A systematic review examined the effectiveness of indwelling silver alloy urinary catheters to cut rates of catheter-associated urinary tract infections

Can silver alloy catheters reduce infection rates?

In this article...
- Why patients with urinary catheters are at risk of infection
- How silver alloy urinary catheters compare with standard silicone or latex products to reduce infections
- Potential advantages of using silver alloy urinary catheters to reduce CAUTIs

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Background Catheter-associated urinary tract infections remain a persistent challenge in healthcare practice.

Aim To establish whether silver alloy urinary catheters reduce catheter-associated urinary tract infections compared with standard silicone or latex urinary catheters in short-term hospitalised adult patients.

Method Analysis of eight studies using the Critical Appraisal Skills for Practitioners tool.

Results A consistent pattern emerged that supported the effectiveness of silver alloy urinary catheters over uncoated catheters to reduce infections in adult patients.

Conclusion Changing practice to use silver alloy catheters would have a significant impact on patient care.

Catheter-associated urinary tract infections (CAUTIs) remain a persistent challenge in healthcare practice. While there are numerous infection prevention strategies intended to reduce CAUTI rates, there is room for improvement.

It is widely known these infections often result in poor outcomes for patients, such as a longer stay in hospital, as well as associated costs incurred by healthcare organisations.

This article discusses the findings of a recently published systematic review, which considered how effective indwelling silver alloy urinary catheters were in reducing CAUTI rates (Beattie and Taylor, 2011).

Background Patients with urinary catheters are at an increased risk of infection. These catheters are inserted into the bladder via the urethra (urethral catheterisation), or through the abdominal wall (suprapubic catheterisation), so essentially the body treats them as a foreign element.

The body’s natural ability to cleanse the urinary tract of microorganisms is reduced because the passage of urine does not flush the urinary tract when a urinary catheter is in situ. This reduction in natural defences increases the risk of micro-organisms entering the bladder through the external (extraluminal) or internal (intraluminal) surfaces of the catheter. Males often develop CAUTIs via the intraluminal route, whereas infection tends to develop through the extraluminal route in females due to the difference in urethral length (Daifuku and Stam, 1984).

Microorganisms can be transmitted by poor handwashing by healthcare workers, breakages in the closed urinary collection systems and by movement from one part of the body to another, such as the transmission of bacteria from bowel to urethral opening (Maki, 2001).

Bacteria can be free-floating or can colonise into biofilms that attach themselves to the catheter surface and may cause catheter blockage. Biofilms are less susceptible to antibiotics because they develop resistance to their actions (Pratt et al, 2007). Reducing biofilm formation is therefore important in reducing CAUTI, but antibiotics are not given as routine prophylaxis with catheterisation because of the risk of antibiotic resistance developing (Nicolle et al, 2005).

One of the strategies believed to reduce CAUTI is the use of silver alloy urinary catheters. Silver has been used in healthcare for centuries and is known for its wide spectrum, antimicrobial properties.

The Centre for Evidence-Based Purchasing has suggested the silver coating...
Within urinary catheters reduces biofilm formation, as well as colonisation by releasing silver ions into the urinary tract (CEP, 2006). Despite this, the use of silver alloy urinary catheters remains sporadic, probably because of a lack of substantive evidence and cost implications.

**Purpose**

This article discusses the practice and policy implications of a systematic review that concluded there was an emerging pattern favouring the effectiveness of silver alloy urinary catheters to reduce CAUTI (Beattie and Taylor, 2011).

The results should be interpreted with caution and a randomised controlled trial is required to substantiate the effectiveness of silver alloy urinary catheters.

**The review**

The research question was: “In short-term hospitalised adult patients, do silver alloy urinary catheters reduce catheter-associated urinary tract infections in comparison with the use of standard silicone or latex urinary catheters?”

Multiple databases were searched and UK urinary catheter suppliers were contacted to obtain literature. A total of 148 papers were retrieved and 51 duplicates removed. Exclusion criteria were applied to the 97 remaining papers, resulting in 80 rejections and 17 being retained. A numerical scoring system was applied to the 17 papers to determine their methodological rigour, which resulted in six rejections and 11 papers being retained. In those 11 papers, there were eight studies, as some had published more than one paper. The eight studies retained were then analysed using a Critical Appraisal Skills for Programme tool (tinyurl.com/CASP-tool).

