NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Medical technology consultation document

Curos for preventing infections when using needleless connectors

The National Institute for Health and Care Excellence (NICE) is producing guidance on using Curos in the NHS in England. The medical technologies advisory committee has considered the evidence submitted by the company and the views of expert advisers.

This document has been prepared for public consultation. It summarises the evidence and views that have been considered, and sets out the recommendations made by the committee. NICE invites comments from the public. This document should be read along with the evidence (see the committee papers).

The advisory committee is interested in receiving comments on the following:

- Has all of the relevant evidence been taken into account?
- Are the summaries of clinical and resource savings reasonable interpretations of the evidence?
- Are the recommendations sound and a suitable basis for guidance to the NHS?
- Are there any equality issues that need special consideration and are not covered in the medical technology consultation document?

Note that this document is not NICE's final guidance on Curos for infection prevention in needleless connectors. The recommendations in section 1 may change after consultation.

After consultation the committee will meet again to consider the evidence, this document and comments from the public consultation. After considering the comments, the committee will prepare its final recommendations which will be the basis for NICE's guidance on the use of the technology in the NHS in England. For further details, see the medical technologies evaluation programme process and methods guides.

The key dates for this guidance topic are:

Closing date for comments: 15 February 2019

Second committee meeting: 22 February 2019

Details of the advisory committee are given in section 5.

NICE medical technologies guidance addresses specific technologies notified to NICE by companies. The 'case for adoption' is based on the claimed advantages of introducing the specific technology compared with current management of the condition. This case is reviewed against the evidence submitted and expert advice.

If the case for adopting the technology is supported, the specific recommendations are not intended to limit use of other relevant technologies that may offer similar advantages. If the technology is recommended for use in research, the recommendations are not intended to preclude the use of the technology in the NHS but to identify further evidence which, after evaluation, could support a recommendation for wider adoption.

1 Recommendations

1.1 Curos disinfecting cap shows promise for preventing infections when using needleless connectors, but there is currently insufficient evidence to support the case for routine adoption in the NHS.

1.2 Research is therefore recommended to address uncertainties about the clinical benefits of using Curos. This research should:

- determine if Curos adds value to the standard bundle of care for preventing infections when using needleless connectors
- explore the use of Curos in people at high risk of infection, including those whose condition is managed in the community
- clearly describe the patients included and use consistent outcomes.

Why the committee made these recommendations

Curos is a disinfecting cap which, when placed on the needleless connector at the end of a vascular access line, is intended to reduce the

risk of infection. Curos can stay in place for up to 7 days but must be replaced each time the line is used.

Evidence for the clinical effectiveness of Curos is limited. The studies include a wide range of people in different clinical situations and use different definitions of bloodstream infection. It is not clear if Curos would provide any additional benefit to the standard bundle of care for preventing infections. There is also no evidence for its effectiveness in community settings and any cost benefits are uncertain.

Despite these uncertainties, Curos shows promise for preventing infections when using needleless connectors, especially in people at high risk of infection. Because of this, further research on Curos is recommended.

2 The technology

Technology	The Curos disinfecting cap (3M) is a single-use device which is placed over the needleless connector of vascular access lines. It contains a foam that is impregnated with 70% isopropyl alcohol, which acts as an antiseptic. The cap can stay in place for up to 7 days, but must be replaced with a new cap if it is removed. Curos is supplied individually or in strips of 10. It received a class IIa CE mark in September 2016.
Innovative aspects	Curos avoids the need to manually disinfect needleless connectors. The company claims that it differs from technologies with a similar purpose because: • it has a wide spectrum of antimicrobial action • it is easy and convenient to use • its design makes it easier to attach and harder to dislodge • its distinctive green colour avoids confusion with other covers.
Intended use	Curos is twisted onto the end of a needleless connector and should be left in place for at least 1 minute. The company claims that, after 1 minute, the antiseptic will kill 6 micro-organisms commonly associated with bloodstream infections. Curos would be used as part of a bundle of care for preventing infections when using vascular access lines. It is intended to replace the use of alcohol wipes or solution. The company provides online training videos for staff using Curos, and further training if needed.
Costs	The unit cost of a Curos cap in the company's submission is £0.32 (including VAT).
For more details, see the website for Curos disinfecting caps.	

