Understanding long-term catheterisation for effective bladder drainage

Rachel Leaver

Patients in the community often have a long-term catheter in place and so their management inevitably becomes the responsibility of community nurses. As urinary incontinence can cause patients discomfort and have a negative impact on their day-to-day life, it is important that healthcare professionals understand the reasons for catheterisation and are aware of the different treatment options available, such as urethral and suprapubic, in order to provide patients with the most suitable device according to their needs and lifestyle. This paper explores the issues involved with indwelling catheterisation and looks at one new product range that aims to promote patient comfort and reduce associated risks.

KEYWORDS:
Continen$e$ Foley catheters Choice Education

In an ideal world, patients who have a problem with continence would not have to resort to an indwelling catheter to keep dry. As catheterisation is an invasive procedure, the introduction of a foreign body into the bladder puts the patient at risk of a number of complications, such as infection (Kleinpell et al, 2008; National Institute for Health and Care Excellence [NICE], 2012), encrustation or catheter blockages (European Association of Urology, 2012). It is good practice, therefore, to ensure that alternative management strategies, i.e. conservative treatment such as pelvic floor exercises (NICE, 2015), bladder retraining, intermittent or self-catheterisation (ISC), are explored before resorting to an indwelling catheter (Mercer Smith, 2003; Fenelly et al, 2015).

However, for some patients, long-term catheterisation is the only way they can be managed effectively, either by inserting a catheter into the bladder via the urethra or a suprapublic incision. Reasons for this include (Geng et al, 2012):
- Acute or chronic urine retention
- Neurological disorders that affect sensation or control of micturition
- The need to accurately measure urinary output in critically ill patients
- Perioperative use for certain surgical procedures

Caring for patients with long-term catheters can be challenging both to healthcare professionals and carers, and, indeed, patients themselves (Moore et al, 2009). Complications of long-term catheterisation include (Gibney, 2016):
- Urinary tract infections (UTIs)
- Encrustation
- Catheter blockage
- Bladder spasm
- Bypassing
- Urethral trauma

THE SCIENCE — COMMON BLADDER SYMPTOMS
Symptoms of bladder dysfunction include:
- A sudden urge to go to urinate or difficulty ‘holding on’ is a symptom of urgency or urge incontinence
- Needing to urinate more than eight times in a single day can be a sign of urinary frequency
- Nocturia is signalled by repeated urination through the night; nocturnal enuresis is wetting the bed at night
- Urination upon laughing, coughing, sneezing or exercise is a symptom of SUI
- Mixed incontinence is when an individual has symptoms of both stress and urge incontinence
- Overflow incontinence is signalled by small leakages of urine that are not noticed by the individual.

Source: Bladder and Bowel Foundation: www.bladderandbowelfoundation.org
Bladder pain
Bladder stones
Difficult removal of the catheter.

Chronic infection may lead to kidney infections (pyelonephritis) and kidney damage, and, as all patients with long-term catheters have bacteriuria (bacteria in their urine, whether symptomatic or asymptomatic), they are also at risk of septicaemia (Fenelly et al, 2015).

CHOOSING THE RIGHT CATHETER

The Foley indwelling catheter is the most common design of catheter generally used for both urethral and suprapubic catheterisation. It was first described by Frederick Foley in the 1930s and since then very little has changed in the design. However, what has changed are the materials used to manufacture the catheters (Fenelly et al, 2015). These continue to evolve in the quest to find the ideal catheter, which will not cause the user problems or at least minimise them. Healthcare professionals should be aware of the different types of catheter available and make sure that they select the best catheter for each individual patient. There is a huge choice of catheters available on the market nowadays, but looking at some of the evidence available can help with making an informed choice.

Catheters are made from a number of materials such as latex, silicone, hydrogel or polytetrafluoroethylene (PTFE)-coated latex or pure silicone. A number of studies over the years have been carried out to determine the best material to reduce urethral trauma and improve bladder drainage, as well as combat UTI and subsequent encrustation and bypassing (Fenelly et al, 2015). Bacterial activity is the main cause of the problems with blockage and encrustation (Gibney, 2016). If a catheter is left in for longer than 5–7 days, all catheterised bladders show an increase in bacteria in the urine, no matter what material or coating is used, although some materials are more resistant than others. However, after 30 days, these differences disappear and all patients have bacteriuria (Lee et al, 2004; Fenelly et al, 2015). Patients may not necessarily have symptoms, so may not need treatment, but they will still carry a bacterial load.