**Results**

Three out of five randomised controlled trials demonstrated with statistical significance that patients with silver alloy urinary catheters were less likely to develop bacteriuria than those with uncoated catheters (Verleyen et al, 1999; Liedberg and Lundeborg, 1990; Liedberg et al, 1990).

The overall quality of the studies needs to be considered when interpreting these results. Given only one study scored an A for quality assessment, the results of the RCTs were generally of lower quality than the systematic reviews (Thibon et al, 2000).

Only two out of four systematic reviews included carried out meta-analysis (Broshnan et al, 2008; Saint et al, 1998), which established the efficacy of silver alloy urinary catheters in reducing CAUTI.

Johnson et al’s (2006) systematic review concluded that a definitive recommendation for antimicrobial catheters, including those with a silver alloy coating, could not be made due to a lack of good-quality evidence. Niell-Weise et al (2002) found there was insufficient evidence to recommend using silver coated urinary catheters.

Collectively, the results of this systematic review show there is a consistent pattern emerging that supports the effectiveness of silver alloy urinary catheters over uncoated catheters to reduce CAUTI in adult patients. This study justifies the expense of conducting a large-scale RCT to determine effectiveness of silver alloy urinary catheters.

**Implications for practice**

While urinary catheterisation is performed by many health professionals, catheter selection is most commonly undertaken. The profession, therefore, should be aware of the potential advantages of silver alloy urinary catheters to reduce CAUTI. Adherence to strict asepsis during catheter insertion, thorough hand-washing and general catheter care remain vital in attempting to reduce CAUTI (Dunn et al, 2000).

This review also reinforces the fact that bacteraemia increases for every day the urinary catheter is in place, supporting the practice of inserting urinary catheters only when absolutely necessary and removing them as soon as is practical (Yates, 2008).

As care of long-term conditions has shifted from the hospital to the community, there is an associated increased use of urinary catheters within patients’ homes. Although this review included inpatients only, there may be potential benefits of using silver alloy catheters for patients at home. There should be no difference in standards of treatment whether a patient is cared for at home or in hospital, so once efficacy is established, their use would likely be extended into the community.

To date, studies have excluded
community patients as they tend to have urinary catheters in place for the long term (more than 14 days). Shifting the balance of care into the community will mean more patients at home will be using short-term urinary catheters.

Due to the significant difference in cost between silver coated and uncoated catheters, health professionals practising catheterisation on manikins in a training environment should continue to use uncoated urinary catheters. The procedure of urinary catheterisation is the same, regardless of urinary catheter type.

Changes in practice may be slower than thought, even with favourable results from a large multicentre RCT, because of the cost implications. Although morally the quality of care should be the most important factor in determining what should be purchased, cost needs to be considered because budgets are limited. It is likely that the long-term financial benefits of silver alloy catheters, such as reduced hospital stays, will mean they are cost-effective. Previous studies have found that silver alloy urinary catheters do offer significant savings when the cost of CAUTIs is considered (Karchmer et al, 2000). In 2000, Saint et al used a decision-making model to compare cost outcomes of both uncoated and silver alloy urinary catheters to determine which was more cost-effective. Their cohort, which included 1,000 hospitalised patients, demonstrated significant cost benefits when using silver coated urinary catheters.

If a large-scale RCT demonstrates with statistical significance that silver alloy urinary catheters are both cost and clinically effective, this may help standardise purchasing policies across the NHS. Currently, purchasing policies vary between organisations, resulting in different treatment and resources being available, depending on where the patient is.

Commercially, the only UK company producing silver alloy catheters is Bard. Perhaps this number will increase.

Purchasing policies will likely be influenced if a RCT demonstrates with statistical significance that silver alloy urinary catheters reduce infection compared with uncoated catheters. A multicentre RCT to determine the effectiveness of silver coated urinary catheters is under way, funded by NHS R&D Health Technology.

**Conclusion**

There is emerging evidence of the effectiveness of silver alloy urinary catheters, which needs to be substantiated through rigorous research.

Given that 12–40% of hospitalised patients will be catheterised (NHS Quality Improvement Scotland, 2004), changing practice to use silver alloy catheters would have a significant impact on patient care.

Once definitive efficacy is proved, nurses can act as change agents by implementing this transformation, ultimately improving infection rates for patients.

Healthcare-associated infection remains a concern for the public and healthcare providers. Given the positive direction of the overall results, the effectiveness of silver alloy urinary catheterisation should not be dismissed.

**References**


