Very low

1. Downgraded twice: single study at high risk of bias.
2. Single study. Inconsistency not applicable.
3. Downgraded twice: greater than 33.3% of the weight of the meta-analysis came from studies at high risk of bias.
4. Downgraded twice for inconsistency: the I^2 was greater than 66.7%.
5. Downgraded once for imprecision: the 95% confidence interval for the effect size crossed the line of no effect.

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
6. Downgraded once: greater than 33.3% of the weight of the meta-analysis came from studies that were partially or indirectly applicable.										

Interventions aimed at pregnant women and healthcare providers compared to control

Table 16 GRADE table for interventions aimed at healthcare providers: interventions compared to control

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
Education/ information versus control										
Provider education and education/ information for pregnant women versus control (RR >1 favours provider education/ information for pregnant women)										
1 (Chamberlain 2015)	Cluster RCT	60	RR 1.43 (0.35, 5.83)	10 per 100	14 per 100 (3, 56)	Serious[1]	Not serious	N/A[4]	Very serious[3]	Very low
Education plus a different intervention versus control										
NON-RCT: interventions by type versus control (RR >1 favours intervention)										
Education plus vaccine availability										
1 (McCarthy 2015)	Before and after	390	RR 1.73 (1.34, 2.23)	30 per 100	51 per 100 (40, 66)	Very serious[2]	Serious[5]	N/A[4]	Not serious	Very low
Education plus reminders										
1 (McCarthy 2012)	Before and after	439	RR 1.33 (1.02, 1.72)	30 per 100	40 per 100 (31, 51)	Very serious[2]	Serious[5]	N/A[4]	Not serious	Very low

1. Downgraded once: Single study at moderate risk of bias.
2. Downgraded twice: Single study at high risk of bias.
3. Downgraded twice for imprecision: the 95% confidence interval for the effect size crossed the line of no effect and the number of pregnant women was <200.
4. Single study. Inconsistency not applicable.
5. Downgraded once: greater than 33.3% of the weight of the meta-analysis came from studies that were partially or indirectly applicable.

Sensitivity analysis

This analysis shows the results of meta-analyses with any studies graded as high risk of bias removed from the analysis.

Frew has influenza vaccine data and Kriss 2017 has pertussis vaccine data.

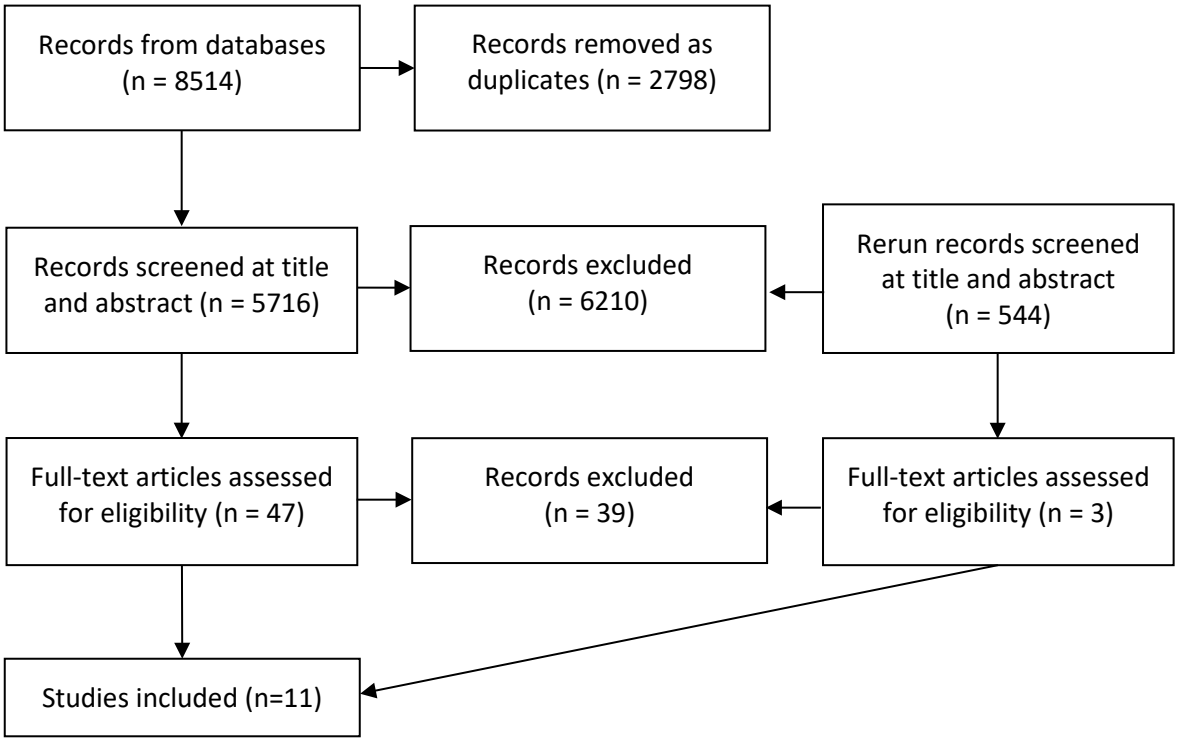
Table 17 GRADE table for interventions aimed at pregnant women: interventions compared to control

No. of studies	Study design	Sample size	Effect size (95% CI)	Absolute risk: control	Absolute risk: intervention (95% CI)	Risk of bias	Indirectness	Inconsistency	Imprecision	Quality
Interventions aimed at pregnant women: interventions compared to control										
Interventions by delivery method versus control (RR >1 favours the intervention)[1]										
Information: video										
2 (Frew 2016, Kriss 2017)	RCT	138	RR 1.51 (0.74, 3.07)	15 per 100	22 per 100 (11, 46)	Serious[2]	Not serious	Not serious	Very serious[3]	Very low

1. The other subgroups for this meta-analysis are not shown because they were unchanged compared to the original meta-analysis.
2. Downgraded once: greater than 33.3% of the weight of the meta-analysis came from studies at moderate or high risk of bias.
3. Downgraded twice for imprecision: the 95% confidence interval for the effect size crossed the line of no effect and the number of pregnant women was <200.

Appendix G – Economic evidence study selection

The diagram below summarises the search results across all of the reviews. None of the 11 studies identified in the full text review were relevant to interventions for pregnant women.



Appendix H – Economic evidence tables

No economic evidence was identified for interventions for pregnant women.

Appendix I – Health economic model

No economic modelling was undertaken for this review question.

Appendix J – Excluded studies

Clinical studies

Excluded from the original search

Study	Reason for exclusion
Abdullahi, L.H., Kagina, B.M., Ndze, V.N. et al. (2020) Improving vaccination uptake among adolescents. Cochrane Database of Systematic Reviews 2020(1): cd011895	- Systematic review used as source of primary studies
Abuelenen, T., Khalil, S., Simoneit, E. et al. (2020) Prevent and Protect: A Vaccination Initiative for Uninsured Patients at a Student-Run Free Clinic. Journal of community health	- The intervention is a free vaccine- not in scope *Also, the comparator is the US national vaccine uptake.*
Achat, H; McIntyre, P; Burgess, M (1999) Health care incentives in immunisation. Australian and New Zealand journal of public health 23(3): 285-8	- Systematic review used as source of primary studies
Acosta, J., Benages, C., Diaz, M.A. et al. (2016) Preventing pertussis in the early infant: Development and results of a prenatal vaccination program. Acta Medica International 3(2): 78-81	- Does not contain an outcome of relevance to this review *This study looks at infants who have had whooping cough and compares the outcomes of vaccinated vs unvaccinated participants.*
Adams, Jean, Bateman, Belinda, Becker, Frauke et al. (2015) Effectiveness and acceptability of parental financial incentives and quasi-mandatory schemes for increasing uptake of vaccinations in preschool children: systematic review, qualitative study and discrete choice experiment. Health technology assessment (Winchester, England) 19(94): 1-176	- Systematic review used as source of primary studies
Adams, Jean, McNaughton, Rebekah J, Wigham, Sarah et al. (2016) Acceptability of Parental Financial Incentives and Quasi-Mandatory Interventions for Preschool Vaccinations: Triangulation of Findings from Three Linked Studies. PloS one 11(6): e0156843	- Not a relevant study design
Adjei Boakye, Eric, Tobo, Betelihem B, Osazuwa-Peters, Nosayaba et al. (2017) A Comparison of Parent- and Provider-Reported Human Papillomavirus Vaccination of Adolescents. American journal of preventive medicine 52(6): 742-752	- Study does not contain an intervention aimed at increasing vaccine uptake *This study looks at reporting vaccine uptake in terms of*

Study	Reason for exclusion
	provider records vs parental recall.
Afzal, Muhammad, Yaqub, Asma, Khalid, Sobia et al. (2017) An effective and doable interventional strategy to enhance vaccination coverage - are we ready to change?. JPMA. The Journal of the Pakistan Medical Association 67(11): 1719-1722	- Study took place in a non-OECD country
Albert, S.M., Nowalk, M.P., Yonas, M.A. et al. (2012) Standing orders for influenza and pneumococcal polysaccharide vaccination: correlates identified in a national survey of U.S. Primary care physicians. BMC family practice 13: 22	- Does not contain an outcome of relevance to this review
Alemi, F, Alemagno, SA, Goldhagen, J et al. (1996) Computer reminders improve on-time immunization rates. Medical care 34(10suppl): OS45-51	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Amirian, I, Huston, S, Ha, D et al. (2017) Results of immunization delivery enhancement intervention on pneumococcal and herpes zoster immunization planning in alabama and california community pharmacies. Journal of the american pharmacists association 57(3)	- Conference abstract
Andrews, R.M. (2005) Assessment of vaccine coverage following the introduction of a publicly funded pneumococcal vaccine program for the elderly in Victoria, Australia. Vaccine 23(21): 2756-2761	- Not a relevant study design *This is a survey. Furthermore, there is no intervention to increase uptake beyond making a vaccine freely available.*
Andrews, Ross M, Skull, Susan A, Byrnes, Graham B et al. (2005) Influenza and pneumococcal vaccine coverage among a random sample of hospitalised persons aged 65 years or more, Victoria. Communicable diseases intelligence quarterly report 29(3): 283-8	- The intervention is a free vaccine- not in scope
Anonymous (1979) AAP immunization schedules. IMJ. Illinois medical journal 155(5): 310-1	- Full text paper or book article is unavailable *This is probably the 1979 edition of the immunisation schedule published by the American Academy of Pediatrics*

Study	Reason for exclusion
Anonymous (2013) Nursing interventions help protect older adults. Nursing 43(4): 26	- Not a review of published literature *Brief commentary about a review article.*
Anonymous. (2005) Automated standing orders to nurses increase influenza and pneumococcal vaccination rates among inpatients compared with reminders to physicians. Evidence-Based Healthcare and Public Health 9(3): 211-212	- Duplicate reference *This is a summary of Dexter 2004*
Arslan I, Beyazova U, Aksakal N et al. (2012) New opportunity for vaccinating older people: well-child clinic visits. Pediatrics international : official journal of the Japan Pediatric Society 54(1): 45-51	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Ashton-Key M and Jorge E (2003) Does providing social services with information and advice on immunisation status of "looked after children" improve uptake?. Archives of disease in childhood 88(4): 299-301	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Atkins K, van Hoek AJ, Watson C et al. Seasonal influenza vaccination delivery through community pharmacists in England: evaluation of the London pilot. BMJ open 6(2): e009739	- Data not reported in an extractable format *This is a before-and-after study but no patient numbers are provided for before 2013/2014 when the intervention was introduced. Therefore, the data is not in an extractable format.*
Atkinson, K.M., Wilson, K., Murphy, M.S.Q. et al. (2019) Effectiveness of digital technologies at improving vaccine uptake and series completion - A systematic review and meta-analysis of randomized controlled trials. Vaccine 37(23): 3050-3060	- Systematic review used as source of primary studies
Au, L; Tso, A; Chin, K (1997) Asian-American adolescent immigrants: the New York City schools experience. The Journal of school health 67(7): 277-9	- Vaccine on UK routine schedule but wrong context for administration

Study	Reason for exclusion
	In the UK, HepB vaccine is given to 0-1 year olds, not 7-13 year olds
Averhoff, F., Linton, L., Peddecord, K.M. et al. (2004) A middle school immunization law rapidly and substantially increases immunization coverage among adolescents. American Journal of Public Health 94(6): 978-984	- Vaccine on UK routine schedule but wrong context for administration *The intervention is for HepB and MMR. In the UK, these are relevant for 0-4 years. However, the study looks at interventions specific to 10-12 year olds at school.*
Bacci, Jennifer L, Hansen, Ryan, Ree, Christina et al. (2019) The effects of vaccination forecasts and value-based payment on adult immunizations by community pharmacists. Vaccine 37(1): 152-159	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Bach, A.T., Kang, A.Y., Lewis, J. et al. (2019) Addressing common barriers in adult immunizations: a review of interventions. Expert Review of Vaccines 18(11): 1167-1185	- Systematic review used as source of primary studies
Bakare, Mobolaji, Shrivastava, Rakesh, Jeevanantham, Vinodh et al. (2007) Impact of two different models on influenza and pneumococcal vaccination in hospitalized patients. Southern medical journal 100(2): 140-4	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Balzarini, F., Frascella, B., Oradini-Alacreu, A. et al. (2020) Does the use of personal electronic health records increase vaccine uptake? A systematic review. Vaccine 38(38): 5966-5978	- Systematic review used as source of primary studies
Bangure, Donewell, Chirundu, Daniel, Gombe, Notion et al. (2015) Effectiveness of short message services reminder on childhood immunization programme in Kadoma, Zimbabwe - a randomized controlled trial, 2013. BMC public health 15: 137	- Study took place in a non-OECD country
Bardenheier, Barbara, Shefer, Abigail, Tiggle, Ronald et al. (2005) Nursing home resident and facility characteristics associated with pneumococcal vaccination: national nursing home survey, 1995-1999. Journal of the American Geriatrics Society 53(9): 1543-51	- The study did not report any of the outcomes specified in the protocol

Study	Reason for exclusion
Baroy, Justin, Chung, Danny, Frisch, Ryan et al. (2016) The impact of pharmacist immunization programs on adult immunization rates: A systematic review and meta-analysis. Journal of the American Pharmacists Association : JAPhA 56(4): 418-26	- Systematic review used as source of primary studies
Bassani, Diego G, Arora, Paul, Wazny, Kerri et al. (2013) Financial incentives and coverage of child health interventions: a systematic review and meta-analysis. BMC public health 13suppl3: 30	- Systematic review of non-OECD countries
Baumann, A., Andersen, B., Ostergaard, L. et al. (2019) Sense & sensibility: Decision-making and sources of information in mothers who decline HPV vaccination of their adolescent daughters. Vaccine: X 2: 100020	- Not a relevant study design
Baxter D (2013) Approaches to the vaccination of pregnant women: experience from Stockport, UK, with prenatal influenza. Human vaccines & immunotherapeutics 9(6): 1360-1363	- Data not reported in an extractable format *The number of participants in each arm was not provided.*
Becker DM, Gomez EB, Kaiser DL et al. (1989) Improving preventive care at a medical clinic: how can the patient help?. American journal of preventive medicine 5(6): 353-359	- Study published before 1990 date limit set in review protocol
Bedford, H. (2014) Randomised controlled trial: Pro-vaccine messages may be counterproductive among vaccine-hesitant parents. Evidence-Based Medicine 19(6): 219	- Does not contain an outcome of relevance to this review *This study measures intention, not uptake.*
Bedwick, Brian W; Garofoli, Gretchen K; Elswick, Betsy M (2017) Assessment of targeted automated messages on herpes zoster immunization numbers in an independent community pharmacy. Journal of the American Pharmacists Association : JAPhA 57(3s): 293-s297e1	- Does not contain an outcome of relevance to this review
Beggs, Ashton E, Morrical-Kline, Karie A, Wilhoite, Jessica E et al. (2013) Effect of an intervention on medical resident knowledge and adult immunization rates. Family medicine 45(2): 118-21	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Belmaker, I, Dukhan, L, Elgrici, M et al. (2006) Reduction of vaccine-preventable communicable diseases in a Bedouin population: summary of a community-based intervention programme. Lancet (London, England) 367(9515): 987-91	- Study took place in a non-OECD country
Benabbas, R., Shan, G., Akindutire, O. et al. (2019) The Effect of Pay-for-Performance Compensation Model Implementation on Vaccination Rate: A Systematic Review. Quality management in health care 28(3): 155-162	- Systematic review used as source of primary studies
Berenson, Abbey B, Rahman, Mahbubur, Hirth, Jacqueline M et al. (2015) A brief educational intervention increases providers' human papillomavirus vaccine knowledge. Human vaccines & immunotherapeutics 11(6): 1331-6	- Study does not contain an intervention aimed at increasing vaccine uptake
Berg GD, Fleegler E, vanVonno CJ et al. (2005) A matched-cohort study of health services utilization outcomes for a heart failure disease management program. Disease management : DM 8(1): 35-41	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Berg, Gregory D, Thomas, Eileen, Silverstein, Steven et al. (2004) Reducing medical service utilization by encouraging vaccines: randomized controlled trial. American journal of preventive medicine 27(4): 284-8	- Study does not contain an intervention aimed at increasing vaccine uptake *The 2 marketing pieces were identical and aimed at increasing influenza vaccine uptake - not pneumonia vaccine uptake. Pneumonia vaccine uptake was measured coincidentally.*
Betsch, Cornelia, Rossmann, Constanze, Pletz, Mathias W et al. (2018) Increasing influenza and pneumococcal vaccine uptake in the elderly: study protocol for the multi-methods prospective intervention study Vaccination60. BMC public health 18(1): 885	- Protocol for a future study
Bigham, M., Remple, V.P., Pielak, K. et al. (2006) Uptake and behavioural and attitudinal determinants of immunization in an expanded routine infant hepatitis B vaccination program in British Columbia. Canadian Journal of Public Health 97(2): 90-95	- Study does not contain an intervention aimed at increasing vaccine uptake *The intervention is nothing more than a free vaccine.*

Study	Reason for exclusion
Bitton, A., Baughman, A.W., Carlini, S. et al. (2016) Enhanced primary care and impact on quality of care in Massachusetts. American Journal of Managed Care 22(5): e169-e174	- Not a relevant study design
Bloom, H.G.; Wheeler, D.A.; Linn, J. (1999) A managed care organization's attempt to increase influenza and pneumococcal immunizations for older adults in an acute care setting. Journal of the American Geriatrics Society 47(1): 106-110	- Does not contain an outcome of relevance to this review *This study does not have a comparator*
Bloom, HG, Bloom, JS, Krasnoff, L et al. (1988) Increased utilization of influenza and pneumococcal vaccines in an elderly hospitalized population. Journal of the American Geriatrics Society 36(10): 897-901	- Study published before 1990 date limit set in review protocol
Bonafide, Katherine E and Vanable, Peter A (2015) Male human papillomavirus vaccine acceptance is enhanced by a brief intervention that emphasizes both male-specific vaccine benefits and altruistic motives. Sexually transmitted diseases 42(2): 76-80	- Does not contain an outcome of relevance to this review
Bond, L., Davie, G., Carlin, J.B. et al. (2002) Increases in vaccination coverage for children in child care, 1997 to 2000: An evaluation of the impact of government incentives and initiatives. Australian and New Zealand Journal of Public Health 26(1): 58-64	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Boom JA, Nelson CS, Kohrt AE et al. (2010) Utilizing peer academic detailing to improve childhood immunization coverage levels. Health promotion practice 11(3): 377-386	- Does not contain an outcome of relevance to this review *Study does not measure uptake. It measures "coverage" and explains this is not uptake but does not fully explain what the criteria are for adequate coverage.*
Boom, Julie A, Nelson, Cynthia S, Laufman, Larry E et al. (2007) Improvement in provider immunization knowledge and behaviors following a peer education intervention. Clinical pediatrics 46(8): 706-17	- Does not contain an outcome of relevance to this review

Study	Reason for exclusion
	The data is a survey of opinions and attitudes.
Borgiel, Alexander E M, Williams, J Ivan, Davis, David A et al. (1999) Evaluating the effectiveness of 2 educational interventions in family practice: CMAJ. Canadian Medical Association. Journal 161(8): 965-70	- Does not contain an outcome of relevance to this review *Does not measure vaccine uptake*
Bouchez, M., Ward, J.K., Bocquier, A. et al. (2021) Physicians' decision processes about the HPV vaccine: A qualitative study. Vaccine 39(3): 521-528	- Not a relevant study design *Qualitative study - considered for the qualitative review*
Brabin, Loretta, Roberts, Stephen A, Stretch, Rebecca et al. (2008) Uptake of first two doses of human papillomavirus vaccine by adolescent schoolgirls in Manchester: prospective cohort study. BMJ (Clinical research ed.) 336(7652): 1056-8	- Does not contain an outcome of relevance to this review *There is no comparator*
Brackett, Amber; Butler, Michell; Chapman, Liza (2015) Using motivational interviewing in the community pharmacy to increase adult immunization readiness: A pilot evaluation. Journal of the American Pharmacists Association : JAPhA 55(2): 182-6	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Bradshaw, C., DiFrisco, E., Schweizer, W. et al. (2020) Improving birth dose hepatitis B vaccination rates: A quality improvement intervention. Hospital Pediatrics 10(5): 430-437	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Braeckman, T., Van Herck, K., Raes, M. et al. (2011) Rotavirus vaccines in Belgium: Policy and impact. Pediatric Infectious Disease Journal 30(suppl1): 21-s24	- Does not contain an outcome of relevance to this review
Brewer, NT, Gilkey, MB, Malo, TL et al. (2018) Efficient and participatory strategies for recommending HPV vaccination: a randomized controlled trial. Pediatrics 141(1)	- Conference abstract

Study	Reason for exclusion
Brewer, NT, Hall, ME, Malo, TL et al. (2017) Announcements Versus Conversations to Improve HPV Vaccination Coverage: a Randomized Trial. Pediatrics 139(1)	- Data not reported in an extractable format *Data was given as percentages without participant numbers*
Brigham, Kathryn S, Woods, Elizabeth R, Steltz, Sarah K et al. (2012) Randomized controlled trial of an immunization recall intervention for adolescents. Pediatrics 130(3): 507-14	- Data not reported in an extractable format *The study reports combined uptake data for 3 vaccinations but chickenpox vaccination is not on the UK routine schedule.*
Brimberry, R (1988) Vaccination of high-risk patients for influenza. A comparison of telephone and mail reminder methods. The Journal of family practice 26(4): 397-400	- Study published before 1990 date limit set in review protocol - The study did not report any of the outcomes specified in the protocol *Focused on flu vaccination which is out of scope*
Brink SG (1989) Provider reminders. Changing information format to increase infant immunizations. Medical care 27(6): 648-653	- Study published before 1990 date limit set in review protocol
Briss P A, Rodewald L E, Hinman A R, Shefer A M, Strikas R A, Bernier R R, Carande-Kulis V G, Yusuf H R, Ndiaye S M, Williams S M (2000) Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. American Journal of Preventive Medicine 18(1 Supplement): 97-140	- Review article but not a systematic review
Briss, P A, Rodewald, L E, Hinman, A R et al. (2000) Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. The Task Force on Community Preventive Services. American journal of preventive medicine 18(1suppl): 97-140	- Duplicate reference
Briss, P.A., Rodewald, L.E., Hinman, A.R. et al. (2000) Reviews of evidence regarding interventions to improve vaccination coverage in	- Duplicate reference