CATHETER MATERIALS AND BIOFILMS

The uneven surfaces of catheters allow bacteria in the urine to colonise catheters and form biofilms on both the internal and external catheter surface (Tunney and Gorman, 2002; Stickler et al, 2003). Studies have shown that silicone catheters are the smoothest when examined under electron microscopes. However, all catheters, including silicone ones, have cracks and uneven surfaces which is down to the manufacturing process and the bonding of the catheter coatings to the latex base (Lawrence and Turner, 2006a). Bacteria attach themselves in these areas and rapidly multiply forming a thick matrix known as a biofilm. Once within the biofilm, bacteria are protected and very resistant to antibiotics or catheter maintenance solutions (Gibney, 2016).

Thus, even if treated, the bacteria may then reseed and infect the urine again (Ford et al, 2017). Ultimately, the bacterial activity results in a change in the pH of urine, making it more alkaline. Research has shown that urea-splitting bacteria such as Proteus mirabilis result in more alkaline urine (Stickler and Morgan, 2008). This alkalinity allows crystallisation of salts in the urine, which congregate around the area of the catheter tip and eventually build up to form encrustation which, in turn, leads to blockage of the ‘eyes’, i.e. the drainage holes at the catheter tip, resulting in urine bypassing and/or retention of urine (Gibney, 2016). A good flow of urine has been shown to prevent or delay encrustation. Silicone catheters usually have a larger lumen and kink less and so allow better drainage (Lawrence and Turner, 2006b), and consequently formation of biofilms and encrustation occurs later than on other catheter material (Morris et al, 1997; Tunney and Gorman, 2002; Verma et al, 2016).

However, on the negative side, when deflating the balloon to remove or replace the catheter, there can be more ‘cuff’ formation around the bottom end of the deflated balloon where it is attached to the catheter tip because of ‘creeping’ of the material. This cuff means that the catheter tip is no longer smooth and the ridge formed by the cuff can catch internally and hinder removal. While all types of catheters result in cufing, silicone catheters are usually the most difficult to remove, especially suprapubically (Parkin et al, 2002). Removal may need more force than a softer latex catheter, resulting in pain and trauma for the patient (Robinson, 2003a; Evans et al, 2001; Lawrence and Turner, 2006b).

Innovation

Innovation in catheter manufacturing focuses on tackling these universal problems, with new products becoming available on the market for healthcare professionals to try. One example are those by LINC Medical, with their Unibal® technology where the balloon is integral to the catheter itself with no bonded parts, promising a smoother insertion and removal and thus less trauma to the urethra (see p. 47). There are also catheters on the market which have coatings bonded to their surface specifically to try to minimise or delay urinary tract infection. Other innovations are the use of antimicrobial coatings on Foley catheters, such as impregnation with antibiotics or antimicrobial agents, with the aim of reducing infection and consequently encrustation and blockage (Stickler and Morgan, 2008).

Practice point

Urinary incontinence can cause social isolation, distress, low self-esteem and possible mental health issues (All Party Parliamentary Group for Continence Care [APPCGG], 2013), thus choosing a treatment option with which the patient feels comfortable is vital.

Always choose catheters for:
- Comfort
- Ease of insertion
- Ease of removal (Evans et al, 2001).
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It is important to note, however, that most studies have shown that these latter types of catheters mainly work in patients in the short term (Johnson et al, 2006).

**SUPRAPUBIC CATHETERS**

For some patients, long-term suprapubic catheterisation may be the preferable option. It is seen as having fewer complications than urethral catheterisation and allows the patient more dignity, comfort and convenience when it comes to caring and changing the catheter (NHS, 2009). However, as previously said, they are not problem-free and complications such as UTIs, urine leakage around the abdominal catheter site or from the urethra, and bladder spasms are common (Addison and Mould, 2002). They are also prone to infection around the catheter site and granulation of tissue in this area, which can lead to pain and difficulty with catheter removal. This is not helped by catheter balloon cuffing.

