Using maximal sterile barriers to prevent central venous catheter-related infection: a systematic evidence-based review

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CRD summary
This review assessed the efficacy of maximal sterile barriers (MSB) for the prevention of central venous catheter-related infection. The authors concluded that high-quality randomised trials and economic analyses are required to clarify the value of MSB. Given the limited evidence available, this conclusion seems appropriate.

Authors' objectives
To determine the efficacy of maximal sterile barriers (MSB) for the prevention of central venous catheter-related infection.

Searching
MEDLINE (1966 to February 2003), the Cochrane Library (Issue 1, 2003) and ISI Web of Science (1975 to February 2003) were searched for relevant articles published in English; the search terms were reported. The reference lists of identified articles were also checked and experts in the field were contacted for additional studies.

Study selection
Study designs of evaluations included in the review
The study designs eligible were not pre-specified; one randomised controlled trial (RCT) and two observational studies were included in the review.

Specific interventions included in the review
Studies comparing MSB and less stringent sterile barrier techniques were eligible for inclusion. The comparators included sterile gloves, small sterile drape, no gown or no large drape during the operating room procedure.

Participants included in the review
Individuals requiring central venous catheter insertion were eligible for inclusion. Participants from operating room, intensive care and step-down units, and ambulatory oncology clinic settings were included in the review.

Outcomes assessed in the review
No a priori outcomes were described. The incidence of catheter-related infection (including bloodstream infection), number of patient-days as a result of catheter-related infection, catheter-colonisation, colonisation rates and attitudes (e.g. perceived need for MSB) were assessed.

How were decisions on the relevance of primary studies made?
The authors did not state how articles were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not specify any criteria by which the validity of the primary studies was assessed.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.
Methods of synthesis
How were the studies combined?
The studies were individually reported in a narrative form; no synthesis of the data was attempted.

How were differences between studies investigated?
No formal assessment was undertaken. However, differences between the studies were highlighted within the individual study descriptions.

Results of the review
Three studies were included in the review; this included one RCT (n=343).

The only RCT found that MSB had significantly fewer episodes of catheter colonisation (relative risk, RR=0.32, 95% confidence interval, CI: 0.10, 0.96) and a non-statistically significant reduced risk of catheter-related bloodstream infection (RR 0.16, 95% CI: 0.02, 1.30) compared with standard precautions in ambulatory oncology patients.

One observational study in adult medical and surgical intensive care unit patients found that catheter placement in the intensive care unit with MSB was associated with a decreased risk of catheter-related infection compared with catheter placement in the operating room using less stringent barrier precautions. Another observational study found that the rate of catheter-related infections decreased by 28% after an educational course to improve infection control practices and procedures. The training programme was also associated with an increase in the perceived need for MSB and an increased use of large sterile drapes.

Authors' conclusions
While limited available evidence supports the use of MSB during the routine insertion of central venous catheters, high-quality randomised trials and economic analyses are required to clarify its value.

CRD commentary
The review question was not supported by clear inclusion or exclusion criteria in terms of the study design, population or outcomes. Several electronic databases were searched and some attempt was made to locate unpublished or ongoing trials. However, since the search strategy was restricted by language, some relevant studies might not have been included in the review. The procedures used to select the primary studies and extract the data were not described, so it was not possible to assess the potential for reviewer error or bias at these stages. It does not appear that any formal assessment of study quality was undertaken. The narrative description was appropriate given that the included studies differed substantially in terms of their study design and population. The authors cautioned against any generalisability of the study results. The authors' conclusion, that further research is necessary, reflects the limited data available.

Implications of the review for practice and research
Practice: The authors suggested that MSB can still be recommended during the routine insertion of a central venous catheter, but stated that the data supporting other preventive measures, such as the use of an antimicrobial catheter or chlorhexidine solution, are stronger.

Research: The authors stated that high-quality RCTs are needed to clarify the potential value of MSB in patients requiring various types of vascular catheters. The authors also suggested that an economic evaluation, using decision-analytic modelling, might be a useful method to evaluate the potential clinical and economic benefits of MSB.

Bibliographic details

PubMedID
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.