Study	Reason for exclusion
children, adolescents, and adults. American Journal of Preventive Medicine 18(1suppl1): 97-140	
Britto, Maria T, Schoettker, Pamela J, Pandzik, Geralyn M et al. (2007) Improving influenza immunisation for high-risk children and adolescents. Quality & safety in health care 16(5): 363-8	- The study did not report any of the outcomes specified in the protocol
Brousseau, Nicholas, Sauvageau, Chantal, Ouakki, Manale et al. (2010) Feasibility and impact of providing feedback to vaccinating medical clinics: evaluating a public health intervention. BMC public health 10: 750	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Bryan AR; Liu Y; Kuehl PG (2013) Advocating zoster vaccination in a community pharmacy through use of personal selling. Journal of the American Pharmacists Association : JAPhA 53(1): 70-77	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Burka, A.T., Fann, J.P., Lamb, K.D. et al. (2019) Evaluation of a novel discharge reminder tool on pneumococcal vaccination in hospitalized elderly veterans. JACCP Journal of the American College of Clinical Pharmacy 2(5): 462-467	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Burns, Ilene Timko; Zimmerman, Richard Kent; Santibanez, Tammy A (2002) Effectiveness of chart prompt about immunizations in an urban health center. The Journal of family practice 51(12): 1018	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Burson, Randall C, Buttenheim, Alison M, Armstrong, Allison et al. (2016) Community pharmacies as sites of adult vaccination: A systematic review. Human vaccines & immunotherapeutics 12(12): 3146-3159	- Systematic review used as source of primary studies
Calihan, Jessica B, MD, MS, Tomaszewski, Kathy, RN, Wheeler, Noah, MPH et al. (2020) USING REPRODUCTIVE HEALTH VISITS TO ENGAGE ADOLESCENT AND YOUNG ADULT WOMEN IN PRIMARY CARE. Journal of Adolescent Health 66(2s)	- Conference abstract

Study	Reason for exclusion
Calo, William A, Gilkey, Melissa B, Leeman, Jennifer et al. (2019) Coaching primary care clinics for HPV vaccination quality improvement: Comparing in-person and webinar implementation. Translational behavioral medicine 9(1): 23-31	- Does not contain an outcome of relevance to this review
Cardozo LJ, Steinberg J, Lepczyk MB et al. (1998) Delivery of preventive healthcare to older African-American patients: a performance comparison from two practice models. The American journal of managed care 4(6): 809-816	- Data not reported in an extractable format *Data in graph form with no error bars (no SD, SE or CI provided).*
Carney, Patricia A, Hatch, Brigit, Stock, Isabel et al. (2019) A stepped-wedge cluster randomized trial designed to improve completion of HPV vaccine series and reduce missed opportunities to vaccinate in rural primary care practices. Implementation science : IS 14(1): 30	- Protocol for a future study
Carolan, Kate, Verran, Joanna, Crossley, Matthew et al. (2018) Impact of educational interventions on adolescent attitudes and knowledge regarding vaccination: A pilot study. PloS one 13(1): e0190984	- Does not contain an outcome of relevance to this review
Carter, W B; Beach, L R; Inui, T S (1986) The flu shot study: using multiattribute utility theory to design a vaccination intervention. Organizational behavior and human decision processes 38(3): 378-91	- Study published before 1990 date limit set in review protocol - The study did not report any of the outcomes specified in the protocol
Caskey, R; Weiner, S; Gerber, B (2011) Exam-room based education to influence vaccination behavior among veteran patients in a primary care setting. Journal of general internal medicine 26: S271	- Conference abstract
Cassidy B, Braxter B, Charron-Prochownik D et al. (2014) A quality improvement initiative to increase HPV vaccine rates using an educational and reminder strategy with parents of preteen girls. Journal of pediatric health care : official publication of National Association of Pediatric Nurse Associates & Practitioners 28(2): 155-164	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Cataldi, J.R., Habesland, M., Anderson-Mellies, A. et al. (2020) The potential population-based impact of an HPV vaccination intervention in Colorado. Cancer Medicine 9(4): 1553-1561	- Does not contain an outcome of relevance to this review *The paper is a follow up study looking at implementing a relevant intervention in Colorado rather then the effectiveness of the intervention itself.*
Cates, Joan R, Diehl, Sandra J, Crandell, Jamie L et al. (2014) Intervention effects from a social marketing campaign to promote HPV vaccination in preteen boys. Vaccine 32(33): 4171-8	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Chamberlain, Allison T, Seib, Katherine, Ault, Kevin A et al. (2016) Impact of a multi-component antenatal vaccine promotion package on improving knowledge, attitudes and beliefs about influenza and Tdap vaccination during pregnancy. Human vaccines & immunotherapeutics 12(8): 2017-2024	- Does not contain an outcome of relevance to this review
Chan, Sophia S C, Leung, Doris Y P, Leung, Angela Y M et al. (2015) A nurse-delivered brief health education intervention to improve pneumococcal vaccination rate among older patients with chronic diseases: a cluster randomized controlled trial. International journal of nursing studies 52(1): 317-24	- Study took place in a non-OECD country
Chau, Janita Pak Chun, Lo, Suzanne Hoi Shan, Choi, Kai Chow et al. (2020) Effects of a multidisciplinary team-led school-based human papillomavirus vaccination health-promotion programme on improving vaccine acceptance and uptake among female adolescents: A cluster randomized controlled trial. Medicine 99(37): e22072	- Study took place in a non-OECD country
Chien AT; Li Z; Rosenthal MB (2010) Improving timely childhood immunizations through pay for performance in Medicaid-managed care. Health services research 45(6 Pt 2): 1934-1947	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This study was an interrupted time series.*
Closser, Svea, Rosenthal, Anat, Maes, Kenneth et al. (2016) The Global Context of Vaccine Refusal: Insights from a Systematic	- Study took place in a non-OECD country

Study	Reason for exclusion
Comparative Ethnography of the Global Polio Eradication Initiative. Medical Anthropology Quarterly 30(3): 321	
Coley, K.C., Gessler, C., McGivney, M. et al. (2020) Increasing adult vaccinations at a regional supermarket chain pharmacy: A multi-site demonstration project. Vaccine 38(24): 4044-4049	- Data not reported in an extractable format *The number of participants considered for vaccination was not provided. They only reported the number of vaccinations given.*
Collins, Brian K, Morrow, Helen E, Ramirez, Jennifer M et al. (2006) Childhood immunization coverage in US states: the impact of state policy interventions and programmatic support. Journal of health & social policy 22(1): 77-92	- Not a review of published literature *Study uses a survey to review the impact of interventions.*
Connors, John T; Slotwinski, Kate L; Hodges, Eric A (2017) Provider-parent Communication When Discussing Vaccines: A Systematic Review. Journal of pediatric nursing 33: 10-15	- Systematic review that does not include the outcomes stated in the protocol
Cooper Robbins, Spring Chenoa; Ward, Kirsten; Skinner, S Rachel (2011) School-based vaccination: a systematic review of process evaluations. Vaccine 29(52): 9588-99	- Systematic review used as source of primary studies
Cooper, S.C., Davies, C., McBride, K. et al. (2016) Development of a human papillomavirus vaccination intervention for Australian adolescents. Health Education Journal 75(5): 610-620	- The study did not report any of the outcomes specified in the protocol
Cory, L., Cha, B., Ellenberg, S. et al. (2019) Effects of Educational Interventions on Human Papillomavirus Vaccine Acceptability: A Randomized Controlled Trial. Obstetrics and Gynecology 134(2): 376-384	- Study participants are the wrong age group *The mean age of the participants was 24 years (SD 4). For HPV vaccination, the protocol is for participants aged 11-18 years.*
Costantino, C., Restivo, V., Ventura, G. et al. (2018) Increased vaccination coverage among adolescents and young adults in the	- Education non-RCT. Excluded because there

Study	Reason for exclusion
district of Palermo as a result of a public health strategy to counteract an 'epidemic panic'. International Journal of Environmental Research and Public Health 15(5): 1014	was sufficient RCT evidence for this review *This was a before-and-after information/education study.*
Costantino, Claudio, Caracci, Francesca, Brandi, Mariarosa et al. (2020) Determinants of vaccine hesitancy and effectiveness of vaccination counseling interventions among a sample of the general population in Palermo, Italy. Human vaccines & immunotherapeutics: 1-7	- Does not contain an outcome of relevance to this review
Cox, Dena S, Cox, Anthony D, Sturm, Lynne et al. (2010) Behavioral interventions to increase HPV vaccination acceptability among mothers of young girls. Health psychology : official journal of the Division of Health Psychology, American Psychological Association 29(1): 29-39	- Does not contain an outcome of relevance to this review *This study looks at vaccination intention, not uptake.*
Coyle, Christina M and Currie, Brian P (2004) Improving the rates of inpatient pneumococcal vaccination: impact of standing orders versus computerized reminders to physicians. Infection control and hospital epidemiology 25(11): 904-7	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Crawford, N.W., Barfield, C., Hunt, R.W. et al. (2014) Improving preterm infants' immunisation status: A follow-up audit. Journal of Paediatrics and Child Health 50(4): 314-318	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Crocker-Buque, Tim; Edelstein, Michael; Mounier-Jack, Sandra (2017) Interventions to reduce inequalities in vaccine uptake in children and adolescents aged <19 years: a systematic review. Journal of epidemiology and community health 71(1): 87-97	- Systematic review used as source of primary studies
Crocker-Buque, Tim and Mounier-Jack, Sandra (2018) Vaccination in England: a review of why business as usual is not enough to maintain coverage. BMC public health 18(1): 1351	- Systematic review used as source of primary studies
Cuff, R.D., Buchanan, T., Pelkofski, E. et al. (2016) Rates of human papillomavirus vaccine uptake amongst girls five years after introduction of statewide mandate in Virginia Presented as a podium presentation at the Annual Meeting of the South Atlantic Association of Obstetricians and Gynecologists, Charleston, South Carolina,	- Conference abstract

Study	Reason for exclusion
January 30-February 2, 2016. American Journal of Obstetrics and Gynecology 214(6): 752	
Cuff, Ryan D, Buchanan, Tommy, Pelkofski, Elizabeth et al. (2016) Rates of human papillomavirus vaccine uptake amongst girls five years after introduction of statewide mandate in Virginia. American journal of obstetrics and gynecology 214(6): 752e1-6	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Curran, Eileen A; Bednarczyk, Robert A; Omer, Saad B (2013) Evaluation of the frequency of immunization information system use for public health research. Human vaccines & immunotherapeutics 9(6): 1346-50	- Systematic review that does not include the outcomes stated in the protocol *Review evaluating the use of an information system in research*
Cutrona, S.L., Golden, J.G., Goff, S.L. et al. (2018) Improving Rates of Outpatient Influenza Vaccination Through EHR Portal Messages and Interactive Automated Calls: A Randomized Controlled Trial. Journal of General Internal Medicine 33(5): 659-667	- Study participants are the wrong age group *59% of the participants were younger than 50 years. This study has pneumococcal vaccine uptake data but this vaccine is routinely given to people aged 65 years and older in the UK.*
Czajka, H., Lauterbach, R., Pawlik, D. et al. (2017) Implementation of mandatory vaccinations against diphtheria, tetanus and pertussis in preterm infants as part of the Polish Immunization Programme. Pediatria Polska 92(5): 485-493	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study about mandatory vaccinations. The 2 subgroups of babies in the intervention arm all received the same intervention.*

Study	Reason for exclusion
Daku, Mark; Raub, Amy; Heymann, Jody (2012) Maternal leave policies and vaccination coverage: a global analysis. Social science & medicine (1982) 74(2): 120-4	- Not a relevant study design *This is a global survey that looks at correlations.*
Daley, Matthew F, MD, Narwaney, Komal J, MPH, PhD, Shoup, Jo Ann, PhD et al. (2018) Addressing Parents' Vaccine Concerns: A Randomized Trial of a Social Media Intervention. American Journal of Preventive Medicine 55(1): 44	- Does not contain an outcome of relevance to this review
Das, J.K., Salam, R.A., Arshad, A. et al. (2016) Systematic Review and Meta-Analysis of Interventions to Improve Access and Coverage of Adolescent Immunizations. Journal of Adolescent Health 59(2supplement): 40-s48	- Systematic review used as source of primary studies
Davies, C., Skinner, S.R., Stoney, T. et al. (2017) 'Is it like one of those infectious kind of things?' The importance of educating young people about HPV and HPV vaccination at school. Sex Education 17(3): 256-275	- Does not contain an outcome of relevance to this review
Davis TC, Fredrickson DD, Arnold C et al. (1998) A polio immunization pamphlet with increased appeal and simplified language does not improve comprehension to an acceptable level. Patient education and counseling 33(1): 25-37	- The study did not report any of the outcomes specified in the protocol
de Oliveira Bressane Lima, P., van Lier, A., de Melker, H. et al. (2020) MenACWY vaccination campaign for adolescents in the Netherlands: Uptake and its determinants. Vaccine 38(34): 5516-5524	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
deHart, M.P., Salinas, S.K., Barnette Jr., L.J. et al. (2005) Project Protect: Pneumococcal vaccination in Washington State nursing homes. Journal of the American Medical Directors Association 6(2): 91-96	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review
Dempsey AF, Maertens J, Beaty B et al. (2015) Characteristics of users of a tailored, interactive website for parents and its impact on adolescent vaccination attitudes and uptake. BMC research notes 8: 739	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Dempsey AF, Zimet GD, Davis RL et al. (2006) Factors that are associated with parental acceptance of human papillomavirus vaccines: a randomized intervention study of written information about HPV. Pediatrics 117(5): 1486-1493	- The study did not report any of the outcomes specified in the protocol
Dempsey Amanda, F, Pyrznawoski, Jennifer, Lockhart, Steven et al. (2018) Effect of a Health Care Professional Communication Training Intervention on Adolescent Human Papillomavirus Vaccination: a Cluster Randomized Clinical Trial. 172	- Duplicate reference *Dempsey 2015 was included in this evidence review.*
Dempsey, A.F., Pyrzanowski, J., Campbell, J. et al. (2020) Cost and reimbursement of providing routine vaccines in outpatient obstetrician/gynecologist settings. American Journal of Obstetrics and Gynecology 223(4): 562	- Duplicate reference *This is an economic analysis of O'Leary 2019: "Effectiveness of a multimodal intervention to increase vaccination in obstetrics/gynecology settings"*
Dempsey, A.F. and Zimet, G.D. (2015) Interventions to Improve Adolescent Vaccination: What May Work and What Still Needs to Be Tested. Vaccine 33(supplement4): d106-d113	- Review article but not a systematic review
Dempsey, Amanda F and Zimet, Gregory D (2015) Interventions to Improve Adolescent Vaccination: What May Work and What Still Needs to Be Tested. American journal of preventive medicine 49(6suppl4): 445-54	- Duplicate reference *Article published in a different journal concurrently with identical text.*
Desai, Sonali P, Lu, Bing, Szent-Gyorgyi, Lara E et al. (2013) Increasing pneumococcal vaccination for immunosuppressed patients: a cluster quality improvement trial. Arthritis and rheumatism 65(1): 39-47	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Deshmukh, Uma, Oliveira, Carlos R, Griggs, Susan et al. (2018) Impact of a clinical interventions bundle on uptake of HPV vaccine at an OB/GYN clinic. Vaccine 36(25): 3599-3605	- Vaccine on UK routine schedule but wrong context for administration *The mean age of the women receiving the HPV vaccine was 22 years.*

Study	Reason for exclusion
Dexheimer, Judith W, Jones, Ian, Waitman, Russ et al. (2006) Prospective evaluation of a closed-loop, computerized reminder system for pneumococcal vaccination in the emergency department. AMIA ... Annual Symposium proceedings. AMIA Symposium: 910	- Conference abstract
Dexheimer, Judith W, Talbot, Thomas R 3rd, Ye, Fei et al. (2011) A computerized pneumococcal vaccination reminder system in the adult emergency department. Vaccine 29(40): 7035-41	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Dexheimer, Judith W, Talbot, Thomas R, Ye, Fei et al. (2008) Implementing a computerized pneumococcal vaccination reminder system in an emergency department: a prospective study. AMIA ... Annual Symposium proceedings. AMIA Symposium: 867	- Conference abstract
Dexter LJ, Teare MD, Dexter M et al. (2012) Strategies to increase influenza vaccination rates: outcomes of a nationwide cross-sectional survey of UK general practice. BMJ open 2(3)	- Data not reported in an extractable format *The number of participants in each arm was not provided. The study mentions supplementary tables but they are not provided on the journal's website.*
Dexter, P R, Perkins, S, Overhage, J M et al. (2001) A computerized reminder system to increase the use of preventive care for hospitalized patients. The New England journal of medicine 345(13): 965-70	- Data not reported in an extractable format *Pneumonococcal vaccine uptake data reported per hospitalisation and not per person.*
Dini, E F, Chaney, M, Moolenaar, R L et al. (1996) Information as intervention: how Georgia used vaccination coverage data to double public sector vaccination coverage in seven years. Journal of public health management and practice : JPHMP 2(1): 45-9	- Review article but not a systematic review
Dini; Linkins; Sigafoos (2000) The impact of computer-generated messages on childhood immunization coverage(2)(2). American journal of preventive medicine 19(1): 68-70	- Duplicate reference

Study	Reason for exclusion
Dini; Linkins; Sigafoos (2000) The impact of computer-generated messages on childhood immunization coverage(2)(2). American journal of preventive medicine 19(1): 68-70	- Duplicate reference
Dixon, B, Downs, S, Zhang, Z et al. (2016) A mhealth intervention trial to improve HPV vaccination rates in urban primary care clinics. Sexually transmitted diseases 43(10): S199	- Conference abstract
Dixon, Brian E, Kasting, Monica L, Wilson, Shannon et al. (2017) Health care providers' perceptions of use and influence of clinical decision support reminders: qualitative study following a randomized trial to improve HPV vaccination rates. BMC medical informatics and decision making 17(1): 119	- Does not contain an outcome of relevance to this review *The quanitative study is Zimet 2018, which is detailed elsewhere. Dixon 2017 has qualitative findings.*
Djibuti, M., Gotsadze, G., Zoidze, A. et al. (2009) The role of supportive supervision on immunization program outcome - A randomized field trial from Georgia. BMC International Health and Human Rights 9(suppl1): 11	- Study took place in a non-OECD country
Dona, Daniele, Masiero, Susanna, Brisotto, Sara et al. (2018) Special Immunization Service: A 14-year experience in Italy. PloS one 13(4): e0195881	- Not a relevant study design
Donahue K, Hendrix K, Sturm L et al. (2018) Provider Communication and Mothers' Willingness to Vaccinate Against Human Papillomavirus and Influenza: A Randomized Health Messaging Trial. Academic pediatrics 18(2): 145-153	- The study did not report any of the outcomes specified in the protocol
Donnelly, Amber (2008) HPV vaccination: Parental perspectives in Omaha, Nebraska. Dissertation Abstracts International: Section B: The Sciences and Engineering 69(5b): 2941	- Full text paper or book article is unavailable *Dissertation abstract*
Dorell, Christina G, Yankey, David, Santibanez, Tammy A et al. (2011) Human papillomavirus vaccination series initiation and completion, 2008-2009. Pediatrics 128(5): 830-9	- Not a relevant study design *Survey that looks at correlations/risk factors.*

Study	Reason for exclusion
Dubowitz H., Feigelman S. LW&KJ (2009) Pediatric primary care to help prevent child maltreatment: the Safe Environment for Every Kid (SEEK) model. Pediatrics: 858-864	- Study does not contain an intervention aimed at increasing vaccine uptake *This study is about preventing child mistreatment via social work etc. There is no mention of interventions to increase vaccination uptake in the methods section.*
Dumo P, Dougherty J SM (2002) Impact of clinical pharmacists on vaccination rates in medicine, surgery, and infectious disease services: a randomized, controlled trial. Pharmacotherapy 10: 1347–8	- Conference abstract
Dylag, Andrew M and Shah, Shetal I (2008) Administration of tetanus, diphtheria, and acellular pertussis vaccine to parents of high-risk infants in the neonatal intensive care unit. Pediatrics 122(3): e550-5	- Does not contain an outcome of relevance to this review *This study does not have a comparator.*
Eason E, Naus M, Sciberras J et al. (2001) Evaluation of an institution-based protocol for postpartum rubella vaccination. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 165(10): 1321-1323	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Eckrode, Carl; Church, Nancy; English, Woodruff J 3rd (2007) Implementation and evaluation of a nursing assessment/standing orders-based inpatient pneumococcal vaccination program. American journal of infection control 35(8): 508-15	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Eid, Deeb D; Meagher, Rebecca C; Lengel, Aaron J (2015) The Impact of Pharmacist Interventions on Herpes Zoster Vaccination Rates. The Consultant pharmacist : the journal of the American Society of Consultant Pharmacists 30(8): 459-62	- Review article but not a systematic review
Ellerbeck, Edward F, Totten, Bonnie, Markello, Samuel et al. (2003) Quality improvement in critical access hospitals: addressing immunizations prior to discharge. The Journal of rural health : official journal of the American Rural Health Association and the National Rural Health Care Association 19(4): 433-8	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Ellis, Catherine; Roland, Damian; Blair, Mitch E (2013) Professional educational interventions designed to improve knowledge and uptake of immunisation. Community practitioner : the journal of the Community Practitioners' & Health Visitors' Association 86(6): 20-3	- More recent systematic review identified that covers the same topic
Ernst, Kimberly D (2017) Electronic Alerts Improve Immunization Rates in Two-month-old Premature Infants Hospitalized in the Neonatal Intensive Care Unit. Applied clinical informatics 8(1): 206-213	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Fadda, Marta, Galimberti, Elisa, Fiordelli, Maddalena et al. (2018) Evaluation of a Mobile Phone-Based Intervention to Increase Parents' Knowledge About the Measles-Mumps-Rubella Vaccination and Their Psychological Empowerment: Mixed-Method Approach. JMIR mHealth and uHealth 6(3): e59	- Does not contain an outcome of relevance to this review
Fairbrother, G., Friedman, S., Hanson, K.L. et al. (1997) Effect of the vaccines for children program on inner-city neighborhood physicians. Archives of Pediatrics and Adolescent Medicine 151(12): 1229-1235	- The intervention is a free vaccine- not in scope
Fiks, AG; Luan, X; Mayne, SL (2016) Improving HPV Vaccination Rates Using Maintenance-of-Certification Requirements. Pediatrics 137(3): e20150675	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Findley, Sally E, Irigoyen, Matilde, Sanchez, Martha et al. (2008) Effectiveness of a community coalition for improving child vaccination rates in New York City. American journal of public health 98(11): 1959-62	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Fishbein, DB, Willis, BC, Cassidy, WM et al. (2006) A comprehensive patient assessment and physician reminder tool for adult immunization: effect on vaccine administration. Vaccine 24(18): 3971-3983	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Fisher-Borne, Marcie, Preiss, Alexander J, Black, Molly et al. (2018) Early Outcomes of a Multilevel Human Papillomavirus Vaccination Pilot Intervention in Federally Qualified Health Centers. Academic pediatrics 18(2s): 79-s84	- Data not reported in an extractable format *The number of participants was not provided.*