3 Evidence

Clinical evidence

The evidence for Curos is limited in quantity and quality and may not be generalisable to NHS practice

3.1 The clinical evidence for Curos comprises 6 uncontrolled before-and-after studies and 9 unpublished abstracts (for full details of the clinical

evidence, see sections 2.2 and 2.3 of the assessment report). Overall, the before-and-after studies reported a reduction in bloodstream infections but were of low quality and have a high risk of potential bias. All studies introduced Curos at the same time as elements of education, disinfection protocol awareness and audit, all of which may have affected the outcomes. The studies used inconsistent classifications and definitions of bloodstream infections. They also included different populations, which makes it difficult to accurately compare results. The 9 unpublished abstracts describe studies done in a range of settings, but the details are limited. There was no evidence for the use of Curos in community settings. Only 1 of the before-and-after studies and 2 of the abstracts were done in the UK, which may limit the generalisability of the results to NHS practice.

The meta-analysis of 4 studies is likely to be imprecise because it is based on low quality evidence

3.2 The company submitted 2 meta-analyses: the first used data from 4 studies that reported rates of central line-associated bloodstream infection, and the second used data from 2 of the same 4 studies which were done in an intensive care setting. Because of the low quality of the individual studies and the differences between them, the external assessment centre (EAC) concluded that the meta-analysis of the 4 studies was at risk of serious imprecision. However, the results of both meta-analyses were used in the cost modelling because no better estimates were available (see appendix E of the assessment report for further details).

Cost evidence

The company's cost model shows that using Curos is cost saving in both general hospital and intensive care populations

3.3 The company presented a decision-tree model with 2 main branches: 1 for Curos and 1 for standard care (alcohol wipes). Patients in each branch can develop central line-associated bloodstream infections. Based on the

company's 2 meta-analyses, the model can report results for either the whole hospital population or only the intensive care population. The EAC agreed with the overall structure, noting that there were no changes to the model care pathway other than exchanging 1 method of disinfecting for another. The company's model showed that using Curos saves around £28 per person in the general hospital population and around £134 per person in the intensive care population. For full details of the cost evidence, see section 4 of the assessment report.

The EAC's revised model shows that Curos is only cost saving in the general hospital population

3.4 The EAC made some changes to the model, including increasing the number of needleless connector ports in the intensive care setting from 10 to 12 (based on expert advice). The EAC also reduced the nurse time for standard care from 45 seconds to 15 seconds (equal to Curos); it considered that nurses would use the 30-second drying time of alcohol wipes for other tasks (such as preparing the syringe or writing notes), and so this should not be considered as time saved when using Curos. The EAC's revised model showed that using Curos saves around £17 in the general hospital population, but incurs additional costs of around £94 per person in the intensive care population.

Sensitivity analyses suggest that Curos could be cost saving in the intensive care population but any results are uncertain

3.5 The EAC's sensitivity analyses showed that the main driver of cost savings in the general hospital population was baseline infection rate. No main driver of cost savings was identified in the intensive care population, but a threshold analysis showed that Curos could be cost saving in this population if there were a high enough difference in infection incidence between Curos and standard care (an incidence rate ratio of 0.75). However, any results are uncertain because the analyses are informed by data from the clinical evidence, which is of low quality.

4 Committee discussion

Clinical effectiveness overview

Evidence for the clinical effectiveness of Curos is uncertain

4.1 Although the studies report a reduction in bloodstream infections with Curos, there are differences in the way in which this is measured between studies. The clinical experts explained that this variation in measuring and reporting bloodstream infections is a common problem in both clinical studies and NHS practice. The committee considered that this makes any judgement about the overall effectiveness of Curos less certain. The committee acknowledged the low quality of the evidence, noting that the before-and-after design of the studies was likely to introduce bias. Most of the studies were done outside of the UK so their generalisability to NHS practice is uncertain. The committee noted that the studies were insufficiently powered to detect any benefit with Curos independent of the existing bundle of care for preventing infections. The studies also provide few details about any other infection prevention techniques that were used.

More evidence is needed about Curos in the context of the bundle of care

4.2 In NHS practice, Curos would be used as part of the standard bundle of care for preventing infections. The committee proposed that more NHS-based evidence was needed, exploring the potential clinical benefits of Curos when used as part of a bundle of care for preventing infections.

