

Switching From Saline Solution to an Antimicrobial Solution for Pre-Catheter Skin Cleansing

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Received 5 December 2013; accepted 26 March 2014
Published online 6 April 2014

Abstract

The Infection Prevention and Control team at Rotherham Foundation Trust made the decision to switch from saline solution to an antimicrobial solution for skin cleansing prior to urinary catheterisation. The first stage of the switch has taken place in the community, with secondary care likely to follow suit at a later stage. The rationale for the switch, the two year journey it took to implement the changes and the parameters by which the success of the switch will be evaluated, are discussed in this article.

Catheter-associated urinary tract infections (CAUTI) are a cause of considerable concern and any measures which can be taken to potentially reduce the rate of CAUTI's should be given careful consideration. In 2012 the Infection Prevention and Control team at Rotherham Foundation Trust switched from saline solution to an antimicrobial solution (Octenilin® cleaning solution sachets) for skin cleansing prior to urinary catheterisation to try to reduce CAUTI's. Initially, Octenilin cleansing solution sachets were intended for use solely for patients with a current or historical confirmed result of MRSA in the urine and/or other sites. However, use has been extended to other patients, including those with a history of *E. coli* or *Klebsiella*, Gram-negative organisms frequently identified as a source of UTI's. Early feedback from using Octenilin cleansing solution sachets in place of saline solution has indicated a high level of satisfaction from both patients and health-care professionals. Reports of catheterisation-associated trauma have reduced significantly and no CAUTI's have been identified to date.

Key words: MRSA; Urinary catheter encrustation; Antimicrobial solution; Catheter associated urinary tract infection (CAUTI's)

Helen Levers (2014). Switching From Saline Solution to an Antimicrobial Solution for Pre-Catheter Skin Cleansing. *Cross-Cultural Communication*, 10(3), 28-32. Available from: <http://www.cscanada.net/index.php/ccc/article/view/4721>
DOI: <http://dx.doi.org/10.3968/4721>

INTRODUCTION

Urinary catheterisation is a key aspect of patient care. A prevalence study from the Hospital Infection Society estimates that around 32% of patients in hospital have a urinary catheter (Hospital Infection Society 2007). In the acute setting, urinary catheterisation is likely to be on a short-term basis (less than 14 days).

In the community, long-term urinary catheterisation (i.e. longer than 28 days) is estimated to be used in the management of around 4% of patients undergoing domiciliary care (Nation Institute of Health and Care Excellence (NICE) 2003). Long-term catheterisation of the bladder is often used in the care of older patients and those with neurological conditions. Patients with urinary retention or urinary incontinence may require continuous bladder drainage using a urethral or suprapubic catheter.

Indwelling catheters place patients at significant risk of acquiring a urinary tract infection. It is estimated that 19% of all health-care associated infections are urinary tract infections (Loveday et al, 2014) and catheter-associated urinary tract infections (CAUTIs) account for between 43% and 56% of these infections (Loveday et al, 2014).

The longer a catheter is in place, the greater the likelihood of a urinary tract infection developing. In the acute setting, 20-30% of catheterised patients develop bacteriuria, with the risk increasing by approximately 5% for each day of catheterisation (Loveday et al, 2013). A US study demonstrated that the use of indwelling urinary catheters was associated with higher colonisation rates of methicillin-resistant *Staphylococcus aureus* (MRSA). Of the 51 nursing home residents in the study who had an

indwelling catheter, 28 (55%) were colonised with MRSA at any site. Residents who had urinary catheters were 2.8 times as likely to be colonised with MRSA as those in the control group without a urinary catheter (Mody 2007).

The patient's own colonic flora are likely to be the cause of most infections, as the urethral catheter provides a direct entry point for bacteria into the bladder. When the bacteria attach to the surface of the catheter, they may mutate into biofilms.