Study	Reason for exclusion
Flanagan, J R, Doebbeling, B N, Dawson, J et al. (1999) Randomized study of online vaccine reminders in adult primary care. Proceedings. AMIA Symposium: 755-9	- Does not contain an outcome of relevance to this review *Study reports ordering of vaccination by physician not if it was administered.*
Flood, T., Wilson, I.M., Prue, G. et al. (2020) Impact of school-based educational interventions in middle adolescent populations (15-17yrs) on human papillomavirus (HPV) vaccination uptake and perceptions/knowledge of HPV and its associated cancers: A systematic review. Preventive Medicine 139: 106168	- Systematic review used as source of primary studies *Some studies are non-OECD*
Fogarty, Kieran J, Massoudi, Mehran S, Gallo, William et al. (2004) Vaccine coverage levels after implementation of a middle school vaccination requirement, Florida, 1997-2000. Public health reports (Washington, D.C. : 1974) 119(2): 163-9	- Does not contain an outcome of relevance to this review *This study only reports data after the intervention is implemented - there is no 'before' comparison data.*
Forbes, Thomas A, McMinn, Alissa, Crawford, Nigel et al. (2015) Vaccination uptake by vaccine-hesitant parents attending a specialist immunization clinic in Australia. Human vaccines & immunotherapeutics 11(12): 2895-903	- Does not contain an outcome of relevance to this review *This study does not have a comparator.*
Ford, A.J. and Alwan, N.A. (2018) Use of social networking sites and women's decision to receive vaccinations during pregnancy: A cross-sectional study in the UK. Vaccine 36(35): 5294-5303	- Does not contain an outcome of relevance to this review
Forster, A, Cornelius, V, Rockliffe, L et al. (2018) A cluster randomised feasibility study of an adolescent incentive intervention to increase uptake of HPV vaccination. British journal of cancer. Conference: 2018 national cancer research institute cancer conference, NCRI 2018. United kingdom 119(1): 34	- Conference abstract
Forster, Alice S, Cornelius, Victoria, Rockliffe, Lauren et al. (2017) A protocol for a cluster randomised feasibility study of an adolescent incentive intervention to increase uptake of HPV vaccination among girls. Pilot and feasibility studies 3: 13	- Protocol for a future study *This is the protocol for Forester 2018, which is also considered in this review.*

Study	Reason for exclusion
Forster, Alice S, Cornelius, Victoria, Rockliffe, Lauren et al. (2017) A cluster randomised feasibility study of an adolescent incentive intervention to increase uptake of HPV vaccination. British journal of cancer 117(8): 1121-1127	- Does not contain an outcome of relevance to this review *Vaccine uptake may have been recorded during the study but the data was not included in the results section.*
Frame, P S, Zimmer, J G, Werth, P L et al. (1994) Computer-based vs manual health maintenance tracking. A controlled trial. Archives of family medicine 3(7): 581-8	- Vaccine on UK routine schedule but wrong context for administration *Study is about adult tetanus boosters in the USA.*
Francis, Diane B, Cates, Joan R, Wagner, Kyla P Garrett et al. (2017) Communication technologies to improve HPV vaccination initiation and completion: A systematic review. Patient education and counseling 100(7): 1280-1286	- More recent systematic review identified that covers the same topic
Franco, M., Mazzucca, S., Padek, M. et al. (2019) Going beyond the individual: how state-level characteristics relate to HPV vaccine rates in the United States. BMC public health 19(1): 246	- Not a relevant study design *This is a snap-shot of a national survey.*
Franzini, Luisa; Boom, Julie; Nelson, Cynthia (2007) Cost-effectiveness analysis of a practice-based immunization education intervention. Ambulatory pediatrics : the official journal of the Ambulatory Pediatric Association 7(2): 167-75	- Study includes data on a vaccine that is not on the UK routine vaccination schedule *This study does not separate out the data on varicella vaccine uptake, which is not on the UK routine vaccination schedule.*
Frascella, B., Oradini-Alacreu, A., Balzarini, F. et al. (2020) Effectiveness of email-based reminders to increase vaccine uptake: a systematic review. Vaccine 38(3): 433-443	- Systematic review used as source of primary studies

Study	Reason for exclusion
Free, Caroline, Phillips, Gemma, Felix, Lambert et al. (2010) The effectiveness of M-health technologies for improving health and health services: a systematic review protocol. BMC research notes 3: 250	- Review article but not a systematic review
Frew PM, Owens LE, Saint-Victor DS et al. (2014) Factors associated with maternal influenza immunization decision-making. Evidence of immunization history and message framing effects. Human vaccines & immunotherapeutics 10(9): 2576-2583	- Does not contain an outcome of relevance to this review *The outcome is intention to vaccinate, not vaccine uptake.*
Frew, Paula M and Lutz, Chelsea S (2017) Interventions to increase pediatric vaccine uptake: An overview of recent findings. Human vaccines & immunotherapeutics 13(11): 2503-2511	- Systematic review used as source of primary studies
Fried, Bruce J, Keyes-Elstein, Lynette, Lannon, Carole M et al. (2004) Practice based education to improve delivery systems for prevention in primary care: randomised trial. British Medical Journal 328(7436): 388-392	- Duplicate reference *This study is the same as Margolis 2004, which was excluded because the vaccine uptake data is only presented in a chart. This abstract entry has a different order of authors. It is otherwise identical.*
Frère J, De Wals P, Ovetchkine P et al. (2013) Evaluation of several approaches to immunize parents of neonates against B. pertussis. Vaccine 31(51): 6087-6091	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Fu, Linda Y, Bonhomme, Lize-Anne, Cooper, Spring Chenoa et al. (2014) Educational interventions to increase HPV vaccination acceptance: a systematic review. Vaccine 32(17): 1901-20	- More recent systematic review identified that covers the same topic
Fu, LY, Zook, K, Gingold, JA et al. (2016) Strategies for Improving Vaccine Delivery: a Cluster-Randomized Trial. Pediatrics 137(6)	- Study includes data on a vaccine that is not on the UK routine vaccination schedule *Varicella vaccine is not on the UK routine vaccination schedule and it is not*

Study	Reason for exclusion
	possible to separate this data out from other vaccines' uptake data.
Fujiwara, Hiroyuki, Takei, Yuji, Ishikawa, Yoshiki et al. (2013) Community-based interventions to improve HPV vaccination coverage among 13- to 15-year-old females: measures implemented by local governments in Japan. PloS one 8(12): e84126	- Not a relevant study design *This is a survey that analyses interventions as if they were 'risk factors' increasing uptake.*
Gaglani, M, Riggs, M, Kamenicky, C et al. (2001) A computerized reminder strategy is effective for annual influenza immunization of children with asthma or reactive airway disease. The Pediatric infectious disease journal 20(12): 1155-60	- The study did not report any of the outcomes specified in the protocol
Gagneur, Arnaud, Lemaitre, Thomas, Gosselin, Virginie et al. (2018) A postpartum vaccination promotion intervention using motivational interviewing techniques improves short-term vaccine coverage: PromoVac study. BMC public health 18(1): 811	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Gamble, George R; Goldstein, Adam O; Bearman, Rachel S (2008) Implementing a standing order immunization policy: a minimalist intervention. Journal of the American Board of Family Medicine : JABFM 21(1): 38-44	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Gannon M, Qaseem A, Snooks Q et al. (2012) Improving adult immunization practices using a team approach in the primary care setting. American journal of public health 102(7): e46	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Gargano, Lisa M, Herbert, Natasha L, Painter, Julia E et al. (2014) Development, theoretical framework, and evaluation of a parent and teacher-delivered intervention on adolescent vaccination. Health promotion practice 15(4): 556-67	- Does not contain an outcome of relevance to this review

Study	Reason for exclusion
Gates, A., Gates, M., Rahman, S. et al. (2021) A systematic review of factors that influence the acceptability of vaccines among Canadians. Vaccine 39(2): 222-236	- Not a relevant study design
Gazibara, T.; Jia, H.; Lubetkin, E.I. (2017) Trends in HPV vaccine initiation and completion among girls in Texas: Behavioral risk factor surveillance system data, 2008-2010. Puerto Rico Health Sciences Journal 36(3): 152-158	- Study does not contain an intervention aimed at increasing vaccine uptake
Gellert, Paul; Bethke, Norma; Seybold, Joachim (2019) School-based educational and on-site vaccination intervention among adolescents: study protocol of a cluster randomised controlled trial. BMJ open 9(1): e025113	- Protocol for a future study
Ghadieh, A.S., Hamadeh, G.N., Mahmassani, D.M. et al. (2015) The effect of various types of patients' reminders on the uptake of pneumococcal vaccine in adults: A randomized controlled trial. Vaccine 33(43): 5868-5872	- Study took place in a non-OECD country *Lebanon*
Gidengil, Courtney, Chen, Christine, Parker, Andrew M et al. (2019) Beliefs around childhood vaccines in the United States: A systematic review. Vaccine 37(45): 6793-6802	- Not a relevant study design *Qualitative study - considered for the qualitative review*
Giles EL, Robalino S, McColl E, Sniehotta FF, Adams J (2014) The effectiveness of financial incentives for health behaviour change: systematic review and meta-analysis. PLOS ONE 9(3): e90347	- Systematic review that does not include the outcomes stated in the protocol *Review focuses on financial incentives for behaviour change and covers changes in vaccination, but included references are not for routine vaccinations included in our protocol.*
Gilkey, Melissa B and McRee, Annie-Laurie (2016) Provider communication about HPV vaccination: A systematic review. Human vaccines & immunotherapeutics 12(6): 1454-68	- Systematic review that does not include relevant study types *Review of surveys and qualitative studies*

Study	Reason for exclusion
Gindler, J.S., Cutts, F.T., Barnett-Antinori, M.E. et al. (1993) Successes and failures in vaccine delivery: Evaluation of the immunization delivery system in Puerto Rico. Pediatrics 91(2): 315-320	- Not a relevant study design *Survey snapshot of Puerto Rico.*
Girard, Dorota Zdanowska (2012) Recommended or mandatory pertussis vaccination policy in developed countries: does the choice matter?. Public health 126(2): 117-22	- Review article but not a systematic review
Gleeson S; Kelleher K; Gardner W (2016) Evaluating a Pay-for-Performance Program for Medicaid Children in an Accountable Care Organization. JAMA pediatrics 170(3): 259-266	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before and after study.*
Glenton, Claire, Scheel, Inger B, Lewin, Simon et al. (2011) Can lay health workers increase the uptake of childhood immunisation? Systematic review and typology. Tropical medicine & international health : TM & IH 16(9): 1044-53	- Systematic review used as source of primary studies
Goebel, LJ (1997) A peer review feedback method of promoting compliance with preventive care guidelines in a resident ambulatory care clinic. Joint Commission journal on quality improvement 23(4): 196-202	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Golden, Shelley D, Moracco, Kathryn E, Feld, Ashley L et al. (2014) Process evaluation of an intervention to increase provision of adolescent vaccines at school health centers. Health education & behavior : the official publication of the Society for Public Health Education 41(6): 625-32	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Gordon, Louisa G, Holden, Libby, Ware, Robert S et al. (2012) Comprehensive health assessments for adults with intellectual disability living in the community: Weighing up the costs and benefits. Australian Family Physician 41(12): 969-72	- Vaccine on UK routine schedule but wrong context for administration *The mean age of participants was 36 years (SD 13). For the pneumonia vaccine. This is younger than the committee's cut-off mean age of 50 years.*

Study	Reason for exclusion
Gori, D., Costantino, C., Odone, A. et al. (2020) The impact of mandatory vaccination law in Italy on mmr coverage rates in two of the largest italian regions (Emilia-romagna and sicily): An effective strategy to contrast vaccine hesitancy. Vaccines 8(1): 57	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Gosselin Boucher, Vincent, Colmegna, Ines, Gemme, Claudia et al. (2019) Interventions to improve vaccine acceptance among rheumatoid arthritis patients: a systematic review. Clinical rheumatology 38(6): 1537-1544	- Systematic review used as source of primary studies
Gottlieb, N H, Huang, P P, Blozis, S A et al. (2001) The impact of Put Prevention into Practice on selected clinical preventive services in five Texas sites. American journal of preventive medicine 21(1): 35-40	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Grant, C.C., Turner, N.M., York, D.G. et al. (2010) Factors associated with immunisation coverage and timeliness in New Zealand. British Journal of General Practice 60(572): 180-186	- Not a relevant study design *Survey snapshot of New Zealand.*
Green, D., Labriola, G., Smeaton, L. et al. (2017) Prevention of neonatal whooping cough in England: The essential role of the midwife. British Journal of Midwifery 25(4): 224-228	- Review article but not a systematic review
Greyson, Devon; Vriesema-Magnuson, Chris; Bettinger, Julie A (2019) Impact of school vaccination mandates on pediatric vaccination coverage: a systematic review. CMAJ open 7(3): e524-e536	- Systematic review used as source of primary studies
Groom, Holly C, Irving, Stephanie A, Caldwell, Jessica et al. (2017) Implementing a Multipartner HPV Vaccination Assessment and Feedback Intervention in an Integrated Health System. Journal of public health management and practice : JPHMP 23(6): 589-592	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Groom, Holly, Hopkins, David P, Pabst, Laura J et al. (2015) Immunization information systems to increase vaccination rates: a	- Systematic review used as source of primary studies

Study	Reason for exclusion
community guide systematic review. Journal of public health management and practice : JPHMP 21(3): 227-48	
Gruber, T and Marada, R (2000) Improving pneumococcal vaccination rates for elderly patients. New Jersey medicine : the journal of the Medical Society of New Jersey 97(2): 35-9	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review *This was a before-and-after study.*
Guo, J.-L.; Gottlieb, N.H.; Huang, C.-M. (2002) Effects of office system and educational interventions in increasing the delivery of preventive health services: A meta-analysis. Taiwan Journal of Public Health 21(1): 36-51	- More recent systematic review identified that covers the same topic *SR is not specific to increasing vaccination and other more relevant and up to date SRs identified.*
Gust, Deborah A, Kennedy, Allison, Weber, Deanne et al. (2009) Parents questioning immunization: evaluation of an intervention. American journal of health behavior 33(3): 287-98	- Does not contain an outcome of relevance to this review
Haesebaert J, Lutringer-Magnin D, Kalecinski J et al. (2012) French women's knowledge of and attitudes towards cervical cancer prevention and the acceptability of HPV vaccination among those with 14 - 18 year old daughters: a quantitative-qualitative study. BMC public health 12: 1034	- The study did not report any of the outcomes specified in the protocol
Haji, Adam, Lowther, S, Ngan'ga, Z et al. (2016) Reducing routine vaccination dropout rates: evaluating two interventions in three Kenyan districts, 2014. BMC public health 16: 152	- Study took place in a non-OECD country
Hajizadeh, Mohammad, Heymann, Jody, Strumpf, Erin et al. (2015) Paid maternity leave and childhood vaccination uptake: Longitudinal evidence from 20 low-and-middle-income countries. Social science & medicine (1982) 140: 104-17	- Systematic review of non-OECD countries
Hakim, Hina, Provencher, Thierry, Chambers, Christine T et al. (2019) Interventions to help people understand community immunity: A systematic review. Vaccine 37(2): 235-247	- Systematic review used as source of primary studies
Hansen, P.R.; Schmidtblaicher, M.; Brewer, N.T. (2020) Resilience of HPV vaccine uptake in Denmark: Decline and recovery. Vaccine 38(7): 1842-1848	- Education non-RCT. Excluded because there

Study	Reason for exclusion
	was sufficient RCT evidence for this review
Harper, P and Madlon-Kay, D J (1994) Adolescent measles vaccination. Response rates to mailings addressed to patients vs parents. Archives of family medicine 3(7): 619-22	- Study participants are the wrong age group *This study is a measles catch-up campaign for adolescents aged 12 to 18 years. MMR is on the routine schedule for children aged 0-5 years. Catch-up campaigns are out of scope.*
Harvey, Hannah; Reissland, Nadja; Mason, James (2015) Parental reminder, recall and educational interventions to improve early childhood immunisation uptake: A systematic review and meta-analysis. Vaccine 33(25): 2862-80	- Systematic review used as source of primary studies
Hastings, Tessa J, Hohmann, Lindsey A, Huston, Sally A et al. (2020) Enhancing pharmacy personnel immunization-related confidence, perceived barriers, and perceived influence: The We Immunize program. Journal of the American Pharmacists Association : JAPhA 60(2): 344-351e2	- Does not contain an outcome of relevance to this review
Hayles, Elizabeth Helen, Cooper, Spring Chenoa, Wood, Nicholas et al. (2015) What predicts postpartum pertussis booster vaccination? A controlled intervention trial. Vaccine 33(1): 228-36	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Healy CM, Ng N, Taylor RS et al. (2015) Tetanus and diphtheria toxoids and acellular pertussis vaccine uptake during pregnancy in a metropolitan tertiary care center. Vaccine 33(38): 4983-4987	- Data not reported in an extractable format *The number of participants in each cohort was not provided.*
Hechter, Rulin C, Qian, Lei, Luo, Yi et al. (2019) Impact of an electronic medical record reminder on hepatitis B vaccine initiation and completion rates among insured adults with diabetes mellitus. Vaccine 37(1): 195-201	- Vaccine on UK routine schedule but wrong context for administration *This study is about HepB vaccination for adults.*

Study	Reason for exclusion
Hempstead, K., Bresnitz, E., Howell-White, S. et al. (2004) Use of a state regulation for adult vaccination. American Journal of Preventive Medicine 26(4): 311-314	- Does not contain an outcome of relevance to this review
Henninger, Michelle L, Mcmullen, Carmit K, Firemark, Alison J et al. (2017) User-Centered Design for Developing Interventions to Improve Clinician Recommendation of Human Papillomavirus Vaccination. The Permanente journal 21: 16-191	- Not a relevant study design
Henrikson, N, Zhu, W, Nguyen, M et al. (2017) Health system-based HPV vaccine reminders: randomized trial results. Cancer epidemiology biomarkers and prevention 26(3): 435	- Conference abstract
Henry SL, Shen E, Ahuja A et al. (2016) The Online Personal Action Plan: A Tool to Transform Patient-Enabled Preventive and Chronic Care. American journal of preventive medicine 51(1): 71-77	- Not a relevant study design *Use of a website for education is treated as a risk factor for vaccine uptake. All participants had access to the same website.*
Herbert, N (2014) Parental attitudes and beliefs about human papillomavirus (HPV) vaccination and vaccine receipt among adolescents in richmond county, Georgia. Journal of adolescent health 54(2): S82	- Conference abstract
Herman, C.J.; Speroff, T.; Cebul, R.D. (1994) Improving compliance with immunization in the older adult: Results of a randomized cohort study. Journal of the American Geriatrics Society 42(11): 1154-1159	- Does not contain an outcome of relevance to this review *This study has data for vaccinations offered. This is not the same thing as uptake.*
Hicks, Paul; Tarr, Gillian A M; Hicks, Ximena Prieto (2007) Reminder cards and immunization rates among Latinos and the rural poor in Northeast Colorado. Journal of the American Board of Family Medicine : JABFM 20(6): 581-6	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Higginbotham, Suzanne; Stewart, Autumn; Pfalzgraf, Andrea (2012) Impact of a pharmacist immunizer on adult immunization rates. Journal of the American Pharmacists Association : JAPhA 52(3): 367-71	- Study participants are the wrong age group *The participants for all 3 arms have a mean age of*

Study	Reason for exclusion
	45 years (SD 12.1). This is the wrong age group for vaccines on the UK routine vaccination schedule.
Ho, Hanley J, Chan, Yin Ying, Ibrahim, Muhamad Alif Bin et al. (2017) A formative research-guided educational intervention to improve the knowledge and attitudes of seniors towards influenza and pneumococcal vaccinations. Vaccine 35(47): 6367-6374	- Does not contain an outcome of relevance to this review
Hofstetter, Annika M, Vargas, Celibell Y, Camargo, Stewin et al. (2015) Impacting delayed pediatric influenza vaccination: a randomized controlled trial of text message reminders. American journal of preventive medicine 48(4): 392-401	- The study did not report any of the outcomes specified in the protocol
Hohmann, L.A., Hastings, T.J., Ha, D.R. et al. (2019) Impact of a multi-component immunization intervention on pneumococcal and herpes zoster vaccinations: A randomized controlled trial of community pharmacies in 2 states. Research in social & administrative pharmacy : RSAP 15(12): 1453-1463	- The study did not report any of the outcomes specified in the protocol *And unable to determine what proportion of individuals were over 65 years of age*
Hohmann, L, Hastings, T, Garza, K et al. (2018) Impact of a multicomponent immunization intervention on pneumococcal and herpes zoster vaccinations: a randomized controlled trial of community pharmacies in two states. Journal of the american pharmacists association 58(3): e71	- Conference abstract
Holloway, Ginger L (2019) Effective HPV Vaccination Strategies: What Does the Evidence Say? An Integrated Literature Review. Journal of pediatric nursing 44: 31-41	- Review article but not a systematic review
Holzman, GS, Harwell, TS, Johnson, EA et al. (2005) A media campaign to promote pneumococcal vaccinations: is a telephone survey an effective evaluation strategy?. Journal of public health management and practice 11(3): 228-234	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Hopfer S, Ray AE, Hecht ML et al. Taking an HPV vaccine research-tested intervention to scale in a clinical setting. Translational behavioral medicine 8(5): 745-752	- The study did not report any of the outcomes specified in the protocol

