

Curoso for preventing infections when using needleless connectors

Medical technologies guidance

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www.nice.org.uk/guidance/mtg44

Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

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This guidance replaces MIB143.

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 define the patient groups included and use consistent outcomes.

NICE will facilitate this research, in collaboration with the company, clinical and academic partners, and will update this guidance if or when substantive new evidence becomes available.

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	<p>The Curoso 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.</p> <p>The cap can stay in place for up to 7 days, but must be replaced with a new cap if it is removed.</p> <p>Curoso is supplied individually or in strips of 10. It received a class IIa CE mark in September 2016.</p>
Innovative aspects	<p>Curoso avoids the need to manually disinfect needleless connectors. The company claims that it differs from technologies with a similar purpose because:</p> <ul style="list-style-type: none"> • 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	<p>Curoso 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 microorganisms commonly associated with bloodstream infections.</p> <p>Curoso 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.</p> <p>The company provides online training videos for staff using Curoso, and further training if needed.</p>
Costs	<p>The unit cost of a Curoso cap in the company's submission is £0.32 (including VAT).</p>
<p>For more details, see the website for Curoso disinfecting caps.</p>	

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. 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. For full details of the clinical evidence, see sections 2.2 and 2.3 of the [assessment report](#).

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, 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. Clinical expert advice was mixed: although some experts agreed that Curos may save time compared with manual disinfection, others noted that compliance with manual disinfection protocols is very low in practice and using Curos would be unlikely to free up any staff time. 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 technologies 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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Accreditation