Urinary tract infections, tissue damage and encrustation of the catheter (which may block the catheter) are all complications that can arise during long-term catheterisation. It is important to provide effective catheter care to minimise the risk of complications. There continues to be debate about certain aspects of catheter management, including skin cleansing prior to catheterisation.

1. GUIDELINES FOR SKIN CLEANING BEFORE URINARY CATHETERISATION

The *Guidance for Prevention of Catheter-Associated Urinary Tract Infections* (Healthcare Infection Control Practices Advisory Committee (HICPAC), 2009) recommends that aseptic technique and sterile equipment are essential. However, the guidance state that 'further research is needed on the use of antiseptic solutions versus sterile water or saline for periurethral cleaning prior to catheter insertion'. No recommendation is made in terms of using an antiseptic or saline solution. NICE (2012) recommends that 'for urethral catheterisation, the meatus should be cleaned before insertion of the catheter, in accordance with local guidelines/policy'. NICE does not give specific guidance regarding the use of particular cleansing agents.

2. BACKGROUND

Around 1200 mainly elderly patients are cared for by the Rotherham NHS Foundation Trust Community Continence service. This includes patients who intermittently perform self-catheterisation and 477 patients with a long term urethral or supra pubic catheter. Re-catheterisation takes place at least every 12 weeks and patients likely to be at high risk of infection are identified and closely monitored. All patients are screened for MRSA in the urine prior to catheterisation.

Reducing and eliminating infections is a high priority for the trust and MRSA remains a key quality indicator. The trust has adopted the NHS Safety Thermometer as a template to identify where improvements can be made and take appropriate action. The NHS Safety Thermometer identifies CAUTI as a key patient harm (Department of Health 2012) and the trust has taken measures to focus on the prevention of CAUTIs.

3. SELECTING AN ANTIMICROBIAL SOLUTION

In 2012, in the absence of any definitive guidelines and based on the Infection Prevention and Control team and the Continence teams' experience of using antimicrobial solutions, it was agreed to use an antimicrobial solution rather than saline solution to clean the meatus prior to urinary catheterisation.

The antimicrobial selected needed to:

- Have a broad antimicrobial efficacy
- Be non-irritating to the skin
- Be available in a single use presentation
- Cost a similar amount to saline solution

Octenilin® cleaning solution sachets (an octenidine based antimicrobial solution) were chosen on the basis of the Community Infection Prevention and Control team's previous positive experience of using Octenisan® wash lotion (also an octenidine based solution).

Initially, Octenilin® cleaning solution sachets were intended for use solely for patients with a current or historical confirmed result of MRSA in the urine and/or other sites. However, the use has been extended to other patients, including those with a history of *E. coli* or *klebsiella*, which are gram negative organisms frequently identified as a source of urinary tract infections (UTIs). Octenilin®cleansing solution was also used for patients identified with recurrent UTIs or UTI-like symptoms after catheterisation.

4. OCTENILIN® CLEANING SOLUTION

Octenilin® cleaning solution 30ml sachets contain an octenidine-based antimicrobial solution for the cleaning and decontamination of skin before urinary catheterisation. The cleaning solution consists of a combination of octenidine and ethylhexylglycerin. Ethylhexylglycerin reduces the surface tension of the skin.

Octenidine® is a broad-spectrum antimicrobial that is active against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Proteus mirabilis*, *Streptococcus pyogenes*, *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Serratia marcescens* and *Candida albicans*. Research has shown that octenidine reduces levels of resident skin bacteria by between 90.00% and 99.98%, depending on the concentration and number of applications [Sedlock and Bailey 1985].

It is known that, once attached to the catheter surface, bacteria change and form microcolonies and eventually mature into biofilms [Jacobsen, 2008]. Studies have demonstrated that octenidine dihydrochloride is effective in preventing the formation of *Staphylococcus aureus* biofilms and can also help remove established *Staphylococcus aureus* biofilms [Westgate and Cutting, 2012].