Study	Reason for exclusion
Houle, Sherilyn K D, McAlister, Finlay A, Jackevicius, Cynthia A et al. (2012) Does performance-based remuneration for individual health care practitioners affect patient care?: a systematic review. Annals of internal medicine 157(12): 889-99	- Systematic review used as source of primary studies
Hui, Charles, Dunn, Jessica, Morton, Rachael et al. (2018) Interventions to Improve Vaccination Uptake and Cost Effectiveness of Vaccination Strategies in Newly Arrived Migrants in the EU/EEA: A Systematic Review. International journal of environmental research and public health 15(10)	- Systematic review used as source of primary studies
Hull, Sally, Hagdrup, Nicola, Hart, Ben et al. (2002) Boosting uptake of influenza immunisation: a randomised controlled trial of telephone appointing in general practice. The British journal of general practice : the journal of the Royal College of General Practitioners 52(482): 712-6	- The study did not report any of the outcomes specified in the protocol
Hutchinson, A.F. and Smith, S.M. (2020) Effectiveness of strategies to increase uptake of pertussis vaccination by new parents and family caregivers: A systematic review. Midwifery 87: 102734	- Systematic review used as source of primary studies
Ibikunle-Salami, Tawa B (2016) Educational intervention to impact parental decisions to consent to Human Papillomavirus vaccine. Dissertation Abstracts International: Section B: The Sciences and Engineering 77(2be): no-specified	- Not a peer-reviewed publication
Ibáñez-Jiménez, A, Pairet-Jofre, G, Prat-González, I et al. (2007) Randomized clinical trial on the effectiveness of a postal reminder to increase tetanus-diphtheria vaccination coverage in the young adult population. Enfermeria clinica 17(4): 171-176	- Study not reported in English
Interaminense, I.N.C.S., de Oliveira, S.C., Leal, L.P. et al. (2016) Educational technologies to promote vaccination against human papillomavirus: Integrative literature review. Texto e Contexto Enfermagem 25(2): e2300015	- More recent systematic review identified that covers the same topic
Irigoyen, M M, Findley, S, Earle, B et al. (2000) Impact of appointment reminders on vaccination coverage at an urban clinic. Pediatrics 106(4suppl): 919-23	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Irigoyen, M., Findley, S.E., Chen, S. et al. (2004) Early continuity of care and immunization coverage. Ambulatory Pediatrics 4(3): 199-203	- Does not contain an outcome of relevance to this review *This study does not compare one arm against another. Continuity of care*

Study	Reason for exclusion
	is analysed like a risk factor for vaccination.
Irving, S.A.; Salmon, D.A.; Curbow, B.A. (2007) Vaccine risk communication interventions in the United States, 1996-2006: A review. Current Pediatric Reviews 3(3): 238-247	- More recent systematic review identified that covers the same topic
Isaac, Michael R, Chartier, Mariette, Brownell, Marni et al. (2015) Can opportunities be enhanced for vaccinating children in home visiting programs? A population-based cohort study. BMC Public Health 15(620)	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Isenor, J E, Edwards, N T, Alia, T A et al. (2016) Impact of pharmacists as immunizers on vaccination rates: A systematic review and meta-analysis. Vaccine 34(47): 5708-5723	- Systematic review used as source of primary studies
Isenor, J.E., Kervin, M.S., Halperin, D.M. et al. (2020) Pharmacists as immunizers to Improve coverage and provider/recipient satisfaction: A prospective, Controlled Community Embedded Study with vaccineS with low coverage rates (the Improve ACCESS Study): Study summary and anticipated significance. Canadian Pharmacists Journal 153(2): 88-94	- Protocol for a future study
ISRCTN20165116 (2003) Randomised trial of pre-pregnancy information and counselling in inner urban Melbourne. http://www.who.int/trialsearch/Trial2.aspx?TrialID=ISRCTN20165116	- Does not contain an outcome of relevance to this review *This is a study registration. They went on to look at birth weight but not vaccine uptake.*
Ito, Tomoko, Takenoshita, Remi, Narumoto, Keiichiro et al. (2014) A community-based intervention in middle schools to improve HPV vaccination and cervical cancer screening in Japan. Asia Pacific family medicine 13(1): 13	- Does not contain an outcome of relevance to this review
Jaca, Anelisa, Mathebula, Lindi, Iweze, Arthur et al. (2018) A systematic review of strategies for reducing missed opportunities for vaccination. Vaccine 36(21): 2921-2927	- Systematic review used as source of primary studies
Jacob, Verughese, Chattopadhyay, Sajal K, Hopkins, David P et al. (2016) Increasing Coverage of Appropriate Vaccinations: A	- Systematic review used as source of primary studies

Study	Reason for exclusion
Community Guide Systematic Economic Review. American journal of preventive medicine 50(6): 797-808	
Jacobs-Wingo, Jasmine L; Jim, Cheyenne C; Groom, Amy V (2017) Human Papillomavirus Vaccine Uptake: Increase for American Indian Adolescents, 2013-2015. American journal of preventive medicine 53(2): 162-168	- Not a relevant study design *This is a survey that looks for associations / risk factors that appear to increase or decrease vaccine uptake.*
Jarrett, Caitlin, Wilson, Rose, O'Leary, Maureen et al. (2015) Strategies for addressing vaccine hesitancy - A systematic review. Vaccine 33(34): 4180-90	- Systematic review used as source of primary studies
Jeannot, Emilien; Petignat, Patrick; Sudre, Philippe (2015) Successful Implementation and Results of an HPV Vaccination Program in Geneva Canton, Switzerland. Public Health Reports 130(3): 202-206	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Joffe, M.D. and Luberti, A. (1994) Effect of emergency department immunization on compliance with primary care. Pediatric Emergency Care 10(6): 317-319	- The intervention is a free vaccine- not in scope
Johnson, Elizabeth A, Harwell, Todd S, Donahue, Peg M et al. (2003) Promoting pneumococcal immunizations among rural Medicare beneficiaries using multiple strategies. The Journal of rural health : official journal of the American Rural Health Association and the National Rural Health Care Association 19(4): 506-10	- Does not contain an outcome of relevance to this review *Does not state number or % vaccinated*
Johnston, Jennifer Cyne, McNeil, Deborah, Lee, Germaeline et al. (2017) Piloting CenteringParenting in Two Alberta Public Health Well-Child Clinics. Public Health Nursing 34(3): 229-237	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Jordan, Elizabeth T, Bushar, Jessica A, Kendrick, Juliette S et al. (2015) Encouraging Influenza Vaccination Among Text4baby Pregnant Women and Mothers. American journal of preventive medicine 49(4): 563-72	- The study did not report any of the outcomes specified in the protocol

Study	Reason for exclusion
Jung, Jesse J, Elkin, Zachary P, Li, Xiaochun et al. (2013) Increasing use of the vaccine against zoster through recommendation and administration by ophthalmologists at a city hospital. American journal of ophthalmology 155(5): 787-95	- The study did not report any of the outcomes specified in the protocol
Juon, Hee-Soon, Strong, Carol, Kim, Frederic et al. (2016) Lay Health Worker Intervention Improved Compliance with Hepatitis B Vaccination in Asian Americans: Randomized Controlled Trial. PloS one 11(9): e0162683	- Study participants are the wrong age group *In the UK, HepB routine vaccination is for infants. Participants in this study are all adults.*
Kamath, Geetanjali (2018) Hepatitis-B vaccination, behavioral cognitions, and changing risk behaviors among a drug using population: Findings from a cluster randomized controlled trial. Dissertation Abstracts International: Section B: The Sciences and Engineering 78(10be): no-specified	- Conference abstract
Katz ML, Oldach BR, Goodwin J et al. (2014) Development and initial feedback about a human papillomavirus (HPV) vaccine comic book for adolescents. Journal of cancer education : the official journal of the American Association for Cancer Education 29(2): 318-324	- The study did not report any of the outcomes specified in the protocol
Kaufman, Jessica, Ryan, Rebecca, Walsh, Louisa et al. (2018) Face-to-face interventions for informing or educating parents about early childhood vaccination. The Cochrane database of systematic reviews 5: cd010038	- Duplicate reference
Kaufman, Jessica, Ryan, Rebecca, Walsh, Louisa et al. (2018) Face-to-face interventions for informing or educating parents about early childhood vaccination. The Cochrane database of systematic reviews 5: cd010038	- Duplicate reference
Kaufman, Jessica, Ryan, Rebecca, Walsh, Louisa et al. (2018) Face-to-face interventions for informing or educating parents about early childhood vaccination. The Cochrane database of systematic reviews 5: cd010038	- Duplicate reference
Kaufman, Jessica, Synnot, Anneliese, Ryan, Rebecca et al. (2013) Face to face interventions for informing or educating parents about early childhood vaccination. The Cochrane database of systematic reviews: cd010038	- More recent systematic review identified that covers the same topic
Kempe, Allison, Saville, Alison, Dickinson, L Miriam et al. (2013) Population-based versus practice-based recall for childhood	- Study includes data on a vaccine that is not on the

Study	Reason for exclusion
immunizations: a randomized controlled comparative effectiveness trial. American journal of public health 103(6): 1116-23	UK routine vaccination schedule *Varicella vaccine uptake was incorporated into the data and could not be separated.*
Kendrick, D, Hewitt, M, Dewey, M et al. (2002) The effect of home visiting programmes on uptake of childhood immunization: a systematic review and meta-analysis. British Journal of Clinical Governance 7(1): 51-52	- Duplicate reference *This is a reprint of Kendrick 2000, which has been considered in this evidence review.*
Kendrick, D, Hewitt, M, Dewey, M et al. (2000) The effect of home visiting programmes on uptake of childhood immunization: a systematic review and meta-analysis. Journal of public health medicine 22(1): 90-8	- Systematic review used as source of primary studies
Kim, C S, Kristopaitis, R J, Stone, E et al. (1999) Physician education and report cards: do they make the grade? results from a randomized controlled trial. The American journal of medicine 107(6): 556-60	- Does not contain an outcome of relevance to this review
Kim, J (2020) The impact of narrative strategy on promoting HPV vaccination among college students in korea: the role of anticipated regret. Vaccines 8(2)	- The study did not report any of the outcomes specified in the protocol - Vaccine on UK routine schedule but wrong context for administration *Vaccination of university students for HPV is not on the UK routine schedule.*
Kim, M, Lee, H, Aronowitz, T et al. (2018) An online-based storytelling video intervention on promoting Korean American female college students' HPV vaccine uptake. Cancer epidemiology biomarkers and prevention 27(7)	- Conference abstract
Kim, MinJin (2018) "I want to know more about the HPV vaccine": Stories by Korean American college women. Dissertation Abstracts International: Section B: The Sciences and Engineering 79(4be): no-specified	- Not a peer-reviewed publication

Study	Reason for exclusion
Kim, Sujin; Hughes, Christine A; Sadowski, Cheryl A (2014) A review of acute care interventions to improve inpatient pneumococcal vaccination. Preventive medicine 67: 119-27	- Systematic review used as source of primary studies
Klein, R S and Adachi, N (1983) Pneumococcal vaccine in the hospital. Improved use and implications for high-risk patients. Archives of internal medicine 143(10): 1878-81	- Study published before 1990 date limit set in review protocol
Klein, RS and Adachi, N (1986) An effective hospital-based pneumococcal immunization program. Archives of internal medicine 146(2): 327-329	- Study published before 1990 date limit set in review protocol
Kolasa, M S, Petersen, T J, Brink, E W et al. (2001) Impact of multiple injections on immunization rates among vulnerable children. American journal of preventive medicine 21(4): 261-6	- Study looks at intervention in the context of introducing a new vaccine
Kolasa, M.S., Chilkatowsky, A.P., Stevenson, J.M. et al. (2003) Do laws bring children in child care centers up to date for immunizations?. Ambulatory Pediatrics 3(3): 154-157	- The study did not report any of the outcomes specified in the protocol
Koniak-Griffin D, Anderson NL, Brecht ML et al. (2002) Public health nursing care for adolescent mothers: impact on infant health and selected maternal outcomes at 1 year postbirth. The Journal of adolescent health : official publication of the Society for Adolescent Medicine 30(1): 44-54	- Duplicate reference *These are the preliminary findings of Koniak-Griffin 2003, which has also been considered in this review.*
Korn, Lars, Betsch, Cornelia, Bohm, Robert et al. (2018) Social nudging: The effect of social feedback interventions on vaccine uptake. Health psychology : official journal of the Division of Health Psychology, American Psychological Association 37(11): 1045-1054	- Does not contain an outcome of relevance to this review
Krantz, Landon, Ollberding, Nicholas J, Beck, Andrew F et al. (2018) Increasing HPV Vaccination Coverage Through Provider-Based Interventions. Clinical pediatrics 57(3): 319-326	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This is a before-and-after study.*

Study	Reason for exclusion
Kreuter, Matthew W, Caburnay, Charlene A, Chen, John J et al. (2004) Effectiveness of individually tailored calendars in promoting childhood immunization in urban public health centers. American journal of public health 94(1): 122-7	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Krishnaswamy, S., Wallace, E.M., Buttery, J. et al. (2018) Strategies to implement maternal vaccination: A comparison between standing orders for midwife delivery, a hospital based maternal immunisation service and primary care. Vaccine 36(13): 1796-1800	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Kruspe, Rachel, Lillis, Rebecca, Daberkow, Dayton W 2nd et al. (2003) Education does pay off: pneumococcal vaccine screening and administration in hospitalized adult patients with pneumonia. The Journal of the Louisiana State Medical Society : official organ of the Louisiana State Medical Society 155(6): 325-31	- Vaccine on UK routine schedule but wrong context for administration *This study looks at hospital vaccination in the context of managing pneumonia rather than uptake in the general population of people 65+ years old.*
Kuehne, Flora, Sanftenberg, Linda, Dreischulte, Tobias et al. (2020) Shared Decision Making Enhances Pneumococcal Vaccination Rates in Adult Patients in Outpatient Care. International journal of environmental research and public health 17(23)	- Systematic review used as source of primary studies
Kumar, Rajesh (2014) Effective messages in vaccine promotion: a randomised trial: public health viewpoint. Indian pediatrics 51(6): 493	- Not a peer-reviewed publication *This is a letter about Nyhan 2014. Nyhan 2014 was excluded because it did not have an outcome of relevance to this review.*
Kuria, Patrick; Brook, Gary; McSorley, John (2016) The effect of electronic patient records on hepatitis B vaccination completion rates at a genitourinary medicine clinic. International journal of STD & AIDS 27(6): 486-9	- Vaccine on UK routine schedule but wrong context for administration *This is an adult study on HepB vaccination.*

Study	Reason for exclusion
Lam LP and McLaws ML (1998) Hepatitis B vaccination coverage of Vietnamese children in south-western Sydney. Australian and New Zealand journal of public health 22(4): 502-504	- Vaccine on UK routine schedule but wrong context for administration
Lam, Sum and Jodlowski, Tomas Z (2009) Vaccines for older adults. The Consultant pharmacist : the journal of the American Society of Consultant Pharmacists 24(5): 380-91	- Review article but not a systematic review
Lau, Darren, Hu, Jia, Majumdar, Sumit R et al. (2012) Interventions to improve influenza and pneumococcal vaccination rates among community-dwelling adults: a systematic review and meta-analysis. Annals of family medicine 10(6): 538-46	- Systematic review used as source of primary studies
Lawrence GL, MacIntyre CR, Hull BP et al. (2004) Effectiveness of the linkage of child care and maternity payments to childhood immunisation. Vaccine 22(17-18): 2345-2350	- Does not contain an outcome of relevance to this review
Lee, Cecilia and Robinson, Joan L (2016) Systematic review of the effect of immunization mandates on uptake of routine childhood immunizations. The Journal of infection 72(6): 659-666	- Systematic review used as source of primary studies
Lee, Haeok, Kim, Minjin, Allison, Jeroan et al. (2017) Development of a theory-guided storytelling narrative intervention to improve HPV vaccination behavior: Save our daughters from cervical cancer. Applied nursing research : ANR 34: 57-61	- Protocol linked to an included study or paper
Lee, Hee Yun, Koopmeiners, Joseph S, McHugh, Jennifer et al. (2016) mHealth Pilot Study: Text Messaging Intervention to Promote HPV Vaccination. American journal of health behavior 40(1): 67-76	- Does not contain an outcome of relevance to this review *This study does not have a comparator.*
Lefevere, Eva, Hens, Niel, De Smet, Frank et al. (2016) The impact of non-financial and financial encouragements on participation in non school-based human papillomavirus vaccination: a retrospective cohort study. The European journal of health economics : HEPAC : health economics in prevention and care 17(3): 305-15	- The intervention is a free vaccine- not in scope *The financial encouragement is free vaccination. The non-financial encouragement is information, whichis in both arms of the study equally.*

Study	Reason for exclusion
Lemaitre, Thomas, Carrier, Nathalie, Farrands, Anne et al. (2019) Impact of a vaccination promotion intervention using motivational interview techniques on long-term vaccine coverage: the PromoVac strategy. Human vaccines & immunotherapeutics 15(3): 732-739	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Lieu TA, Glauber JH, Fuentes-Afflick E et al. (1994) Effects of vaccine information pamphlets on parents' attitudes. Archives of pediatrics & adolescent medicine 148(9): 921-925	- The study did not report any of the outcomes specified in the protocol
Lim, W Ting, Sears, Kim, Smith, Leah M et al. (2014) Evidence of effective delivery of the human papillomavirus (HPV) vaccine through a publicly funded, school-based program: the Ontario Grade 8 HPV Vaccine Cohort Study. BMC public health 14: 1029	- The study did not report any of the outcomes specified in the protocol *This study does not have a comparator.*
Lin, James L, Bacci, Jennifer L, Reynolds, Marci J et al. (2018) Comparison of two training methods in community pharmacy: Project VACCINATE. Journal of the American Pharmacists Association : JAPhA 58(4s): 94-s100e3	- Data not reported in an extractable format *Uptake was reported as percentages - the number of participants was not provided.*
Lin, S.-C., Tam, K.-W., Yen, J.Y.-C. et al. (2020) The impact of shared decision making with patient decision aids on the rotavirus vaccination rate in children: A randomized controlled trial. Preventive medicine: 106244	- Study took place in a non-OECD country
Linton, Leslie S, Peddecord, K Michael, Seidman, Robert L et al. (2003) Implementing a seventh grade vaccination law: school factors associated with completion of required immunizations. Preventive medicine 36(4): 510-7	- Not a relevant study design *This is a survey and does not specifically look at an intervention.*
Lopez, N., Garces-Sanchez, M., Panizo, M.B. et al. (2020) HPV knowledge and vaccine acceptance among European adolescents and their parents: A systematic literature review. Public Health Reviews 41(1): 10	- Not a relevant study design
Lu, P.-J., Yankey, D., Jeyarajah, J. et al. (2017) Impact of Provider Recommendation on Tdap Vaccination of Adolescents Aged 13-17 Years. American Journal of Preventive Medicine 53(3): 373-384	- Study does not contain an intervention aimed at increasing vaccine uptake

Study	Reason for exclusion
Lukusa, Lungeni Auguy, Ndze, Valantine Ngum, Mbeye, Nyanyiwe Masingi et al. (2018) A systematic review and meta-analysis of the effects of educating parents on the benefits and schedules of childhood vaccinations in low and middle-income countries. Human vaccines & immunotherapeutics 14(8): 2058-2068	- Systematic review of non-OECD countries
Ma, Grace X, Lee, Minsun M, Tan, Yin et al. (2018) Efficacy of a community-based participatory and multilevel intervention to enhance hepatitis B virus screening and vaccination in underserved Korean Americans. Cancer 124(5): 973-982	- Vaccine on UK routine schedule but wrong context for administration
MacDougall DM, Halperin BA, Langley JM et al. (2016) Knowledge, attitudes, beliefs, and behaviors of parents and healthcare providers before and after implementation of a universal rotavirus vaccination program. Vaccine 34(5): 687-695	- Study does not contain an intervention aimed at increasing vaccine uptake *This study compares patient and healthcare provider attitudes towards a physician-delivered programme compared to a nurse-delivered programme. However, there are no details of an intervention to increase uptake.*
Mackey, Jessica K, Thompson, Katie, Abdulwahab, Adeem et al. (2019) A Simple Intervention to Increase Human Papillomavirus Vaccination in a Family Medicine Practice. South Dakota medicine : the journal of the South Dakota State Medical Association 72(10): 438-441	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Macknin, J.; Marks, M.; Macknin, M.L. (2000) Effect of telephone follow-up on frequency of health maintenance visits among children attending free immunization clinics: A randomized, controlled trial. Clinical Pediatrics 39(11): 679-681	- Does not contain an outcome of relevance to this review *This study does not have any vaccine uptake data.*
Madlon-Kay, Diane J (2011) Effect of revised nursery orders on newborn preventive services. Journal of the American Board of Family Medicine : JABFM 24(6): 656-64	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Maertens, Julie A, Jimenez-Zambrano, Andrea M, Albright, Karen et al. (2017) Using Community Engagement to Develop a Web-Based Intervention for Latinos about the HPV Vaccine. Journal of health communication 22(4): 285-293	- Duplicate reference
Malo, Teri L, Hall, Megan E, Brewer, Noel T et al. (2018) Why is announcement training more effective than conversation training for introducing HPV vaccination? A theory-based investigation. Implementation science : IS 13(1): 57	- Does not contain an outcome of relevance to this review
Malone, Kathryn, Clark, Stephanie, Palmer, Jo Ann et al. (2016) A quality improvement initiative to increase pneumococcal vaccination coverage among children after kidney transplant. Pediatric transplantation 20(6): 783-9	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Manthey, David E; Stopyra, Jason; Askew, Kim (2004) Referral of emergency department patients for pneumococcal vaccination. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 11(3): 271-5	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Mantzari, Eleni; Vogt, Florian; Marteau, Theresa M (2012) Using financial incentives to increase initial uptake and completion of HPV vaccinations: protocol for a randomised controlled trial. BMC health services research 12: 301	- Protocol for a future study *The RCT is Mantzari 2015 and it has been considered in this review*
Margolis PA, Lannon CM, Stuart JM et al. (2004) Practice based education to improve delivery systems for prevention in primary care: randomised trial. BMJ (Clinical research ed.) 328(7436): 388	- Data not reported in an extractable format *The vaccine uptake data is only presented in a chart.*
Mayne, Stephanie L, duRivage, Nathalie E, Feemster, Kristen A et al. (2014) Effect of decision support on missed opportunities for human papillomavirus vaccination. American journal of preventive medicine 47(6): 734-44	- The study did not report any of the outcomes specified in the protocol *Reports number of vaccinations given relative to number of visits, rather than number of people vaccinated*

