Is there evidence for recommending silver-coated urinary catheters in guidelines?
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Authors' objectives
To compare the effectiveness of silver-coated with uncoated urinary catheters in preventing urinary tract infections in catheterised patients.

Searching
MEDLINE (from 1966 to 2001) and the Cochrane Controlled Trials Register were searched; the keywords were stated. Articles published in English, German or French were eligible for inclusion. Abstracts and letters were excluded.

Study selection
Study designs of evaluations included in the review
Controlled clinical trials, randomised controlled trials (RCTs) and systematic reviews/meta-analysis were eligible for inclusion. All of the included studies were RCTs.

Specific interventions included in the review
Comparisons of silver-coated and uncoated urinary catheters were eligible for inclusion. Studies that used open urinary drainage systems were excluded. The included studies used catheters with silver alloy or silver oxide coating. All but one study used catheters that were coated on the internal and external surface; the other study used catheters that were only coated externally. In some of the included studies the patients received systemic antibiotics; in other studies patients receiving systemic antibiotics were excluded.

Participants included in the review
Studies of patients undergoing urinary catheterisation were eligible for inclusion. Studies of patients who were already bacteriuric when they were catheterised were excluded. The included studies were of general hospital patients, intensive care patients, neurosurgical, or urological (including post radical prostatectomy) patients. Male and female patients were included. The patients in the included studies were catheterised for a mean duration ranging from 3.5 to 14 days (median duration: 3 to 5). One study only included patients who were catheterised for at least 14 days.

Outcomes assessed in the review
The included studies had to report rates of bacteriuria using standard microbiological culture methods. The studies used different definitions for bacteriuria: these ranged from 100 to at least 100,000 colony forming units of bacterial growth/mL, with or without other criteria. The studies also differed in the method they used to obtain the urine for culture. The methods included needle aspiration using a sampling port on the catheter, suprapubic puncture and directly from drainage bags.

How were decisions on the relevance of primary studies made?
[A:One reviewer independently assessed all titles and abstracts identified by the search. Where there was any possibility that a study might be included, the full paper was obtained. Any doubts that could not be resolved by the one researcher was discussed with the second researcher]

Assessment of study quality
Study quality was assessed using modified Jadad criteria: adequacy of randomisation, researcher blinding instead of double-blinding, and completeness of follow-up. The possible scores ranged from 0 to 5 points. Studies scoring 3 or more points were classified as good quality, while those scoring less than 3 points were classified as poor quality. In addition, the baseline comparability of the treatment groups was assessed and whether specified confounding factors were taken into account. [A:Data were extracted by one reviewer and in case of doubt, the second reviewer independently extracted the data and data were compared. If the data in trials had not been fully reported, clarification was sought directly from the trialists.]
**Data extraction**

The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. The data extracted were: details of the population and intervention; use of systematic antibiotics, and whether broad or narrow spectrum; gender; duration of catheterisation; renal function; and culture methods. To be included, the studies had to report sufficient data to calculate the risk of bacteriuria in each treatment group. The relative risk (RR) and 95% confidence interval (CI) of bacteriuria for silver-coated versus uncoated catheters was estimated for each study.

**Methods of synthesis**

How were the studies combined?

The paucity of good-quality studies precluded a meta-analysis and a narrative synthesis of the studies was undertaken.

How were differences between studies investigated?

The results from good- and poor-quality studies were considered separately. There were insufficient data to carry out the planned subgroup analyses.

**Results of the review**

Seven RCTs (2,375 patients) were included.

One RCT was good quality (Jadad score 5) and the other six were poor quality (score 1 or 0). The good-quality RCT was the only trial that adequately randomised patients and in which the researcher was blinded.

Other methodological problems included: treatment groups not comparable at baseline; treatment groups catheterised for different lengths of time; a lack of information on renal function; a lack of reporting of the withdrawals and drop-outs; and a lack of adjustment for potential confounding factors in any of the RCTs.

The good-quality RCT (199 patients) found no statistically-significant difference in bacteriuria between silver-coated and uncoated catheters (RR 0.84, 95% CI: 0.38, 1.87).

The six poor-quality RCTs reported inconsistent results. Three RCTs found that silver-coated catheters significantly reduced bacteriuria compared with uncoated catheters, and three RCTs found no significant difference.

**Authors' conclusions**

The authors concluded that there was insufficient evidence to recommend the use of silver-coated catheters.

**CRD commentary**

The review question was clear in terms of the study design, intervention, participants and outcomes. Two databases, including a database of published and unpublished RCTs, were searched; this would have reduced the potential for publication bias. The inclusion of reports published in some other languages than English would have reduced language bias. The methods used to select the studies and extract the data were not described, so it is not possible to assess the adequacy of the methods used in reducing possible errors and bias. More than one reviewer assessed validity using validated criteria, thus reducing the possibility for bias and errors. The studies were appropriately grouped by study quality and combined narratively, and clinical differences between the studies were considered. The evidence presented appears to support the authors' conclusions.

**Implications of the review for practice and research**

Practice: The authors stated that there was insufficient evidence to recommend the use of silver-coated catheters.

Research: The authors stated that there is a need for good-quality RCTs that control for confounding factors and
estimate effects in specific subgroups

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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.