A study undertaken in an independent laboratory compared skin cleansing using saline solution with an octenidine based antimicrobial solution. The octenidine based solution had superior bacterial reduction properties, removing 90% of a known bacterial population of *E. coli* from the surface of the skin. The reduction with saline solution was 55%. The solution was left in contact with the skin for two minutes. [Sandle, 2013].

5. MAKING THE SWITCH FROM SALINE TO AN ANTIMICROBIAL SOLUTION

The project—from considering Octenilin® cleaning solution sachets as a theoretical concept for cleansing prior to urinary catheterisation to actually using the product in practice—has taken 2 years. Their use in the community is now well established and the next aim is to introduce the sachets into secondary care. The Continence team working in primary care has good links to the Community Infection Prevention and Control team. This was a significant benefit when first introducing the concept of switching to an antimicrobial wash. The Continence team were already familiar with Octenisan® wash lotion, which has the same active ingredient (octenidine) as the Octenilin® sachets. This familiarity helped as the team were confident to use the product and found it to be gentle and non-irritating to the skin.

However, before the team could start using Octenilin® cleaning solution there were extensive discussions with the Medicines Management team about including octenilin solution on the Formulary. Clinical data were presented to the Hospital Chief Pharmacist. The implications in terms of cost and staff time were taken into consideration. A business case was developed which included the cost of preventing one CAUTI compared to the cost of treating a CAUTI.

The switch was cost-neutral, as three 5ml pods of saline solution cost around 60p and one 30ml sachet of octenilin cleaning solution costs in the region of 55p. The business evidence was overwhelming in favour of the change, and once the switch had been made would not affect staff time.

The simplest and most cost effective mechanism was for the Trust to purchase Octenilin solution directly from the supplier rather than pharmacy, to distribute to the Continence team. Otherwise prescribing costs of £7.65 per patient would have been incurred, which would have made the change prohibitive. The Continence budget is held by the Continence team (not the GPs) which made the process simpler to implement.

A new catheterisation protocol which included the use of Octenilin® cleaning solution for cleansing prior to urinary catheterisation was drawn up for use in the community, by the Community Infection Prevention

and Control team. The protocol advises that Octenilin® cleaning solution should be applied undiluted to the skin, ensuring that the area to be cleansed is completely covered with the Octenilin® solution. It is left on the skin for 1 - 2 minutes before continuing with the catheter insertion procedure.

6. BENCHMARKING

In order to provide a benchmark by which to measure the use of Octenilin® solution, all patients with an indwelling urethral or supra pubic catheter were screened for MRSA in the urine **before** catheterisation and **before** the use of Octenilin® solution. Of the 477 patients with a long term urethral or supra pubic catheter 22 were found to be colonised with MRSA on their skin but with no signs of clinical or systemic infection. Six patients out of the 22 had a history of a positive result for MRSA in the urine. It is unclear if the MRSA was present prior to or whether it developed after catheterisation.

All of the patients are screened (nose, groin and urine as standard) prior to re-catheterisation and the results determine the response. Any patient who is positive for MRSA is decolonised with Octenisan® wash lotion if appropriate and those with MRSA in the urine who test positive prior to catheterisation may be considered for antibiotic treatment.

The Continence team works with the Infection Prevention and Control team to identify low- and high risk patients. Low risk patients with a catheter are those who are re-catheterised 12 weekly or less, who do not have issues with the procedure and have not developed a UTI. The high risk group are those patients who require more frequent catheterisation due to blockage, UTI, those with a history of MRSA or other infection (*E. coli*, *Klebsiella* or *pseudomonas*) and those who experience trauma or difficult catheterisations.

Once the protocol was finalised and supplies of Octenilin® solution purchased, the switch was communicated to the Continence team by email. All feedback received was highly positive about the change.

7. EVALUATION

After twelve months, the community data will be analysed looking at MRSA in the urine and at the catheter site. The optimum outcome will be either a status quo on the current numbers of MRSA bacteria in the urine or a reduction in the number of positive MRSA bacteria in the urine. Rates of *E. coli* and *Klebsiella* will also be monitored in patients known to be susceptible to infection with these organisms. Early results have been promising as these patients have not developed the usual UTI issues post-catheterisation. This is not a randomised controlled trial, but will be an evaluation of feedback and data obtained.