Study	Reason for exclusion
McCaul, Kevin D; Johnson, Rebecca J; Rothman, Alexander J (2002) The effects of framing and action instructions on whether older adults obtain flu shots. Health psychology : official journal of the Division of Health Psychology, American Psychological Association 21(6): 624-8	- The study did not report any of the outcomes specified in the protocol
McRee, A-L; Shoben, AB; Reiter, PL (2018) Effects of a pilot randomized controlled trial of a web-based HPV vaccination intervention for young gay and bisexual men: the outsmart HPV project. Journal of adolescent health 62(2): S10	- Conference abstract
Meghea, C I, Li, B., Zhu, Q et al. (2013) Infant health effects of a nurse-community health worker home visitation programme: a randomized controlled trial. Child: Care, Health and Development 39(1): 27-35	- Study does not contain an intervention aimed at increasing vaccine uptake *This study has an intervention that includes parenting education. However, there is nothing specifically about increasing vaccine uptake.*
Melman, S T, Ehrlich, E S, Klugman, D et al. (2000) Compliance with initiation of a sequential schedule for polio immunization. Clinical pediatrics 39(1): 51-3	- Not a relevant study design
Mena Cantero, Alvin (2018) Educational Intervention for Engaging Adolescents and Their Parents in HPV Vaccination. Dissertation Abstracts International: Section B: The Sciences and Engineering 79(3be): no-specified	- Does not contain an outcome of relevance to this review
Meyer, Amanda F, Borkovskiy, Nicole L, Brickley, Jennifer L et al. (2018) Impact of Electronic Point-of-Care Prompts on Human Papillomavirus Vaccine Uptake in Retail Clinics. American journal of preventive medicine 55(6): 822-829	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Michail, G, Smaili, M, Vozikis, A et al. (2014) Female students receiving post-secondary education in Greece: the results of a collaborative human papillomavirus knowledge survey. Public health 128(12): 1099-105	- Not a relevant study design *This study is a survey - there is no comparator.*
Miles, L.W., Williams, N., Luthy, K.E. et al. (2020) Adult Vaccination Rates in the Mentally Ill Population: An Outpatient Improvement	- Does not contain an outcome of relevance to this review

Study	Reason for exclusion
Project. Journal of the American Psychiatric Nurses Association 26(2): 172-180	
Mills, Brittany, Fensterheim, Leonard, Taitel, Michael et al. (2014) Pharmacist-led Tdap vaccination of close contacts of neonates in a women's hospital. Vaccine 32(4): 521-5	- Study does not include a relevant population
Minkovitz, C S, Belote, A D, Higman, S M et al. (2001) Effectiveness of a practice-based intervention to increase vaccination rates and reduce missed opportunities. Archives of pediatrics & adolescent medicine 155(3): 382-6	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review *This was a before-and-after study.*
Mohan, Pavitra (2014) Effective messages in vaccine promotion: a randomised trial: public policy viewpoint. Indian pediatrics 51(6): 492	- Not a peer-reviewed publication *This is a letter about Nyhan 2014. Nyhan 2014 was excluded because it did not have an outcome of relevance to this review.*
Mohr, J.J., Randolph, G.D., Laughon, M.M. et al. (2003) Integrating improvement competencies into residency education: A pilot project from a pediatric continuity clinic. Ambulatory Pediatrics 3(3): 131-136	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Monreal Perez, M. and Beltran Viciano, M.A. (2019) Educational intervention for achieving improvements in the vaccination coverage of meningitis C in primary care. Vacunas 20(1): 25-33	- Study not reported in English
Moretti, Manuel, Grill, Eva, Weitkunat, Rolf et al. (2003) An individualized telephone intervention to increase the immunization rates of school beginners. Zeitschrift fur Gesundheitspsychologie 11(2): 39-48	- Not a peer-reviewed publication
Morgan JL, Baggari SR, Chung W et al. (2015) Association of a Best-Practice Alert and Prenatal Administration With Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis Vaccination Rates. Obstetrics and gynecology 126(2): 333-337	- Comparator in study does not match that specified in protocol *The control cohort was usual care vaccinations during the post-partum period*

Study	Reason for exclusion
Morris, J, Wang, W, Wang, L et al. (2015) Comparison of reminder methods in selected adolescents with records in an immunization registry. Journal of adolescent health 56(5): S27-S32	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Moss, J.L., Gilkey, M.B., Griffith, T. et al. (2013) Organizational correlates of adolescent immunization: Findings of a state-wide study of primary care clinics in North Carolina. Vaccine 31(40): 4436-4441	- Not a relevant study design *Survey with no specific intervention.*
Moss, Jennifer L (2016) Concomitant adolescent vaccination: The influence of seasonal variation, school requirements, and patient-provider communication. Dissertation Abstracts International: Section B: The Sciences and Engineering 76(9be): no-specified	- Conference abstract
Moss, Jennifer L, Reiter, Paul L, Dayton, Amanda et al. (2012) Increasing adolescent immunization by webinar: a brief provider intervention at federally qualified health centers. Vaccine 30(33): 4960-3	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Moss, Jennifer L, Reiter, Paul L, Truong, Young K et al. (2016) School Entry Requirements and Coverage of Nontargeted Adolescent Vaccines. Pediatrics 138(6)	- Data not reported in an extractable format *Number of participants within states not provided.*
Muehleisen, Beda, Baer, Gurli, Schaad, Urs B et al. (2007) Assessment of immunization status in hospitalized children followed by counseling of parents and primary care physicians improves vaccination coverage: an interventional study. The Journal of pediatrics 151(6): 704-2	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Murphy, A W, Harrington, M, Bury, G et al. (1996) Impact of a collaborative immunisation programme in an inner city practice. Irish medical journal 89(6): 220-1	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Murray, K., Low, C., O'Rourke, A. et al. (2020) A quality improvement intervention failed to significantly increase	- Infrastructure study. Excluded because there

Study	Reason for exclusion
pneumococcal and influenza vaccination rates in immunosuppressed inflammatory arthritis patients. Clinical Rheumatology 39(3): 747-754	was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Nace DA, Perera S, Handler SM et al. (2011) Increasing influenza and pneumococcal immunization rates in a nursing home network. Journal of the American Medical Directors Association 12(9): 678-684	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Nan X; Futerfas M; Ma Z (2017) Role of Narrative Perspective and Modality in the Persuasiveness of Public Service Advertisements Promoting HPV Vaccination. Health communication 32(3): 320-328	- The study did not report any of the outcomes specified in the protocol
NCT01719679 (2012) School Located Adolescent Vaccination Study. https://clinicaltrials.gov/show/NCT01719679	- Protocol for a future study *This is the protocol for Shlay 2015, which is considered in this evidence review.*
Ndiaye, Serigne M, Hopkins, David P, Shefer, Abigail M et al. (2005) Interventions to improve influenza, pneumococcal polysaccharide, and hepatitis B vaccination coverage among high-risk adults: a systematic review. American journal of preventive medicine 28(5suppl): 248-79	- Systematic review that does not include a relevant population *Review looks at several high risk groups of adults*
Neubrand, Tara P L, Breitkopf, Carmen Radecki, Rupp, Richard et al. (2009) Factors associated with completion of the human papillomavirus vaccine series. Clinical pediatrics 48(9): 966-9	- Not a relevant study design *This is a survey of women who had an HPV vaccination.*
Niccolai, Linda M and Hansen, Caitlin E (2015) Practice- and Community-Based Interventions to Increase Human Papillomavirus Vaccine Coverage: A Systematic Review. JAMA pediatrics 169(7): 686-92	- Systematic review used as source of primary studies

Study	Reason for exclusion
Nichol, K.L. (1998) Ten-year durability and success of an organized program to increase influenza and pneumococcal vaccination rates among high-risk adults. American Journal of Medicine 105(5): 385-392	- Does not contain an outcome of relevance to this review *Vaccination numbers based on outcome of patient survey*
Nour, Rawan (2019) A Systematic Review of Methods to Improve Attitudes Towards Childhood Vaccinations. Cureus 11(7): e5067	- Systematic review used as source of primary studies
Nowalk MP, Nutini J, Raymund M et al. (2012) Evaluation of a toolkit to introduce standing orders for influenza and pneumococcal vaccination in adults: a multimodal pilot project. Vaccine 30(41): 5978-5982	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Nowalk, Mary Patricia, Moehling, Krissy K, Zhang, Song et al. (2017) Using the 4 Pillars to increase vaccination among high-risk adults: who benefits?. The American journal of managed care 23(11): 651-655	- Secondary publication of an included study that does not provide any additional relevant information
Nwanodi, Oroma; Salisbury, Helen; Bay, Curtis (2017) Multimodal Counseling Interventions: Effect on Human Papilloma Virus Vaccination Acceptance. Healthcare (Basel, Switzerland) 5(4)	- Does not contain an outcome of relevance to this review
Nyhan, Brendan, Reifler, Jason, Richey, Sean et al. (2014) Effective messages in vaccine promotion: a randomized trial. Pediatrics 133(4): e835-42	- Does not contain an outcome of relevance to this review
O'Leary, S, Pyrzanowski, J, Lockhart, S et al. (2017) Impact of a provider communication training intervention on adolescent human papillomavirus vaccination: a cluster randomized, clinical trial. Open forum infectious diseases 4: S61	- Conference abstract
O'Leary, S, Wagner, N, Narwaney, K et al. (2017) Effectiveness of a web-based intervention to increase uptake of maternal vaccines. Open forum infectious diseases 4: S457	- Conference abstract
Odone, Anna, Ferrari, Antonio, Spagnoli, Francesca et al. (2015) Effectiveness of interventions that apply new media to improve	- More recent systematic review identified that covers the same topic

Study	Reason for exclusion
vaccine uptake and vaccine coverage. Human vaccines & immunotherapeutics 11(1): 72-82	
Oeffinger, K C, Roaten, S P, Hitchcock, M A et al. (1992) The effect of patient education on pediatric immunization rates. The Journal of family practice 35(3): 288-93	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review *Participants were randomised by birth day of the week so not true randomisation.*
Ogilvie, G., Anderson, M., Marra, F. et al. (2010) A population-based evaluation of a publicly funded, school-based HPV vaccine program in British Columbia, Canada: Parental factors associated with HPV vaccine receipt. PLoS Medicine 7(5)	- Not a relevant study design *This study is a survey that looks at associations and risk factors for vaccine uptake.*
Okwo-Bele, J.M. (2012) Integrating immunization with other health interventions for greater impact: The right strategic choice. Journal of Infectious Diseases 205(suppl1): 4-s5	- Review article but not a systematic review
Oliver, Kristin; Frawley, Alean; Garland, Elizabeth (2016) HPV vaccination: Population approaches for improving rates. Human vaccines & immunotherapeutics 12(6): 1589-93	- Review article but not a systematic review *Article is assessing the evidence to support American vaccination recommendations.*
Opel, D.J., Henrikson, N., Lepere, K. et al. (2019) Previsit screening for parental vaccine hesitancy: A cluster randomized trial. Pediatrics 144(5): e20190802	- Study does not contain an intervention aimed at increasing vaccine uptake
Orefice, Roberto and Quinlivan, Julie A (2019) Small interface changes have dramatic impacts: how mandatory fields in electronic medical records increased pertussis vaccination rates in Australian obstetric patients. BMJ health & care informatics 26(1): 0	- Study does not contain an intervention aimed at increasing vaccine uptake

Study	Reason for exclusion
Ornstein, S M, Garr, D R, Jenkins, R G et al. (1991) Computer-generated physician and patient reminders. Tools to improve population adherence to selected preventive services. The Journal of family practice 32(1): 82-90	- Vaccine on UK routine schedule but wrong context for administration *This study is about tetanus immunisation that occurs every 10 years after the primary immunisation series.*
Ortega, A.N., Andrews, S.F., Katz, S.H. et al. (1997) Comparing a computer-based childhood vaccination registry with parental vaccination cards: A population-based study of Delaware children. Clinical Pediatrics 36(4): 217-221	- Study does not contain an intervention aimed at increasing vaccine uptake *This study compares the accuracy of 2 different record keeping systems.*
Ortiz, Rebecca R, Shafer, Autumn, Cates, Joan et al. (2018) Development and Evaluation of a Social Media Health Intervention to Improve Adolescents' Knowledge About and Vaccination Against the Human Papillomavirus. Global pediatric health 5: 2333794x18777918	- Does not contain an outcome of relevance to this review
Ortiz, Rebecca R; Smith, Andrea; Coyne-Beasley, Tamera (2019) A systematic literature review to examine the potential for social media to impact HPV vaccine uptake and awareness, knowledge, and attitudes about HPV and HPV vaccination. Human vaccines & immunotherapeutics 15(78): 1465-1475	- Systematic review used as source of primary studies
Pahud, B., Clark, S., Herigon, J.C. et al. (2015) A pilot program to improve vaccination status for hospitalized children. Hospital Pediatrics 5(1): 35-41	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Palmeri, S, Costantino, C, D'Angelo, C et al. (2017) HPV vaccine hesitancy among parents of female adolescents: a pre–post interventional study. Public Health 150: 84	- Does not contain an outcome of relevance to this review
Pandolfi, Elisabetta, Graziani, Maria C, Ieraci, Roberto et al. (2008) A comparison of populations vaccinated in a public service and in a private hospital setting in the same area. BMC public health 8: 278	- Study does not contain an intervention aimed at increasing vaccine uptake

Study	Reason for exclusion
Parker, Siddhartha, Chambers White, Laura, Spangler, Chad et al. (2013) A quality improvement project significantly increased the vaccination rate for immunosuppressed patients with IBD. Inflammatory bowel diseases 19(9): 1809-14	- Study does not include a relevant population *Furthermore, the age of the participants was not provided.*
Parra-Medina, Deborah, Morales-Campos, Daisy Y, Mojica, Cynthia et al. (2015) Promotora Outreach, Education and Navigation Support for HPV Vaccination to Hispanic Women with Unvaccinated Daughters. Journal of cancer education : the official journal of the American Association for Cancer Education 30(2): 353-9	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Parsons, Joanne E; Newby, Katie V; French, David P (2018) Do interventions containing risk messages increase risk appraisal and the subsequent vaccination intentions and uptake? - A systematic review and meta-analysis. British journal of health psychology 23(4): 1084-1106	- Systematic review used as source of primary studies
Patel, A., Stern, L., Unger, Z. et al. (2014) Staying on track: A cluster randomized controlled trial of automated reminders aimed at increasing human papillomavirus vaccine completion. Vaccine 32(21): 2428-2433	- Vaccine on UK routine schedule but wrong context for administration *The women in this study are aged 19 to 26 years (mean age 23 years).*
Patel, Anik R; Breck, Andrew B; Law, Michael R (2018) The impact of pharmacy-based immunization services on the likelihood of immunization in the United States. Journal of the American Pharmacists Association : JAPhA 58(5): 505-514e2	- Not a relevant study design
Paunio M, Virtanen M, Peltola H et al. (1991) Increase of vaccination coverage by mass media and individual approach: intensified measles, mumps, and rubella prevention program in Finland. American journal of epidemiology 133(11): 1152-1160	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Pereira, Jennifer A, Quach, Susan, Heidebrecht, Christine L et al. (2012) Barriers to the use of reminder/recall interventions for immunizations: a systematic review. BMC medical informatics and decision making 12: 145	- Qualitative systematic review
Perkins, Rebecca B, Legler, Aaron, Jansen, Emily et al. (2020) Improving HPV Vaccination Rates: A Stepped-Wedge Randomized Trial. Pediatrics 146(1)	- Education non-RCT. Excluded because there

Study	Reason for exclusion
	was sufficient RCT evidence for this review
Perkins, Rebecca B, Lin, Mengyun, Silliman, Rebecca A et al. (2015) Why are U.S. girls getting meningococcal but not human papilloma virus vaccines? Comparison of factors associated with human papilloma virus and meningococcal vaccination among adolescent girls 2008 to 2012. Women's health issues : official publication of the Jacobs Institute of Women's Health 25(2): 97-104	- Not a relevant study design
Perman, Sarah, Turner, Simon, Ramsay, Angus I G et al. (2017) School-based vaccination programmes: a systematic review of the evidence on organisation and delivery in high income countries. BMC public health 17(1): 252	- Systematic review that does not include the outcomes stated in the protocol
Pich, Jacqueline (2019) Patient reminder and recall interventions to improve immunization rates: A Cochrane review summary. International Journal of Nursing Studies 91: 144	- Review article but not a systematic review *Summary of a Cochrane systematic review*
Piedimonte, S, Leung, A, Zakhari, A et al. (2018) Impact of an HPV Education and Vaccination Campaign among Canadian University Students. Journal of obstetrics and gynaecology canada 40(4): 440-446	- Study participants are the wrong age group *The subjects are university students, not teenagers.*
Pierre-Victor, Dudith, Page, Timothy F, Trepka, Mary Jo et al. (2017) Impact of Virginia's School-Entry Vaccine Mandate on Human Papillomavirus Vaccination Among 13-17-Year-Old Females. Journal of women's health (2002) 26(3): 266-275	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Poole, Tracey, Goodyear-Smith, Felicity, Petousis-Harris, Helen et al. (2012) Human papillomavirus vaccination in Auckland: reducing ethnic and socioeconomic inequities. Vaccine 31(1): 84-8	- Not a relevant study design *This study is a survey*

Study	Reason for exclusion
Porter RM, Amin AB, Bednarczyk RA et al. Cancer-salient messaging for Human Papillomavirus vaccine uptake: A randomized controlled trial. Vaccine 36(18): 2494-2500	- The study did not report any of the outcomes specified in the protocol
Porter, A.M. and Fulco, P.P. (2020) Impact of a pharmacist-driven recombinant zoster vaccine administration program. Journal of the American Pharmacists Association	- Study does not include a relevant population *Furthermore, the age of the participants was not provided.*
Poscia, Andrea, Pastorino, Roberta, Boccia, Stefania et al. (2019) The impact of a school-based multicomponent intervention for promoting vaccine uptake in Italian adolescents: a retrospective cohort study. Annali dell'Istituto superiore di sanita 55(2): 124-130	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Pot, M., Paulussen, T.G., Ruiter, R.A. et al. (2020) Dose-Response Relationship of a Web-Based Tailored Intervention Promoting Human Papillomavirus Vaccination: Process Evaluation of a Randomized Controlled Trial. Journal of medical Internet research 22(7): e14822	- Duplicate reference *This is a process evaluation of Pot 2017, which has been assessed in this evidence review.*
Pot, Mirjam, Ruiter, Robert A C, Paulussen, Theo W G M et al. (2018) Systematically Developing a Web-Based Tailored Intervention Promoting HPV-Vaccination Acceptability Among Mothers of Invited Girls Using Intervention Mapping. Frontiers in public health 6: 226	- Does not contain an outcome of relevance to this review
Quinley, John C and Shih, Anthony (2004) Improving physician coverage of pneumococcal vaccine: a randomized trial of a telephone intervention. Journal of community health 29(2): 103-15	- Data not reported in an extractable format *Participant numbers were not provided.*
Rabarison, Kristina M, Li, Rui, Bish, Connie L et al. (2015) A Cost Analysis of the 1-2-3 Pap Intervention. Frontiers in public health services & systems research 4(4): 45-50	- Not a relevant study design *Cost-effectiveness analysis only*

Study	Reason for exclusion
Ramón Esparza, T; Hernando Arizaleta, L; García Calvente, MM (1990) Vaccination every time when an occasion arises: evaluation of an intervention in the Murcia Autonomous Community. Atencion primaria / Sociedad Espanola de Medicina de Familia y Comunitaria 7(10): 616-621	- Study not reported in English
Rangrej, MI (2017) IMPACT OF CLINICAL PHARMACIST INTERVENTION ON THE KNOWLEDGE OF IMMUNIZATION IN PARENTS OF PEDIATRICS IN TERTIARY CARE HOSPITAL. Value in Health : The Journal of the International Society for Pharmacoeconomics and Outcomes Research 20(5)	- Conference abstract
Rani, U., Darabaner, E., Seserman, M. et al. (2020) Public Education Interventions and Uptake of Human Papillomavirus Vaccine: A Systematic Review. Journal of public health management and practice : JPHMP	- Systematic review used as source of primary studies
Raviotta, Jonathan Marc (2020) The development testing and implementation of the 4 pillarsTM practice transformation program for immunization: Achieving public health outcomes through primary care quality improvement. Dissertation Abstracts International: Section B: The Sciences and Engineering 81(8b): no-specified	- Review article but not a systematic review
Reading, Richard (2009) Pediatric primary care to help prevent child maltreatment: the Safe Environment for Every Kid (SEEK) model. Child Care, Health and Development 35(4): 588	- Not a peer-reviewed publication *This is an editorial about Dubowitz 2009, which has been considered in this review.*
Redfield, J.R. and Wang, T.W. (2000) Improving pneumococcal vaccination rates: A three-step approach. Family Medicine 32(5): 338-341	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Reiter, Paul L, Stubbs, Brenda, Panozzo, Catherine A et al. (2011) HPV and HPV vaccine education intervention: effects on parents, healthcare staff, and school staff. Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology 20(11): 2354-61	- Does not contain an outcome of relevance to this review
Reno, Jenna E, Thomas, Jacob, Pyrzanowski, Jennifer et al. (2019) Examining strategies for improving healthcare providers' communication about adolescent HPV vaccination: evaluation of secondary outcomes in a randomized controlled trial. Human vaccines & immunotherapeutics 15(78): 1592-1598	- Duplicate reference *This is a survey following a study that has already been included: Dempsey 2018:*

Study	Reason for exclusion
	Effect of a Health Care Professional Communication Training Intervention on Adolescent Human Papillomavirus Vaccination: A Cluster Randomized Clinical Trial
Ressler KA, Orr K, Bowdler S et al. (2008) Opportunistic immunisation of infants admitted to hospital: are we doing enough?. Journal of paediatrics and child health 44(6): 317-320	- Study describes a catch up campaign following the introduction of a vaccine- out of scope of the review
Reuben, D.B., Hirsch, S.H., Frank, J.C. et al. (1996) The prevention for elderly persons (PEP) program: A model of municipal and academic partnership to meet the needs of older persons for preventive services. Journal of the American Geriatrics Society 44(11): 1394-1398	- The study did not report any of the outcomes specified in the protocol
Richman, Alice R, Maddy, LaDonna, Torres, Essie et al. (2016) A randomized intervention study to evaluate whether electronic messaging can increase human papillomavirus vaccine completion and knowledge among college students. Journal of American college health : J of ACH 64(4): 269-78	- Study participants are the wrong age group *Adults aged 18-26 for HPV vaccination*
Rickert, Donna, Deladisma, Adeline, Yusuf, Hussain et al. (2004) Adolescent immunizations. are we ready for a new wave?. American journal of preventive medicine 26(1): 22-8	- Not a relevant study design *Survey that looks at associations and risk factors for uptake.*
Rickert, Vaughn I, Auslander, Beth A, Cox, Dena S et al. (2015) School-based HPV immunization of young adolescents: effects of two brief health interventions. Human vaccines & immunotherapeutics 11(2): 315-21	- Does not contain an outcome of relevance to this review *Vaccination intent is recorded for each of the 4 arms but not uptake. Percentage uptake is recorded for all 4 arms together but not for each arm separately.*