There is insufficient evidence to support the adoption of Curos for any subgroups but those at high risk of infection are likely to benefit most

4.3 The committee concluded that because of the heterogeneity of the clinical evidence it could not recommend the adoption of Curos in any subgroup of people. Despite the lack of evidence, the committee considered that it was plausible Curos could provide benefits in certain situations. The external assessment centre (EAC) highlighted the fact that the evidence suggests that the benefits of Curos were most likely to be seen in people

who are at high risk of infection. The clinical experts explained that there are a number of factors that can affect infection rates, including the nature of the underlying disease, the healthcare environment, the type of line in place, the nature of the administered drug or fluid and the frequency of administrations needed. The infection rate is also affected by staff compliance with infection reduction protocols. The clinical experts advised that people who are immunocompromised, such as those having bone marrow transplants or treatment for cancer, are likely to have a higher infection risk. The clinical experts also highlighted the potential benefits of using Curos in a community setting where many people have long-term vascular access devices in place. The committee agreed that future research should focus on people at high risk of infection, including those in community settings.

NHS considerations overview

Compliance with infection prevention protocols varies

4.4 The clinical experts explained that implementing any new infection prevention strategy is likely to increase staff compliance with protocols already in place, particularly when practice is being audited. The committee noted that compliance is likely to vary over time and that this was not adequately captured by the clinical evidence. The clinical experts also advised that compliance with standard infection prevention protocols varies in NHS practice and in some cases may be as low as 20%. The committee acknowledged that using Curos may increase compliance, but there was insufficient evidence for this.

Misuse can be avoided through regular staff training

4.5 Curos is a single-use device: that is, the cap must be replaced each time the line is accessed. The clinical experts agreed that there is a potential risk of Curos being re-used when the line is accessed, but they advised that any misuse can be avoided through regular staff training.

No procurement constraints are expected for Curos

4.6 The clinical experts noted that carefully planned stock control is important to ensure the continued availability of Curos. The company confirmed that Curos is readily available and that the NHS supply chain holds a 3- to 4-week stock. The committee raised concerns about the sustainability of the technology and if disposing the caps (which are not currently recyclable) would have a negative environmental impact. The company stated that Curos caps are treated as clinical waste on disposal.

Cost modelling overview

The EAC's revisions to the model are acceptable but uncertainties remain

4.7 The committee agreed with the EAC that the reliability of the cost modelling was limited because of the uncertainty in the clinical evidence. The clinical experts agreed with the EAC that nurses would spend time on other tasks while waiting for the cleaned connector to dry. The committee accepted the EAC's revisions to the cost model but concluded that further evidence is needed to show if using Curos releases staff resources or not.

Main cost drivers

More robust data are needed to understand the potential resource impact of Curos

4.8 The main driver in the cost model was baseline infection rate (that is, the higher the baseline infection rate, the greater the potential cost savings with Curos). The clinical experts explained that bloodstream infection rates are highly variable both within and between hospitals, and the way in which hospitals measure and report bloodstream infections varies. Having reviewed the cost evidence and accepting the uncertain clinical benefits, the committee concluded that more robust data were needed to understand the potential resource impact of using Curos in the NHS.

Further research

Curos shows promise and further research would help address the uncertainties

4.9 The committee concluded that further research would help resolve the uncertainties about the potential benefits of using Curos. The research should determine if Curos adds clinical value to the standard bundle of care for preventing infections when using needleless connectors. It should focus on people at high risk of infection. A community-based trial should be considered, and a prospective and randomised trial design would be appropriate to limit bias. The research should provide data to inform cost modelling and should be designed with a timeframe that would provide useful information before this guidance is reviewed.

5 Committee members and NICE project team

Committee members

This topic was considered by the medical technology advisory committee which is a standing advisory committee of NICE.

Committee members are asked to declare any interests in the technology to be appraised. If it is considered there is a conflict of interest, the member is excluded from participating further in that evaluation.

The minutes of each committee meeting, which include the names of the members who attended and their declarations of interests, are posted on the NICE website.

NICE project team

Each medical technologies guidance topic is assigned to a team consisting of 1 or more technical analysts (who act as technical leads for the topic), a technical adviser and a project manager.

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