7.1 Case Study 1

Bert is 82, lives alone and has urinary incontinence. To help manage this, Bert has a long-term catheter which is monitored regularly by the district nursing team. Bert has a very tight foreskin which makes the catheterisation procedure traumatic, but he has declined surgery to rectify the problem. During the 3 years that Bert has had the long-term catheter, he has had recurrent *Klebsiella* infections in his urine. In spite of repeated courses of antibiotics, the infections have been difficult to treat. His urine was often thick and cloudy, leading to blockage of the catheter and the need for frequent catheter changes.

It was agreed to start using Octenilin® cleaning solution sachets rather than saline solution for cleansing prior to catheterisation. Octenilin® cleaning solution was also used in place of saline to soften the foreskin area to help make the procedure easier for Bert. Octenilin® cleaning solution has now been used for 4 months prior to re-catheterisation. To date Bert has not had a CAUTI or experienced his usual post-catheterisation trauma symptoms of blood in the urine and feeling unwell. He claimed:

I used to dread having the catheter changed; it was really painful and made me feel ill afterwards. It's much easier now the nurses are using a different cleaner.

7.2 Case Study 2

Margaret is an 86-year-old female living with her husband. She has had multiple sclerosis for 20 years. Her condition is deteriorating; she has no mobility and is doubly incontinent. Her husband is supported by a team of care workers, including the Continence team. Margaret has had a long-term urethral catheter for the past 10 years, which is changed every 12 weeks. She has a long history of MRSA colonisation, including MRSA in her urine and frequent UTIs (which have, on occasion, necessitated emergency hospital admission).

Since switching from saline solution to Octenilin® cleaning solution sachets for pre-catheterisation skin cleansing Margaret has tested negative for MRSA in her urine for 8 months and has not required any antibiotics or unplanned hospital admissions. The single-use Octenilin® cleaning solution sachets are easy to use and the Continence team are looking to extend their usage to all patients with a long-term urinary catheter.

7.3 Case Study 3

Jason is a 24-year-old male and was involved in a catastrophic road traffic accident 6 years ago. The accident left him with a severe traumatic brain injury and very little sensation from the neck downwards. He has a level of cognition and lives in a converted house next door to his parents, supported by 24-hour care.

Jason is doubly incontinent and has no bladder control. He has had a long-term suprapubic catheter in situ since

his accident. This is changed every 4 weeks by the Continence team. Jason has had recurrent UTIs, usually caused by *E. coli*, *Klebsiella* and other non-specific organisms. He also has post-catheterisation trauma, including haematuria. Jason is colonised with MRSA in his groin and nose; he has frequently tested positive for MRSA in his urine, despite undergoing decolonisation procedures and the prescription of antibiotics. He is categorised as a high-risk patient for developing a bacteraemia.

Octenilin® cleaning solution sachets have been used instead of saline solution for 7 months for pre-catheterisation skin cleansing. During this time Jason has not tested positive for MRSA and has not contracted a CAUTI.

A nurse in the Continence team that regularly monitors Jason said:

I can't believe the difference this has made. I didn't think Jason would be free of infection for as long as this. Ideally I would use Octenilin® cleaning solution for pre-catheterisation skin cleansing for all of my patients.

CONCLUSION

The Rotherham NHS Foundation Trust Community Division pioneered the use of Octenilin® cleaning solution sachets for skin cleansing prior to urinary catheterisation. Using an antimicrobial wash rather than saline solution has so far demonstrated promising results in terms of preventing CAUTIs and catheter-associated trauma. The switch was cost-neutral. An ongoing evaluation is being conducted by the Continence team and further data about the efficacy of using an antimicrobial wash will be available after 12 months of use.

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