Study	Reason for exclusion
Ridda, Iman, MacIntyre, Raina C, Lindley, Richard I et al. (2007) Predictors of pneumococcal vaccination uptake in hospitalized patients aged 65 years and over shortly following the commencement of a publicly funded national pneumococcal vaccination program in Australia. Human vaccines 3(3): 83-6	- The intervention is a free vaccine- not in scope
Righolt, Christiaan H; Bozat-Emre, Songul; Mahmud, Salaheddin M (2019) Effectiveness of school-based and high-risk human papillomavirus vaccination programs against cervical dysplasia in Manitoba, Canada. International journal of cancer 145(3): 671-677	- Does not contain an outcome of relevance to this review
Rihtarchik, Lindsey, Murphy, Claire V, Porter, Kyle et al. (2018) Utilizing pharmacy intervention in asplenic patients to improve vaccination rates. Research in social & administrative pharmacy : RSAP 14(4): 367-371	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review
Riley R; Maher C; Kolbe A (1993) Hepatitis B vaccination of high-risk neonates in the South West Region of New South Wales: evaluation of program coverage. Australian journal of public health 17(2): 171-173	- Not a relevant study design *Study does not have a comparison group.*
Riley, D.J.; Mughal, M.Z.; Roland, J. (1991) Immunisation state of young children admitted to hospital and effectiveness of a ward based opportunistic immunisation policy. British Medical Journal 302(6767): 31-33	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Rimple, Diane, Weiss, Steven J, Brett, Meghan et al. (2006) An emergency department-based vaccination program: overcoming the barriers for adults at high risk for vaccine-preventable diseases. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 13(9): 922-30	- Study does not include a relevant population
Rizzo, C. (2006) Improving immunization rates in practice settings. Pediatric Annals 35(7): 493-497	- Review article but not a systematic review
Robare, Joseph F, Bayles, Constance M, Newman, Anne B et al. (2011) The "10 Keys" to Healthy Aging: 24-Month Follow-Up Results From an Innovative Community-Based Prevention Program. Health Education & Behavior 38(4): 379-388	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Robison, Steve G (2013) Sick-visit immunizations and delayed well-baby visits. Pediatrics 132(1): 44-8	- Data not reported in an extractable format *The data that we would like was written in a narrative rather than numerical format.*
Rockliffe L, Chorley AJ, McBride E et al. Assessing the acceptability of incentivising HPV vaccination consent form return as a means of increasing uptake. BMC public health 18(1): 382	- The study did not report any of the outcomes specified in the protocol
Rosberger Z, Krawczyk A, Stephenson E et al. (2014) HPV vaccine education: enhancing knowledge and attitudes of community counselors and educators. Journal of cancer education : the official journal of the American Association for Cancer Education 29(3): 473-477	- The study did not report any of the outcomes specified in the protocol
Rosen, Brittany L, Bishop, James M, McDonald, Skye L et al. (2018) Quality of Web-Based Educational Interventions for Clinicians on Human Papillomavirus Vaccine: Content and Usability Assessment. JMIR cancer 4(1): e3	- Systematic review that does not include the outcomes stated in the protocol
Rosenberg, Karen (2019) EDUCATIONAL INTERVENTION IMPROVES VACCINATION RATES IN OLDER PATIENTS. The American Journal of Nursing 119(7): 63	- Review article but not a systematic review
Rosenberg, Karen (2014) AFIX CONSULTATIONS MAY INCREASE VACCINATION COVERAGE IN YOUNGER ADOLESCENTS. The American Journal of Nursing 114(11): 65	- Not a peer-reviewed publication *Editorial about a study that has already been considered in this review: Gilkey 2014: Increasing provision of adolescent vaccines in primary care: a randomized controlled trial*
Rosenberg, Z, Findley, S, McPhillips, S et al. (1995) Community-based strategies for immunizing the "hard-to-reach" child: the New York State immunization and primary health care initiative. American journal of preventive medicine 11(3suppl): 14-20	- Study does not contain an intervention aimed at increasing vaccine uptake

Study	Reason for exclusion
Rosser, W W; McDowell, I; Newell, C (1991) Use of reminders for preventive procedures in family medicine. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 145(7): 807-14	- The study did not report any of the outcomes specified in the protocol *Tetanus vaccination is not on routine schedule after age 18 in UK and flu vaccination is not covered by this guideline*
Ruffin, Mack T 4th, Plegue, Melissa A, Rockwell, Pamela G et al. (2015) Impact of an Electronic Health Record (EHR) Reminder on Human Papillomavirus (HPV) Vaccine Initiation and Timely Completion. Journal of the American Board of Family Medicine : JABFM 28(3): 324-33	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Ruiz-López T, Sen S, Jakobsen E et al. (2019) FightHPV: Design and Evaluation of a Mobile Game to Raise Awareness About Human Papillomavirus and Nudge People to Take Action Against Cervical Cancer. JMIR serious games 7(2): e8540	- The study did not report any of the outcomes specified in the protocol
Russell, SL (2012) Effectiveness of text message reminders for improving vaccination appointment attendance and series completion among adolescents and adults. Value in health 15(4): A248	- Conference abstract
Sadaf A, Richards JL, Glanz J, Salmon DA, Omer SB (2013) A systematic review of interventions for reducing parental vaccine refusal and vaccine hesitancy. Vaccine 31(40): 4293-4304	- Systematic review used as source of primary studies
Saeterdal, Ingvil, Lewin, Simon, Austvoll-Dahlgren, Astrid et al. (2014) Interventions aimed at communities to inform and/or educate about early childhood vaccination. The Cochrane database of systematic reviews: cd010232	- Systematic review used as source of primary studies
Saffin K (1992) School nurses immunising without a doctor present. Health visitor 65(11): 394-396	- Does not contain an outcome of relevance to this review *This is a survey of nurses' opinions.*
Saito, A, Saitoh, A, Sato, I et al. (2016) Effectiveness of stepwise perinatal immunization education: a cluster randomized controlled trial. Open forum infectious diseases 3	- Conference abstract

Study	Reason for exclusion
Santa Maria, Diane (2020) EFFICACY OF A STUDENT-NURSE BRIEF PARENT-BASED SEXUAL HEALTH INTERVENTION TO INCREASE HPV VACCINATION AMONG ADOLESCENTS. Journal of Adolescent Health 66(2s)	- Conference abstract
Schempf, A.H.; Politzer, R.M.; Wulu, J. (2003) Immunization coverage of vulnerable children: A comparison of health center and national rates. Medical Care Research and Review 60(1): 85-100	- Study does not contain an intervention aimed at increasing vaccine uptake
Seib K, Underwood NL, Gargano LM et al. (2016) Preexisting Chronic Health Conditions and Health Insurance Status Associated With Vaccine Receipt Among Adolescents. The Journal of adolescent health : official publication of the Society for Adolescent Medicine 58(2): 148-153	- Does not contain an outcome of relevance to this review *This study does not measure uptake for each of the 3 arms.*
Seib, KG, Herbert, N, Gargano, L et al. (2014) Pre-existing chronic health conditions and health insurance status as determinants of vaccine receipt among adolescents in Richmond county, Georgia. Journal of adolescent health 54(2): S29	- Conference abstract
Sellors, J, Pickard, L, Mahony, J B et al. (1997) Understanding and enhancing compliance with the second dose of hepatitis B vaccine: a cohort analysis and a randomized controlled trial. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 157(2): 143-8	- Study participants are the wrong age group *This study looks at HepB vaccination for adults.*
Sewell, M.J., Riche, D.M., Fleming, J.W. et al. (2016) Comparison of pharmacist and physician managed annual medicare wellness services. Journal of Managed Care and Specialty Pharmacy 22(12): 1412-1416	- Study does not contain an intervention aimed at increasing vaccine uptake
Shah, M.D., Glenn, B.A., Chang, L.C. et al. (2020) Reducing Missed Opportunities for Human Papillomavirus Vaccination in School-Based Health Centers: Impact of an Intervention. Academic Pediatrics	- Does not contain an outcome of relevance to this review *This study looks at missed opportunities, not vaccine uptake*
Shah, MN, Clarkson, L, Lerner, EB et al. (2006) An emergency medical services program to promote the health of older adults. Journal of the american geriatrics society 54(6): 956-962	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Shaw, J., Mader, E.M., Bennett, B.E. et al. (2018) Immunization mandates, vaccination coverage, and exemption rates in the United States. Open Forum Infectious Diseases 5(6)	- Not a relevant study design *Survey that looks at associations and risk factors for vaccination*
Shaw, J.S., Samuels, R.C., Larusso, E.M. et al. (2000) Impact of an encounter-based prompting system on resident vaccine administration performance and immunization knowledge. Pediatrics 105(4ii): 978-983	- The study did not report any of the outcomes specified in the protocol *Study looks at missed opportunities and prescribing errors, not vaccine uptake*
Shay, L Aubree, Street, Richard L Jr, Baldwin, Austin S et al. (2016) Characterizing safety-net providers' HPV vaccine recommendations to undecided parents: A pilot study. Patient education and counseling 99(9): 1452-60	- The study did not report any of the outcomes specified in the protocol *There is no intervention - this is a conversation analysis of consultations*
Sheaves, Crystal (2016) Evaluating changes in knowledge, beliefs, and behaviors associated with HPV following an educational intervention among women. Dissertation Abstracts International: Section B: The Sciences and Engineering 76(12be): no-specified	- Not a peer-reviewed publication
Shenson, D., Adams, M., Bolen, J. et al. (2011) Routine checkups don't ensure that seniors get preventive services. The Journal of family practice 60(1): e1-e10	- Not a relevant study design *This is a survey that looks for associations and risk factors for vaccination*
Shlay JC, Rodgers S, Lyons J et al. (2015) Implementing a School-Located Vaccination Program in Denver Public Schools. The Journal of school health 85(8): 536-543	- The study did not report any of the outcomes specified in the protocol
Si, Mingyu, Su, Xiaoyou, Jiang, Yu et al. (2019) Interventions to improve human papillomavirus vaccination among Chinese female	- Protocol for a future study

Study	Reason for exclusion
college students: study protocol for a randomized controlled trial. BMC public health 19(1): 1546	
Siebers, M J and Hunt, V B (1985) Increasing the pneumococcal vaccination rate of elderly patients in a general internal medicine clinic. Journal of the American Geriatrics Society 33(3): 175-8	- Study published before 1990 date limit set in review protocol
Singh, S.; Mazor, K.M.; Fisher, K.A. (2019) Positive deviance approaches to improving vaccination coverage rates within healthcare systems: A systematic review. Journal of Comparative Effectiveness Research 8(13): 1055-1065	- Systematic review that does not include relevant study types
Sinn JS; Morrow AL; Finch AB (1999) Improving immunization rates in private pediatric practices through physician leadership. Archives of pediatrics & adolescent medicine 153(6): 597-603	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review *This was a before-and-after study.*
Siriwardena, A.N., Rashid, A., Johnson, M.R.D. et al. (2002) Cluster randomised controlled trial of an educational outreach visit to improve influenza and pneumococcal immunisation rates in primary care. British Journal of General Practice 52(482): 735-740	- Study does not include a relevant population *The intervention is provider education. The ≥65 years of age population for influenza vaccine (n=27,580) was different to the populations for pneumonia vaccine. The populations for pneumonia vaccine were people with: congestive heart disease (n=6207), diabetes (n=4327) and splenectomy (n=169).*
Skedgel C, Langley JM, MacDonald NE et al. (2011) An incremental economic evaluation of targeted and universal influenza vaccination in pregnant women. Canadian journal of public health = Revue canadienne de sante publique 102(6): 445-450	- Does not contain an outcome of relevance to this review *Study does not have vaccine uptake data, it looks at whether people should be vaccinated or not.*

Study	Reason for exclusion
Skinner, S R, Imberger, A, Nolan, T et al. (2000) Randomised controlled trial of an educational strategy to increase school-based adolescent hepatitis B vaccination. Australian and New Zealand journal of public health 24(3): 298-304	- Vaccine on UK routine schedule but wrong context for administration *HepB vaccine is given to infants in the UK, not teenagers.*
Skinner, SR, Davies, C, Cooper, S et al. (2015) Randomised controlled trial of a complex intervention to improve school-based HPV vaccination for adolescents: the HPV. EDU study. Sexually transmitted infections 91: A77	- Conference abstract
Skledar SJ, Hess MM, Ervin KA et al. (2003) Designing a hospital-based pneumococcal vaccination program. American journal of health-system pharmacy : AJHP : official journal of the American Society of Health-System Pharmacists 60(14): 1471-1476	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Smith, J.M. and Craig, T.J. (2006) Strategies for improving pneumococcal vaccination in eligible patients. Current Infectious Disease Reports 8(3): 231-237	- Review article but not a systematic review
Smith, Kenneth J, Zimmerman, Richard K, Nowalk, Mary Patricia et al. (2017) Cost-Effectiveness of the 4 Pillars Practice Transformation Program to Improve Vaccination of Adults Aged 65 and Older. Journal of the American Geriatrics Society 65(4): 763-768	- Duplicate reference *This is an economic analysis of a study already considered in this review: Zimmerman 2017: Using the 4 Pillars Practice Transformation Program to Increase Pneumococcal Immunizations for Older Adults: a Cluster-Randomized Trial*
Smulian, Elizabeth A; Mitchell, Krista R; Stokley, Shannon (2016) Interventions to increase HPV vaccination coverage: A systematic review. Human vaccines & immunotherapeutics 12(6): 1566-88	- Systematic review used as source of primary studies
Sohn, M.-W., Yoo, J., Oh, E.H. et al. (2011) Welfare, maternal work, and on-time childhood vaccination rates. Pediatrics 128(6): 1109-1116	- Not a relevant study design *This study retrospectively selects factors that may increase vaccine uptake as*

Study	Reason for exclusion
	if they were 'risk factors' for vaccine uptake.
Soljak, M A and Handford, S (1987) Early results from the Northland immunisation register. The New Zealand medical journal 100(822): 244-6	- Study published before 1990 date limit set in review protocol
Soon, Reni, Sung, Stephen, Cruz, May Rose Dela et al. (2017) Improving Human Papillomavirus (HPV) Vaccination in the Postpartum Setting. Journal of community health 42(1): 66-71	- Study participants are the wrong age group *Participants were of university age, not teenagers at school.*
Srivastava, T.; Emmer, K.; Feemster, K.A. (2020) Impact of school-entry vaccination requirement changes on clinical practice implementation and adolescent vaccination rates in metropolitan Philadelphia. Human Vaccines and Immunotherapeutics 16(5): 1155-1165	- The study did not report any of the outcomes specified in the protocol
Stanwyck, C.A.; Kolasa, M.S.; Shaw, K.M. (2004) Immunization requirements for childcare programs: Are they enough?. American Journal of Preventive Medicine 27(2): 161-163	- Not a relevant study design *This study is a survey that looks at factors associated with vaccination. There is no specific intervention to increase uptake.*
Staras, S.A.S., Richardson, E., Merlo, L.J. et al. (2021) A feasibility trial of parent HPV vaccine reminders and phone-based motivational interviewing. BMC public health 21(1): 109	- Does not contain an outcome of relevance to this review *The outcome was acceptability, not uptake.*
Staras, SA, Vadaparampil, S, Livingston, IM et al. (2014) A health information technology intervention increases HPV vaccine series initiation among Florida Medicaid and CHIP adolescents. Sexually transmitted diseases 41(suppl1): S9-10	- Conference abstract
Staras, SAS, Vadaparampil, ST, Thompson, LA et al. (2020) Postcard reminders for HPV vaccination mainly primed parents for providers' recommendations. Preventive medicine reports 20	- Does not contain an outcome of relevance to this review

Study	Reason for exclusion
	This is a secondary analysis of a previous study (Staras 2015) and does not report vaccine uptake for each intervention. The previous study was quasi-experimental but this evidence review is at the RCT and cluster RCT level of evidence.
Staras, Stephanie A S, Vadaparampil, Susan T, Livingston, Melvin D et al. (2015) Increasing human papillomavirus vaccine initiation among publicly insured Florida adolescents. The Journal of adolescent health : official publication of the Society for Adolescent Medicine 56(5suppl): 40-6	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Stevens, B. and Gibbins, S. (2002) Immunizations in adulthood. Primary Care - Clinics in Office Practice 29(3): 649-665	- Review article but not a systematic review
Stevenson, K B, McMahon, J W, Harris, J et al. (2000) Increasing pneumococcal vaccination rates among residents of long-term--care facilities: provider-based improvement strategies implemented by peer-review organizations in four western states. Infection control and hospital epidemiology 21(11): 705-10	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Stille, C J, Christison-Lagay, J, Bernstein, B A et al. (2001) A simple provider-based educational intervention to boost infant immunization rates: a controlled trial. Clinical pediatrics 40(7): 365-73	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Stockwell, Melissa S, Kharbanda, Elyse Olshen, Martinez, Raquel Andres et al. (2012) Text4Health: impact of text message reminder-recalls for pediatric and adolescent immunizations. American journal of public health 102(2): e15-21	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Stone, Erin G, Morton, Sally C, Hulscher, Marlies E et al. (2002) Interventions that increase use of adult immunization and cancer screening services: a meta-analysis. Annals of internal medicine 136(9): 641-51	- More recent systematic review identified that covers the same topic *Interventions to increase adult immunisation covered by other SRs while cancer*

Study	Reason for exclusion
	screening is not within the scope of this review.
Stroffolini T and Pasquini P (1990) Five years of vaccination campaign against hepatitis B in Italy in infants of hepatitis B surface antigen carrier mothers. The Italian journal of gastroenterology 22(4): 195-197	- Study does not contain an intervention aimed at increasing vaccine uptake *This study is mostly about screening pregnant women for HBsAg. Yearly changes in HepB uptake are looked at in a coincidental way.*
Sumner, W. (1991) Brief reports. An evaluation of readable preventive health messages. Family Medicine 23(6): 463-6	- Vaccine on UK routine schedule but wrong context for administration *Mean age of participants was 35 to 38 years with SD 10.7 to 13.2 for the 3 study groups. This age group is not on the routine vaccination schedule.*
Suppli, Camilla Hiul, Rasmussen, Mette, Valentiner-Branth, Palle et al. (2017) Written reminders increase vaccine coverage in Danish children - evaluation of a nationwide intervention using The Danish Vaccination Register, 2014 to 2015. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin 22(17)	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Suryadevara M, Bonville CA, Ferraioli F et al. (2013) Community-centered education improves vaccination rates in children from low-income households. Pediatrics 132(2): 319-325	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Szczerbinska, K., Topinkova, E., Brzyski, P. et al. (2016) Delivery of Care to Nursing Home Residents With Diabetes: Results From the SHELTER Study. Journal of the American Medical Directors Association 17(9): 807-813	- Study does not contain an intervention aimed at increasing vaccine uptake *Study looks at factors associated with vaccination*
Taddio, Anna, Alderman, Leslie, Freedman, Tamlyn et al. (2019) The CARD™ System for improving the vaccination experience at	- Study includes data on a vaccine that is not on the

Study	Reason for exclusion
school: Results of a small-scale implementation project on program delivery. Paediatrics & Child Health 24: 54-s67	UK routine vaccination schedule *Study includes HepB vaccine for adolescents and it is not possible to separate out the data for HPV vaccine.*
Taitel, M.S., Fensterheim, L.E., Cannon, A.E. et al. (2013) Improving pneumococcal and herpes zoster vaccination uptake: Expanding pharmacist privileges. American Journal of Managed Care 19(9): e309-e313	- Not a relevant study design *This study has selected characteristics of a population and has treated them as 'risk factors' for vaccine uptake.*
Takayama, J I; Iser, J P; Gandelman, A (1999) Regional differences in infant immunization against hepatitis B: did intervention work?. Preventive medicine 28(2): 160-6	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Tayfur, I.; Gunaydin, M.; Suner, S. (2019) Healthcare service access and utilization among syrian refugees in Turkey. Annals of Global Health 85(1): 42	- Not a relevant study design *This is a survey that looks at factors associated with vaccination.*
Taylor, J.A., Rietberg, K., Greenfield, L. et al. (2008) Effectiveness of a physician peer educator in improving the quality of immunization services for young children in primary care practices. Vaccine 26(33): 4256-4261	- Data not reported in an extractable format *Data was given as percentages without participant numbers*
Thomas, D R, King, J, Evans, M R et al. (1998) Uptake of measles containing vaccines in the measles, mumps, and rubella second dose catch-up programme in Wales. Communicable disease and public health 1(1): 44-7	- Study looks at intervention in the context of introducing a new vaccine
Thomas, T.L.; Stephens, D.P.; Blanchard, B. (2010) Hip Hop, Health, and Human Papilloma Virus (HPV): Using Wireless	- Does not contain an outcome of relevance to this review

Study	Reason for exclusion
Technology to Increase HPV Vaccination Uptake. Journal for Nurse Practitioners 6(6): 464-470	
Thompson, E.L., Livingston, M.D., Daley, E.M. et al. (2020) Rhode Island Human Papillomavirus Vaccine School Entry Requirement Using Provider-Verified Report. American Journal of Preventive Medicine 59(2): 274-277	- Data not reported in an extractable format *Only percentage uptake was provided. Numbers of participants were not provided for each arm.*
Trethewey, Samuel P; Patel, Neil; Turner, Alice M (2019) Interventions to Increase the Rate of Influenza and Pneumococcal Vaccination in Patients with Chronic Obstructive Pulmonary Disease: A Scoping Review. Medicina (Kaunas, Lithuania) 55(6)	- Systematic review that does not include a relevant population *People with COPD*
Trick, William E, Linn, Edward S, Jones, Zina et al. (2010) Using computer decision support to increase maternal postpartum tetanus, diphtheria, and acellular pertussis vaccination. Obstetrics and gynecology 116(1): 51-7	- Study does not include a relevant population
Tubeuf S, Edlin R, Shourie S et al. (2014) Cost effectiveness of a web-based decision aid for parents deciding about MMR vaccination: a three-arm cluster randomised controlled trial in primary care. The British journal of general practice : the journal of the Royal College of General Practitioners 64(625): e493	- Secondary publication of an included study that does not provide any additional relevant information *This is a mirror publication of Shourie 2013. We have included Shourie 2013 in the review because it is a cluster RCT and reports the Intracluster Correlation Coefficient.*
Tyler, Darlene, Nyamathi, Adeline, Stein, Judith A et al. (2014) Increasing hepatitis C knowledge among homeless adults: results of a community-based, interdisciplinary intervention. The journal of behavioral health services & research 41(1): 37-49	- Does not contain an outcome of relevance to this review
Tyler, R., Kile, S., Strain, O. et al. (2020) Impact of pharmacist intervention on completion of recombinant zoster vaccine series in a community pharmacy. Journal of the American Pharmacists Association	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Underwood, Natasha L, Gargano, Lisa M, Jacobs, Samantha et al. (2016) Influence of Sources of Information and Parental Attitudes on Human Papillomavirus Vaccine Uptake among Adolescents. Journal of pediatric and adolescent gynecology 29(6): 617-622	- Secondary publication of an included study that does not provide any additional relevant information *This is a secondary publication of Underwood 2015, which is already considered in this review. Underwood 2015 does not have any further outcomes of interest for each of the 3 arms.*
Uskun, Ersin, Uskun, Suha Basar, Uysalgenc, Meral et al. (2008) Effectiveness of a training intervention on immunization to increase knowledge of primary healthcare workers and vaccination coverage rates. Public health 122(9): 949-58	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Vacek JL (2004) Practical strategies for cardiac disease prevention. Basic steps to ensure better heart health. Postgrad Med 3	- Review article but not a systematic review
Vacek, J.L. (2004) Practice-based continuing education combined with process improvement methods improves delivery of preventive services to children. Evidence-Based Healthcare 8(4): 177-179	- Duplicate reference *This is an editorial about Vacek 2004, which is considered in this review.*
Valdez, Armando, Stewart, Susan L, Tanjasiri, Sora Park et al. (2015) Design and efficacy of a multilingual, multicultural HPV vaccine education intervention. Journal of communication in healthcare 8(2): 106-118	- Does not contain an outcome of relevance to this review
Valeri, Fabio, Hatz, Christoph, Jordan, Dominique et al. (2014) Immunisation coverage of adults: a vaccination counselling campaign in the pharmacies in Switzerland. Swiss medical weekly 144: w13955	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Vanderpool, Robin C, Cohen, Elisia, Crosby, Richard A et al. (2013) "1-2-3 Pap" Intervention Improves HPV Vaccine Series Completion among Appalachian Women. The Journal of communication 63(1): 95-115	- Study participants are the wrong age group *Participants were aged 22 years (SD 2.4). The UK routine vaccination age*

Study	Reason for exclusion
	range for HPV vaccine is 11 to 18 years.
Varman, M, Sharlin, C, Fernandez, C et al. (2018) Human Papilloma Virus Vaccination Among Adolescents in a Community Clinic Before and After Intervention. Journal of community health 43(3): 455-458	- Review article but not a systematic review
Venkatesh, Ashwin, Chia, Daphne Theresa, Tang, Anthony et al. (2020) Efficacy of text message intervention for increasing MMR uptake in light of the recent loss of UK's measles-free status. The British Journal of General Practice : The Journal of the Royal College of General Practitioners 70(692): 110	- Review article but not a systematic review
Vondracek, T G; Pham, T P; Huycke, M M (1998) A hospital-based pharmacy intervention program for pneumococcal vaccination. Archives of internal medicine 158(14): 1543-7	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Wagner, Abram L, Shrivastwa, Nijika, Potter, Rachel C et al. (2018) Pneumococcal and Meningococcal Vaccination among Michigan Children with Sickle Cell Disease. The Journal of pediatrics 196: 223-229	- Study does not contain an intervention aimed at increasing vaccine uptake *This study compares vaccine uptake between children who have sickle cell disease and those who do not.*
Wagner, Nicole Marie (2019) Assessing the value of the vaccine social media intervention through the re-aim framework implementation dimension. Dissertation Abstracts International: Section B: The Sciences and Engineering 80(11be): no-specified	- Not a peer-reviewed publication
Wallace C; Leask J; Trevena LJ (2006) Effects of a web based decision aid on parental attitudes to MMR vaccination: a before and after study. BMJ (Clinical research ed.) 332(7534): 146-149	- The study did not report any of the outcomes specified in the protocol
Wallace, A.S.; Ryman, T.K.; Dietz, V. (2012) Experiences integrating delivery of maternal and child health services with childhood immunization programs: Systematic review update. Journal of Infectious Diseases 205(suppl1): 6-s19	- Systematic review used as source of primary studies

Study	Reason for exclusion
Wallgren, S.; Berry-Caban, C.S.; Bowers, L. (2012) Impact of Clinical Pharmacist Intervention on diabetes-Related outcomes in a military treatment Facility. Annals of Pharmacotherapy 46(3): 353-357	- Study does not contain an intervention aimed at increasing vaccine uptake *The intervention is aimed at managing diabetes and related conditions. There is no mention of an intervention specifically for vaccines.*
Walling, Emily B, Benzoni, Nicole, Dornfeld, Jarrod et al. (2016) Interventions to Improve HPV Vaccine Uptake: A Systematic Review. Pediatrics 138(1)	- Systematic review used as source of primary studies
Wang, Jiangrong, Ploner, Alexander, Sparen, Par et al. (2019) Mode of HPV vaccination delivery and equity in vaccine uptake: A nationwide cohort study. Preventive medicine 120: 26-33	- Not a relevant study design *Survey looking at factors that affect vaccine uptake.*
Wang, Junling, Ford, Lindsay J, Wingate, La'Marcus et al. (2013) Effect of pharmacist intervention on herpes zoster vaccination in community pharmacies. Journal of the American Pharmacists Association : JAPhA 53(1): 46-53	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Ward, K., Chow, M.Y.K., King, C. et al. (2012) Strategies to improve vaccination uptake in Australia, a systematic review of types and effectiveness. Australian and New Zealand Journal of Public Health 36(4): 369-377	- Systematic review used as source of primary studies
Weaver, M, Krieger, J, Castorina, J et al. (2001) Cost-effectiveness of combined outreach for the pneumococcal and influenza vaccines. Archives of internal medicine 161(1): 111-20	- Duplicate reference *This is an economic analysis of a study already considered in this review: Krieger 2000: Increasing influenza and pneumococcal immunization rates: a randomized controlled study of a senior center-based intervention*

Study	Reason for exclusion
Weir, Rosy Chang, Toyoji, Mariko, McKee, Michael et al. (2018) Assessing the Impact of Electronic Health Record Interventions on Hepatitis B Screening and Vaccination. Journal of health care for the poor and underserved 29(4): 1587-1605	- Study does not include a relevant population *Study look at HBV vaccination in Asian American adults who are at higher risk of HBV. Also vaccination not provided to adults routinely in UK.*
Wells, C., Monte, S.V., Prescott, W.A. et al. (2019) A pharmacy resident-driven pneumococcal vaccination protocol increases vaccination rates in hospitalized patients over 65 years. JACCP Journal of the American College of Clinical Pharmacy 2(5): 488-493	- Infrastructure study. Excluded because there was sufficient RCT and cohort evidence for this review
Westrick, Salisa C, Owen, James, Hagel, Harry et al. (2016) Impact of the RxVaccinate program for pharmacy-based pneumococcal immunization: A cluster-randomized controlled trial. Journal of the American Pharmacists Association : JAPhA 56(1): 29-36e1	- Data not reported in an extractable format *Data was given as percentages without participant numbers*
Whelan, Noella W, Steenbeek, Audrey, Martin-Misener, Ruth et al. (2014) Engaging parents and schools improves uptake of the human papillomavirus (HPV) vaccine: examining the role of the public health nurse. Vaccine 32(36): 4665-71	- Not a relevant study design *This is a survey that looks at factors affecting vaccine uptrake*
Whitaker JA, Poland CM, Beckman TJ et al. Immunization education for internal medicine residents: A cluster-randomized controlled trial. Vaccine 36(14): 1823-1829	- The study did not report any of the outcomes specified in the protocol
White, C M and Lines, D R (1995) Compliance with neonatal hepatitis B vaccination. The Medical journal of Australia 162(11): 613	- Not a peer-reviewed publication
Whittaker, Karen (2002) Lay workers for improving the uptake of childhood immunization. British journal of community nursing 7(9): 474-9	- Systematic review used as source of primary studies

Study	Reason for exclusion
Wigham, Sarah, Ternent, Laura, Bryant, Andrew et al. (2014) Parental financial incentives for increasing preschool vaccination uptake: systematic review. Pediatrics 134(4): e1117-28	- Systematic review used as source of primary studies
Williams, Nia, Woodward, Helen, Majeed, Azeem et al. (2011) Primary care strategies to improve childhood immunisation uptake in developed countries: systematic review. JRSM short reports 2(10): 81	- Systematic review used as source of primary studies
Willis, Natalie, Hill, Sophie, Kaufman, Jessica et al. (2013) "Communicate to vaccinate": the development of a taxonomy of communication interventions to improve routine childhood vaccination. BMC international health and human rights 13: 23	- Does not contain an outcome of relevance to this review *Study aims to develop a taxonomy of communication interventions but does not look at whether the identified studies increase uptake*
Wilson, Matthew W; Brown, Blair J; Miles, Matthew C (2016) A Multicomponent Intervention to Improve Pneumococcal Vaccination Knowledge Among Internal Medicine Residents. MedEdPORTAL : the journal of teaching and learning resources 12: 10414	- Does not contain an outcome of relevance to this review
Wilson, Thad R, Fishbein, Daniel B, Ellis, Peggy A et al. (2005) The impact of a school entry law on adolescent immunization rates. The Journal of adolescent health : official publication of the Society for Adolescent Medicine 37(6): 511-6	- Not a relevant study design *Survey that looks at factors affecting uptake*
Witt, CE, Ulm, M, Redfern, T et al. (2020) Video-assisted counseling for human papillomavirus vaccination: a quality improvement study. Journal of investigative medicine 68(2): 683	- Conference abstract
Wong VWY, Fong DYT, Lok KYW et al. Brief education to promote maternal influenza vaccine uptake: A randomized controlled trial. Vaccine 34(44): 5243-5250	- Study took place in a non-OECD country
Wood, Heidi M; McDonough, Randal P; Doucette, William R (2009) Retrospective financial analysis of a herpes zoster vaccination program from an independent community pharmacy perspective. Journal of the American Pharmacists Association : JAPhA 49(1): 12-7	- Does not contain an outcome of relevance to this review *This study does not have a comparator*

Study	Reason for exclusion
Wright A, Poon EG, Wald J et al. (2012) Randomized controlled trial of health maintenance reminders provided directly to patients through an electronic PHR. Journal of general internal medicine 27(1): 85-92	- Study participants are the wrong age group *This study looked at pneumococcal vaccine but ~50% of participants were under the age of 50 years and only ~15% were over ~63 years old.*
Wright, P.J., Fortinsky, R.H., Covinsky, K.E. et al. (2000) Delivery of preventive services to older black patients using neighborhood health centers. Journal of the American Geriatrics Society 48(2): 124-130	- Does not contain an outcome of relevance to this review *This study does not have a comparator*
Yanagihara, Dolores M, Taira, Deborah A, Davis, James et al. (2005) A health plan intervention to improve pneumococcal vaccination in the elderly. Managed care interface 18(9): 25-30	- The study did not report any of the outcomes specified in the protocol *This study does not focus on the effect of specific interventions.*
Yang TU, Kim E, Park YJ et al. (2016) Successful introduction of an underutilized elderly pneumococcal vaccine in a national immunization program by integrating the pre-existing public health infrastructure. Vaccine 34(13): 1623-1629	- The intervention is a free vaccine- not in scope
Yee, Lynn M, Martinez, Noelle G, Nguyen, Antoinette T et al. (2017) Using a Patient Navigator to Improve Postpartum Care in an Urban Women's Health Clinic. Obstetrics and gynecology 129(5): 925-933	- Vaccine on UK routine schedule but wrong context for administration *Study includes data for HPV vaccination for new mothers. Our age range of interest for HPV vaccine is 11-18 years of age.*
Yeh, Sylvia, Mink, ChrisAnna, Kim, Matthew et al. (2014) Effectiveness of hospital-based postpartum procedures on pertussis vaccination among postpartum women. American journal of obstetrics and gynecology 210(3): 237e1-6	- Vaccine on UK routine schedule but wrong context for administration *Pertussis vaccination given to women post-partum in*

Study	Reason for exclusion
	USA, during pregnancy in UK.
Yokley, J M and Glenwick, D S (1984) Increasing the immunization of preschool children; an evaluation of applied community interventions. Journal of applied behavior analysis 17(3): 313-25	- Study published before 1990 date limit set in review protocol
Yoo GJ, Fang T, Zola J et al. (2012) Destigmatizing hepatitis B in the Asian American community: lessons learned from the San Francisco Hep B Free Campaign. Journal of cancer education : the official journal of the American Association for Cancer Education 27(1): 138-144	- The study did not report any of the outcomes specified in the protocol
Yoost, Jennie Lee, Starcher, Rachael Whitley, King-Mallory, Rebecca Ann et al. (2017) The Use of Telehealth to Teach Reproductive Health to Female Rural High School Students. Journal of pediatric and adolescent gynecology 30(2): 193-198	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Young, S A, Halpin, T J, Johnson, D A et al. (1980) Effectiveness of a mailed reminder on the immunization levels of infants at high risk of failure to complete immunizations. American journal of public health 70(4): 422-4	- Study published before 1990 date limit set in review protocol
Yudin MH; Salaripour M; Sgro MD (2010) Acceptability and feasibility of seasonal influenza vaccine administration in an antenatal clinic setting. Journal of obstetrics and gynaecology Canada : JOGC = Journal d'obstetrique et gynecologie du Canada : JOGC 32(8): 745-748	- Not a relevant study design
Yun, Katherine, Urban, Kailey, Mamo, Blain et al. (2016) Increasing Hepatitis B Vaccine Prevalence Among Refugee Children Arriving in the United States, 2006-2012. American journal of public health 106(8): 1460-2	- Study does not contain an intervention aimed at increasing vaccine uptake
Zajicek-Farber, Michaela L (2010) Building Practice Evidence for Parent Mentoring Home Visiting in Early Childhood. Research on Social Work Practice 20(1): 46-64	- The study did not report any of the outcomes specified in the protocol *This study involves general education for parents. However, they do not mention any compotent that should increase vaccine uptake.*

Study	Reason for exclusion
Zimet, G, Dixon, B, Xiao, S et al. (2016) Can automated physician reminders increase 2nd and 3rd dose administration of HPV vaccine?. Sexually transmitted diseases 43(10): S158	- Conference abstract
Zucker, Rachel A, Reiter, Paul L, Mayer, Melissa K et al. (2015) Effects of a Presidential Candidate's Comments on HPV Vaccine. Journal of health communication 20(7): 783-9	- Study does not contain an intervention aimed at increasing vaccine uptake

Excluded from the re-runs search

Study	Reason for exclusion
(2019) Impact of shingrix (recombinant zoster vaccine) second dose reminder member calls by a commercial health plan. Journal of managed care and specialty pharmacy 25: S95-S96	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Abdullahi, Leila H, Kagina, Benjamin M, Ndze, Valantine Ngum et al. (2020) Improving vaccination uptake among adolescents. The Cochrane database of systematic reviews 1: cd011895	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Acampora, Anna, Grossi, Adriano, Barbara, Andrea et al. (2020) Increasing HPV Vaccination Uptake among Adolescents: A Systematic Review. International journal of environmental research and public health 17(21)	- Multicomponent non-RCT. Excluded because there was sufficient RCT evidence for this review
Akojie, Halimat (2021) Strategies for teaching new mothers the importance of vaccination. Dissertation Abstracts International: Section B: The Sciences and Engineering 82(3b): no-specified	- Not a peer-reviewed publication *This is a thesis and was not published in a peer-reviewed journal*
Arendt, F. and Scherr, S. (2020) News-stimulated public-attention dynamics and vaccination coverage during a measles outbreak: An observational study. Social Science and Medicine 265: 113495	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Austin, S., Wooten, K., Dunkle, W. et al. (2021) Increasing HPV Vaccination Support Through a Pilot Film-Based	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Community Engagement. Journal of community health 46(2): 343-348	
Balzarini, F., Frascella, B., Oradini-Alacreu, A. et al. (2020) Does the use of personal electronic health records increase vaccine uptake? A systematic review. Vaccine 38(38): 5966-5978	- Duplicate reference
Barchitta, M., Maugeri, A., Lio, R.M.S. et al. (2021) Vaccination status of mothers and children from the 'mamma & bambino' cohort. Vaccines 9(2): 1-11	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Blanchi, S., Vaux, J., Toque, J.M. et al. (2020) Impact of a catch-up strategy of DT-IPV vaccination during hospitalization on vaccination coverage among people over 65 years of age in france: The HOSPIVAC study (Vaccination during hospitalization). Vaccines 8(2): 1-13	- The vaccine(s) were not on the UK routine vaccine schedule for this age group *Diphtheria, tetanus and polio vaccine are not on the UK vaccination schedule for people aged 65+ years.*
Bond, Amelia M, Volpp, Kevin G, Emanuel, Ezekiel J et al. (2019) Real-time Feedback in Pay-for-Performance: Does More Information Lead to Improvement?. Journal of general internal medicine 34(9): 1737-1743	- Infrastructure before-and-after study. Excluded because there was sufficient RCT and cohort evidence for this review
Bouchez, M., Ward, J.K., Bocquier, A. et al. (2021) Physicians' decision processes about the HPV vaccine: A qualitative study. Vaccine 39(3): 521-528	- Qualitative study
Chantler, Tracey, Pringle, Ellen, Bell, Sadie et al. (2020) Does electronic consent improve the logistics and uptake of HPV vaccination in adolescent girls? A mixed-methods theory informed evaluation of a pilot intervention. BMJ open 10(11): e038963	- Study already identified in the intital search and sift *Already included as a mixed methods study in the qualitative review*
Cunningham, Andrew K, Rourke, Meaghan M, Moeller, James L et al. (2021) HPV Immunization in High School Student-Athletes Receiving Preparticipation Physical Evaluations at Mass Event Versus Other Venues. Sports health 13(1): 91-94	- Not a relevant study design *All participants had access to the same interventions. This study looks at 'risk factors' for getting vaccinated.*

Study	Reason for exclusion
de Cock, Caroline, van Velthoven, Michelle, Milne-Ives, Madison et al. (2020) Use of Apps to Promote Childhood Vaccination: Systematic Review. JMIR mHealth and uHealth 8(5): e17371	- Systematic review that did not include any additional relevant papers
Dempsey, Amanda F, Pyrzanowski, Jennifer, Campbell, Jonathan et al. (2020) Cost and reimbursement of providing routine vaccines in outpatient obstetrician/gynecologist settings. American journal of obstetrics and gynecology 223(4): 562e1-562e8	- Duplicate reference *This is an economic analysis of O'Leary 2019: "Effectiveness of a multimodal intervention to increase vaccination in obstetrics/gynecology settings"*
Duong, H.T. and Hopfer, S. (2021) Let's Chat: Development of a Family Group Chat Cancer Prevention Intervention for Vietnamese Families. Health education & behavior : the official publication of the Society for Public Health Education 48(2): 208-219	- Qualitative study
Duong, H.T. and Hopfer, S. (2020) "Let's Chat": process evaluation of an intergenerational group chat intervention to increase cancer prevention screening among Vietnamese American families. Translational behavioral medicine	- Qualitative study
Eisenhauer, L.; Hansen, B.R.; Pandian, V. (2021) Strategies to improve human papillomavirus vaccination rates among adolescents in family practice settings in the United States: A systematic review. Journal of clinical nursing 30(34): 341-356	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Elliott, T.E., O'Connor, P.J., Asche, S.E. et al. (2021) Design and rationale of an intervention to improve cancer prevention using clinical decision support and shared decision making: A clinic-randomized trial. Contemporary Clinical Trials 102: 106271	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Falkenberg-Olson, A.C., Hayter, K.L., Holzer, R.A. et al. (2020) Infant Vaccinations among Mothers with Substance-Use Disorders: A Comparative Study. Clinical medicine & research	- Multicomponent non-RCT. Excluded because there was sufficient RCT evidence for this review
Flood, T., Wilson, I.M., Prue, G. et al. (2020) Impact of school-based educational interventions in middle adolescent populations (15-17yrs) on human papillomavirus (HPV) vaccination uptake and perceptions/knowledge of HPV and its associated cancers: A systematic review. Preventive Medicine 139: 106168	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Foss, Hakan Safaralilo, Oldervoll, Ann, Fretheim, Atle et al. (2019) Communication around HPV vaccination for adolescents in low- and middle-income countries: a systematic scoping overview of systematic reviews. Systematic reviews 8(1): 190	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Glanz, J.M., Wagner, N.M., Narwaney, K.J. et al. (2020) Web-Based Tailored Messaging to Increase Vaccination: A Randomized Clinical Trial. Pediatrics 146(5): e20200669	- Study already identified in the intital search and sift
Gleeson, S; Kelleher, K; Gardner, W (2016) Evaluating a Pay-for-Performance Program for Medicaid Children in an Accountable Care Organization. JAMA pediatrics 170(3): 259-266	- Infrastructure before-and-after study. Excluded because there was sufficient RCT and cohort evidence for this review
Gori, D., Costantino, C., Odone, A. et al. (2020) The impact of mandatory vaccination law in Italy on mmr coverage rates in two of the largest italian regions (Emilia-romagna and sicily): An effective strategy to contrast vaccine hesitancy. Vaccines 8(1): 57	- Infrastructure before-and-after study. Excluded because there was sufficient RCT and cohort evidence for this review
Hansen, Peter R; Schmidtblaicher, Matthias; Brewer, Noel T (2020) Resilience of HPV vaccine uptake in Denmark: Decline and recovery. Vaccine 38(7): 1842-1848	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Hohmann, Lindsey A, Hastings, Tessa J, Ha, David R et al. (2019) Impact of a multi-component immunization intervention on pneumococcal and herpes zoster vaccinations: A randomized controlled trial of community pharmacies in 2 states. Research in social & administrative pharmacy : RSAP 15(12): 1453-1463	- The study did not report any of the outcomes specified in the protocol *And unable to determine what proportion of individuals were over 65 years of age*
Ilozumba, O., Schmidt, P., Ket, J.C.F. et al. (2021) Can mHealth interventions contribute to increased HPV vaccination uptake? A systematic review. Preventive Medicine Reports 21: 101289	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
JPRN-UMIN000039273 (2020) A blinded RCT to verify the effect of changing the awareness and behavior of HPV vaccination by video viewing intervention for parents who have daughters of targeted generation. http://www.who.int/trialsearch/Trial2.aspx?TrialID=JPRN-UMIN000039273	- This is a study protocol without a published study

Study	Reason for exclusion
Kaufman, J., Attwell, K., Hauck, Y. et al. (2020) Designing a multi-component intervention (P3-MumBubVax) to promote vaccination in antenatal care in Australia. Health promotion journal of Australia : official journal of Australian Association of Health Promotion Professionals	- The study did not report any of the outcomes specified in the protocol *This study is about how an intervention was developed. There is no qualitative data published in this study.*
Kuehne, F., Sanftenberg, L., Dreischulte, T. et al. (2020) Shared decision making enhances pneumococcal vaccination rates in adult patients in outpatient care. International Journal of Environmental Research and Public Health 17(23): 1-15	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Lin, S.-C., Tam, K.-W., Yen, J.Y.-C. et al. (2020) The impact of shared decision making with patient decision aids on the rotavirus vaccination rate in children: A randomized controlled trial. Preventive Medicine 141: 106244	- Study not carried out in an OECD country *Study took place in Taiwan.*
Loskutova, Natalia Y, Smail, Craig, Callen, Elisabeth et al. (2020) Effects of multicomponent primary care-based intervention on immunization rates and missed opportunities to vaccinate adults. BMC family practice 21(1): 46	- Multicomponent non-RCT. Excluded because there was sufficient RCT evidence for this review
Lott, B.E., Okusanya, B.O., Anderson, E.J. et al. (2020) Interventions to increase uptake of Human Papillomavirus (HPV) vaccination in minority populations: A systematic review. Preventive Medicine Reports 19: 101163	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Maggio, L.A.; Krakow, M.; Moorhead, L.L. (2020) There were some clues': A qualitative study of heuristics used by parents of adolescents to make credibility judgements of online health news articles citing research. BMJ Open 10(8): e039692	- Qualitative study
Maria, DS (2020) 8. Efficacy of a Student-Nurse Brief Parent-Based Sexual Health Intervention to Increase HPV Vaccination Among Adolescents. Journal of adolescent health 66(2): S4-S5	- Conference abstract
McAdam-Marx, C., Tak, C., Petigara, T. et al. (2019) Impact of a guideline-based best practice alert on pneumococcal vaccination rates in adults in a primary care setting. BMC health services research 19(1): 474	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review

Study	Reason for exclusion
Nagykaldi, Z., Scheid, D., Zhao, Y.D. et al. (2020) A sustainable model for preventive services in rural counties: The healthier together study. Journal of the American Board of Family Medicine 33(5): 698-706	- Multicomponent non-RCT. Excluded because there was sufficient RCT evidence for this review
NCT04638010 (2020) Increasing Breast, Cervical, and Colorectal Cancer Screening and HPV Vaccination Among Underserved Texans. https://clinicaltrials.gov/show/NCT04638010	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
O'Leary, Sean T, Narwaney, Komal J, Wagner, Nicole M et al. (2019) Efficacy of a Web-Based Intervention to Increase Uptake of Maternal Vaccines: An RCT. American journal of preventive medicine 57(4): e125-e133	- Study already identified in the intital search and sift
O'Leary, Sean T, Pyrzanowski, Jennifer, Brewer, Sarah E et al. (2019) Effectiveness of a multimodal intervention to increase vaccination in obstetrics/gynecology settings. Vaccine 37(26): 3409-3418	- Duplicate reference
Orefice, R. and Quinlivan, J.A. (2019) Small interface changes have dramatic impacts: how mandatory fields in electronic medical records increased pertussis vaccination rates in Australian obstetric patients. BMJ health & care informatics 26(1): 0	- This study has already been included in RQ1
Perkins, RB, Legler, A, Jansen, E et al. (2020) Improving HPV Vaccination Rates: a Stepped-Wedge Randomized Trial. Pediatrics 146(1)	- Education and reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Peterson, Caryn E, Silva, Abigail, Holt, Hunter K et al. (2020) Barriers and facilitators to HPV vaccine uptake among US rural populations: a scoping review. Cancer causes & control : CCC 31(9): 801-814	- Qualitative study
Pot, Mirjam, Paulussen, Theo Gwm, Ruiter, Robert Ac et al. (2020) Dose-Response Relationship of a Web-Based Tailored Intervention Promoting Human Papillomavirus Vaccination: Process Evaluation of a Randomized Controlled Trial. Journal of medical Internet research 22(7): e14822	- Duplicate reference *This is a process evaluation of Pot 2017, which has been assessed in the education evidence review.*

Study	Reason for exclusion
Rani, Uzma, Darabaner, Ellen, Seserman, Michael et al. (2020) Public Education Interventions and Uptake of Human Papillomavirus Vaccine: A Systematic Review. Journal of public health management and practice : JPHMP	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Saitoh, A., Katsuta, T., Mine, M. et al. (2020) Effect of a vaccine information statement (VIS) on immunization status and parental knowledge, attitudes, and beliefs regarding infant immunization in Japan. Vaccine 38(50): 8049-8054	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Scarinci, Isabel C; Hansen, Barbara; Kim, Young-Il (2020) HPV vaccine uptake among daughters of Latinx immigrant mothers: Findings from a cluster randomized controlled trial of a community-based, culturally relevant intervention. Vaccine 38(25): 4125-4134	- Study already identified in the intital search and sift *It was already included in the education evidence review*
Schellenberg, Naomi and Crizzle, Alexander M. (2020) Vaccine hesitancy among parents of preschoolers in Canada: a systematic literature review. Canadian journal of public health = Revue canadienne de sante publique 111(4): 562-584	- Systematic review that did not include any additional relevant papers
Spina, C.I., Brewer, S.E., Ellingson, M.K. et al. (2020) Adapting Center for Disease Control and Prevention's immunization quality improvement program to improve maternal vaccination uptake in obstetrics. Vaccine 38(50): 7963-7969	- Infrastructure before-and-after study. Excluded because there was sufficient RCT and cohort evidence for this review
Staras, S.A.S., Richardson, E., Merlo, L.J. et al. (2021) A feasibility trial of parent HPV vaccine reminders and phone-based motivational interviewing. BMC public health 21(1): 109	- The study did not report any of the outcomes specified in the protocol
Staras, SAS, Vadaparampil, ST, Thompson, LA et al. (2020) Postcard reminders for HPV vaccination mainly primed parents for providers' recommendations. Preventive medicine reports 20	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Szilagyi, Peter, Albertin, Christina, Gurfinkel, Dennis et al. (2020) Effect of State Immunization Information System Centralized Reminder and Recall on HPV Vaccination Rates. Pediatrics 145(5)	- Duplicate reference
Thompson, E.L., Livingston, M.D., Daley, E.M. et al. (2020) Rhode Island Human Papillomavirus Vaccine School Entry	- Study already identified in the intital search and sift

Study	Reason for exclusion
Requirement Using Provider-Verified Report. American Journal of Preventive Medicine 59(2): 274-277	*It was included in the accessibility evidence review.*
Tull, Fraser, Borg, Kim, Knott, Cameron et al. (2019) Short Message Service Reminders to Parents for Increasing Adolescent Human Papillomavirus Vaccination Rates in a Secondary School Vaccine Program: A Randomized Control Trial. The Journal of adolescent health : official publication of the Society for Adolescent Medicine 65(1): 116-123	- Study already identified in the intital search and sift *This study had already been included in the reminders evidence review.*
Tyler, R., Kile, S., Strain, O. et al. (2020) Impact of pharmacist intervention on completion of recombinant zoster vaccine series in a community pharmacy. Journal of the American Pharmacists Association	- Reminders non-RCT. Excluded because there was sufficient RCT evidence for this review
Ulm, MA, Redfern, T, Pierce, V WF et al. (2020) Video-assisted counseling for human papillomavirus vaccination: a quality improvement study. Gynecologic oncology 159: 288-289	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Wallace-Brodeur, R., Li, R., Davis, W. et al. (2020) A quality improvement collaborative to increase human papillomavirus vaccination rates in local health department clinics. Preventive Medicine 139: 106235	- Education non-RCT. Excluded because there was sufficient RCT evidence for this review
Wilder-Smith, Annika B and Qureshi, Kaveri (2020) Resurgence of Measles in Europe: A Systematic Review on Parental Attitudes and Beliefs of Measles Vaccine. Journal of epidemiology and global health 10(1): 46-58	- Qualitative study
Wilkinson, Tracey A, Dixon, Brian E, Xiao, Shan et al. (2019) Physician clinical decision support system prompts and administration of subsequent doses of HPV vaccine: A randomized clinical trial. Vaccine 37(31): 4414-4418	- Study already identified in the intital search and sift *This study has already been included in the reminders evidence review.*
Yunusa, Umar, Garba, Saleh Ngaski, Umar, Addakano Bello et al. (2021) Mobile phone reminders for enhancing uptake, completeness and timeliness of routine childhood immunization in low and middle income countries: A systematic review and meta-analysis. Vaccine 39(2): 209-221	- Systematic review that did not include any additional relevant papers

Table 18 Excluded studies from NICE guideline NG103: Flu vaccination: increasing uptake

Study	Reason for exclusion
Atkins K, van Hoek AJ, Watson C et al. (2016) Seasonal influenza vaccination delivery through community pharmacists in England: evaluation of the London pilot. BMJ open 6(2): e009739	- Data not reported in an extractable format. This is a before-and-after study but no patient numbers are provided for before 2013/2014 when the intervention was introduced. Therefore, the data is not in an extractable format.
Frew PM, Owens LE, Saint-Victor DS et al. (2014) Factors associated with maternal influenza immunization decision-making. Evidence of immunization history and message framing effects. Human vaccines & immunotherapeutics 10(9): 2576-2583	- Does not contain an outcome of relevance to this review. The outcome is intention to vaccinate, not vaccine uptake.
Skedgel C, Langley J M, MacDonald N E. (2011). An Incremental Economic Evaluation of Targeted and Universal Influenza Vaccination in Pregnant Women. Canadian journal of public health. 201:6. 445-450.	- Does not contain an outcome of relevance to this review. Study does not have vaccine uptake data - it looks at whether people should be vaccinated or not.
Wong VWY, Fong DYT, Lok KYW et al. (2016) Brief education to promote maternal influenza vaccine uptake: A randomized controlled trial. Vaccine 34(44): 5243-5250	- Study not carried out in an OECD country. Hong Kong was transferred from the UK to China in 1997 and Wong 2016 took place between 2013 to 2015.
Wong V W. Y, Lok K Y. W, and Tarrant M. (2016). Interventions to increase the uptake of seasonal influenza vaccination among pregnant women: A systematic review. Vaccine, pp.20- 32.	- Studies were already included from other SRs identified in the searches

Economic studies

Study	Reason for exclusion
Ameel, B.M.; Beigi, R.H.; Caughey, A.B. (2018) Cost-effectiveness of the Tdap vaccine during pregnancy. American Journal of Obstetrics and Gynecology 218(1supplement1): 516-s517	- Study did not consider increasing uptake
Atkins, Katherine E, Fitzpatrick, Meagan C, Galvani, Alison P et al. (2016) Cost-Effectiveness of Pertussis Vaccination During Pregnancy in the United States. American journal of epidemiology 183(12): 1159-70	- Study did not consider increasing uptake
Bae, Geun-Ryang, Choe, Young June, Go, Un Yeong et al. (2013) Economic analysis of measles elimination program in the Republic of Korea, 2001: a cost benefit analysis study. Vaccine 31(24): 2661-6	- Study did not consider increasing uptake
Bettampadi, D., Boulton, M.L., Power, L.E. et al. (2019) Are community health workers cost-effective for childhood vaccination in India?. Vaccine 37(22): 2942-2951	- Non-OECD country
Beutels, Ph and Gay, N J (2003) Economic evaluation of options for measles vaccination strategy in a hypothetical Western European country. Epidemiology and infection 130(2): 273-83	- Study did not consider increasing uptake
Burmeister, J., Schroeder, M., Veach, S. et al. (2013) The cost effectiveness of various marketing techniques on Tdap vaccination rates within two community pharmacies. Journal of the American Pharmacists Association 53(2): e45	- No results reported - Did not include QALYs as an outcome - adult studies
Chesson, Harrell W and Markowitz, Lauri E (2015) The cost-effectiveness of human papillomavirus vaccine catch-up programs for women. The Journal of infectious diseases 211(2): 172-4	- No results reported
Chiappini, Elena, Stival, Alessia, Galli, Luisa et al. (2013) Pertussis re-emergence in the post-vaccination era. BMC infectious diseases 13: 151	- Study did not consider increasing uptake
Derrah, K., Ameel, B.M., Hersh, A.R. et al. (2020) 1053: Cost-effectiveness of Tdap vaccination during pregnancy. American Journal of Obstetrics and Gynecology 222(1supplement): 652	- Study did not consider increasing uptake
Ding, Y., Hay, J., Yeh, S.H. et al. (2012) Cost-benefit analysis of hospital based postpartum vaccination with combined tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (TDAP). Value in Health 15(4): a241	- Study did not consider increasing uptake
Ding, Yao, Yeh, Sylvia H, Mink, Chris Anna M et al. (2013) Cost-benefit analysis of hospital based postpartum vaccination with combined tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap). Vaccine 31(22): 2558-64	- Study did not consider increasing uptake
Fernandes, E.G., Rodrigues, C.C.M., Sartori, A.M.C. et al. (2019) Economic evaluation of adolescents and adults' pertussis vaccination: A systematic review of current strategies. Human Vaccines and Immunotherapeutics 15(1): 14-27	- Study did not consider increasing uptake
Fernandes, Eder Gatti, Sartori, Ana Marli Christovam, de Soarez, Patricia Coelho et al. (2020) Cost-effectiveness analysis of universal adult immunization with tetanus-diphtheria-acellular pertussis vaccine (Tdap) versus current practice in Brazil. Vaccine 38(1): 46-53	- Non-OECD country

Fernandez-Cano, Maria Isabel; Armadans Gil, Lluis; Campins Marti, Magda (2015) Cost-benefit of the introduction of new strategies for vaccination against pertussis in Spain: cocooning and pregnant vaccination strategies. Vaccine 33(19): 2213-2220	- Study did not consider increasing uptake
Getsios D, Caro J J, Caro G, De Wals P, Law B J, Robert Y, Lance J M R (2002) Instituting a routine varicella vaccination program in Canada: an economic evaluation. Pediatric Infectious Disease Journal 21(6): 542-547	- Vaccine not routine in the UK
Greengold, Barbara, Nyamathi, Adeline, Kominski, Gerald et al. (2009) Cost-effectiveness analysis of behavioral interventions to improve vaccination compliance in homeless adults. Vaccine 27(5): 718-25	- Vaccine not routine in the UK
Hayman, D T S, Marshall, J C, French, N P et al. (2017) Cost-benefit analyses of supplementary measles immunisation in the highly immunized population of New Zealand. Vaccine 35(37): 4913-4922	- Study did not consider increasing uptake
Hoshi, Shu-Ling, Seposo, Xerxes, Okubo, Ichiro et al. (2018) Cost-effectiveness analysis of pertussis vaccination during pregnancy in Japan. Vaccine 36(34): 5133-5140	- Study did not consider increasing uptake
Hui, Charles, Dunn, Jessica, Morton, Rachael et al. (2018) Interventions to Improve Vaccination Uptake and Cost Effectiveness of Vaccination Strategies in Newly Arrived Migrants in the EU/EEA: A Systematic Review. International journal of environmental research and public health 15(10)	- Systematic review - the only CE study did not consider increasing uptake - Not a cost-effectiveness study
Hurley, L.P., Beaty, B., Lockhart, S. et al. (2017) Centralized vaccine reminder/recall to improve adult vaccination rates at an urban safety net health system. Journal of General Internal Medicine 32(2supplement1): 135-s136	- Did not include QALYs as an outcome - adult studies
Kempe, Allison, Barrow, Jennifer, Stokley, Shannon et al. (2012) Effectiveness and cost of immunization recall at school-based health centers. Pediatrics 129(6): e1446-52	- Not a cost-effectiveness study
Lugner, Anna K, van der Maas, Nicoline, van Boven, Michiel et al. (2013) Cost-effectiveness of targeted vaccination to protect new-borns against pertussis: comparing neonatal, maternal, and cocooning vaccination strategies. Vaccine 31(46): 5392-7	- Study did not consider increasing uptake
Major, J.; Wingate, L.T.; Oishi, T.S. (2016) A cost-effectiveness evaluation of a multifaceted community pharmacy intervention to increae rates of herpes zoster vaccination. Value in Health 19(3): a217	- Vaccine not routine in the UK
Ouwens, M., Littlewood, K., Sauboin, C. et al. (2010) Impact of mmrv mass vaccination with or without a catch up program on the incidence of varicella complications in France. Value in Health 13(7): a430	- Vaccine not routine in the UK
Poirrier, J.E., Mungall, B., Lee, I.H. et al. (2014) Cost-effectiveness of maternal immunisation for pertussis in new zealand. Value in Health 17(7): a806	- Study did not consider increasing uptake
Portnoy, A., Campos, N.G., Sy, S. et al. (2020) Impact and cost-effectiveness of human papillomavirus vaccination campaigns. Cancer Epidemiology Biomarkers and Prevention 29: 22-30	- Study did not consider increasing uptake - Non-OECD country

Rivero-Santana, Amado, Cuellar-Pompa, Leticia, Sanchez-Gomez, Luis M et al. (2014) Effectiveness and cost-effectiveness of different immunization strategies against whooping cough to reduce child morbidity and mortality. Health policy (Amsterdam, Netherlands) 115(1): 82-91	- Study did not consider increasing uptake
Russell, Louise B, Pentakota, Sri Ram, Toscano, Cristiana Maria et al. (2016) What Pertussis Mortality Rates Make Maternal Acellular Pertussis Immunization Cost-Effective in Low- and Middle-Income Countries? A Decision Analysis. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 63(suppl4): 227-s235	- Non-OECD country - Study did not consider increasing uptake
Smith, Kenneth J, Nowalk, Mary Patricia, Lin, Chyongchiou J et al. (2017) Cost effectiveness of a practice-based intervention to improve vaccination rates in adults less than 65-years-old. Human vaccines & immunotherapeutics 13(10): 2207-2212	- Vaccine not routine in this age group in the UK
Suh, Christina A, Saville, Alison, Daley, Matthew F et al. (2012) Effectiveness and net cost of reminder/recall for adolescent immunizations. Pediatrics 129(6): e1437-45	- Cost perspective was inappropriate (private practice, net additional revenue)
Terranella, A., Beeler Asay, G.R., Messonnier, M.L. et al. (2013) Pregnancy dose Tdap and postpartum cocooning to prevent infant pertussis: A decision analysis. Obstetrical and Gynecological Survey 68(9): 615-616	- Study did not consider increasing uptake
Terranella, Andrew, Asay, Garrett R Beeler, Messonnier, Mark L et al. (2013) Pregnancy dose Tdap and postpartum cocooning to prevent infant pertussis: a decision analysis. Pediatrics 131(6): e1748-56	- Study did not consider increasing uptake
Van Bellinghen, Laure-Anne, Dimitroff, Alex, Haberl, Michael et al. (2018) Is adding maternal vaccination to prevent whooping cough cost-effective in Australia?. Human vaccines & immunotherapeutics 14(9): 2263-2273	- Study did not consider increasing uptake
van Hoek, Albert Jan, Campbell, Helen, Amirthalingam, Gayatri et al. (2016) Cost-effectiveness and programmatic benefits of maternal vaccination against pertussis in England. The Journal of infection 73(1): 28-37	- Study did not consider increasing uptake
Wateska, A.R., Nowalk, M.P., Lin, C.J. et al. (2019) An intervention to improve pneumococcal vaccination uptake in high risk 50-64 year olds vs. expanded age-based recommendations: an exploratory cost-effectiveness analysis. Human Vaccines and Immunotherapeutics 15(4): 863-872	- Vaccine not routine in this age group in the UK
Westra, T.A., De Vries, R., Tamminga, H.J. et al. (2009) Cost-effectiveness of a cocooning immunization strategy against pertussis for The Netherlands. Value in Health 12(7): a425-a426	- Study did not consider increasing uptake
Westra, Tjalke A, de Vries, Robin, Tamminga, Johannes J et al. (2010) Cost-effectiveness analysis of various pertussis vaccination strategies primarily aimed at protecting infants in the Netherlands. Clinical therapeutics 32(8): 1479-95	- Study did not consider increasing uptake
Dempsey, Amanda F, Pyrzanowski, Jennifer, Campbell, Jonathan et al. (2020) Cost and reimbursement of providing routine vaccines in outpatient obstetrician/gynecologist settings. American journal of obstetrics and gynecology 223(4): 562e1-562e8	- Exclude - not a cost-effectiveness analysis

Spencer, Jennifer C, Brewer, Noel T, Trogdon, Justin G et al. (2020) Cost-effectiveness of Interventions to Increase HPV Vaccine Uptake. Pediatrics 146(6)	- Exclude - system was too different to the UK context

Appendix K – Research recommendation – full details

K.1.1 Research recommendation

What are the most effective and acceptable interventions to increase pertussis vaccine uptake in pregnant women in the UK?

K.1.2 Why this is important

The evidence in this review has considered different interventions and their effects on vaccine uptake in pregnant women. However, much of this evidence is based on uptake of the flu vaccine, with little evidence on the effectiveness of campaigns aimed at promoting pertussis vaccination during pregnancy. In addition, most of the existing evidence is low to very low quality and none was based in the UK. More UK-based research is therefore needed, specifically focussing on pertussis vaccination, to identify what types of interventions are the most effective at increasing vaccine uptake in pregnant women. The acceptability of these interventions should also be considered as this could provide information about barriers/ facilitators to vaccination that might inform the design of interventions and improves the likelihood of their successful implementation. Qualitative research accompanying an intervention study could also provide useful information to help understand why an intervention does or does not increase uptake and may be used to improve the design and implementation of the intervention in the future.

K.1.3 Rationale for research recommendation

Importance to 'patients' or the population	High levels of pertussis vaccine uptake are necessary for reducing the chances of the pregnant woman, and later mother catching a disease. This in turn protects the unborn child and baby after birth until it can be vaccinated itself.
Relevance to NICE guidance	Medium: the research is relevant to the recommendations in the guidance, but the research recommendations are not essential to future updates. Identifying the most effective and acceptable interventions for pregnant women will help when providing recommendations for providers about the best ways to increase vaccine uptake in this population.
Relevance to the NHS	Identifying the most effective interventions to increase vaccine uptake will help providers to plan effective services for vaccination in this population.
National priorities	There is a new DHSC vaccination strategy due in late 2021 and this work would fall under the goal of increasing uptake routine vaccinations.
Current evidence base	Overall, very few studies were identified that focused on pertussis vaccination for pregnant women. We identified 5 UK-based qualitative studies for pregnant women and no UK-based quantitative studies for pertussis vaccination.
Equality considerations	The most effective intervention could vary between communities and may need targeting to groups who are at particular risk of having low uptake (such as those with specific religious or other beliefs; migrant communities; and Gypsy, Roma and Traveller communities).

K.1.4 Modified PICO table

Population	• Pregnant women who are eligible for pertussis vaccination (including pregnant women from ethnic minorities) • Healthcare staff organising pertussis vaccination programmes or administering vaccinations (including midwives and GPs)
Intervention	Interventions designed to increase uptake of pertussis vaccination. Interventions could be related to (but not limited to): • improving access • providing information or education • providing reminders • infrastructure changes (e.g., recording of status and vaccinations; audit and feedback) • combinations of the above The interventions could be aimed at the pregnant women or healthcare staff or both.
Comparator	• usual processes • different formats of the same intervention • different combinations of interventions
Outcomes	Quantitative outcomes including: • pertussis vaccine uptake by pregnant women • offers of pertussis vaccination. Qualitative outcomes including: • acceptability of the intervention • views about implementation • other views about the intervention or general barriers or facilitators to uptake of pertussis vaccination by pregnant women. The qualitative work should look at the views of both pregnant women and relevant healthcare staff.
Study design	• Quantitative study: RCT or cluster RCT, cohort studies • Qualitative study: interviews, focus groups only (not surveys or open - ended questions from surveys)
Timeframe	There is no specified time frame in which the study needs to be completed.
Additional information	• Pertussis vaccination should be available as detailed in the UK routine schedule. • Flu vaccination is excluded as this is out of scope of this guideline.