Long-term complications for suprapubic catheters are identical to those of urethral catheters and there is the increased risk of stone formation. Patients who have suprapubic catheters long term have also been found to have thick debris and metaplastic changes in the bladder and there is some debate as to whether they should have regular cystoscopic surveillance, especially as all patients with urinary catheters in place are ultimately also at high risk of bladder cancer with long-term use (El Masri et al, 2014). Healthcare professionals need to be aware of this and anticipate problems. If patients are allergic to latex, the use of silicone catheters is the only option, and hopefully, newer products such as Uni-Flo® (LINC Medical), will make this a less traumatic experience for the patient.

**EDUCATING THE PATIENT**

Besides choosing the best catheter for the job, healthcare professionals should also educate the patient and carers on catheter care and personal hygiene and the importance of good fluid intake to ensure steady flow of urine through the catheters. Good flow has been shown to reduce infection and consequently encrustation and blockage. Catheter maintenance solutions may be used to irrigate the catheter and dissolve the encrustation, which may help prolong the life of the catheter. Some healthcare professionals advocate regular washouts with chemical solutions (e.g. Optiflo® G [Bard]), or normal saline (Gibney, 2016). However, Moore et al (2009) found no significant difference between carrying out regular washouts or not on patients with long-term catheters, and the reality is that their efficacy may differ from patient to patient (Moore et al, 2009).

It is well known that certain patients are often labelled as ‘blockers’, while others are ‘non-blockers’ (Gibney, 2016). This refers to the fact that despite all precautions and regular washouts, some patients will regularly have catheter blockages. In these cases, the only strategy would be to change the catheter routinely to pre-empt blockage (Moore et al, 2009). Encouraging the patient to consume lemon/citric-based drinks may also help reduce the alkalinity of urine, and thus lower the pH. Patients could also be advised to trial an open-tipped catheter, such as Supra-Flo® or Opti-Tip® catheters (LINC Medical), as they promote more drainage compared to standard catheters. Eating a healthy diet and drinking more fluids will prevent constipation, which may also impact on the flow of urine (Gibney, 2016). Gibney (2016) also advises monitoring when a patient’s catheter is prone to blockage and advocates proactive catheter changes to avoid crisis blockages.

**Practice point**

The Foley catheter is a hollow drainage tube that is held in the bladder by a small water-filled balloon. It is known as an indwelling catheter and is designed to remain in place for some time (Bard, 2004). There are two types of Foley catheters:

- Urinary: where the tube is passed through the urethra to the bladder
- Suprapubic: where the tube is passed through the lower abdominal wall to the bladder (Fenelly et al, 2015).

**EDUCATING OTHER HEALTHCARE PROFESSIONALS**

Gibney (2016) states that nurses are in an ideal position to improve catheter management. She recommends standardising practice and disseminating evidence to healthcare professionals to ensure that all who look after catheters are aware of the importance of regularly reviewing patients with catheters in place, monitoring urine pH, monitoring the patient’s fluid intake and encouraging citric drinks, as well as assessing the need and efficacy of using catheter maintenance solutions. Choosing the right catheter and maintenance products should also be part of the strategy to reduce complications and less crisis management and distress for patients and carers.

**CONCLUSION**

Caring for patients with long-term catheters can be challenging for community nurses. Long-term catheterisation leads to inevitable problems, requiring nurses to have the knowledge and skills to be proactive in care as well as being able to offer effective solutions for problems when they arise. Understanding the causes of these problems is key, as is keeping up to date with new research and innovations in catheter manufacture in order to minimise complications and improve the quality of patients’ day-to-day life.

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Catheters may not be suitable if the patient:

- Has a high risk of developing a serious infection due to a heart defect, having only one kidney, being immunosuppressed or other medical issue (Pratt et al, 2007)
- Is disoriented or has cognitive impairment and so might pull the catheter out (Fenelly et al, 2015).
LINC Medical catheter range

LINC Medical is a family run company, which believes in producing quality products and ensuring that its experienced sales team build up one-to-one relationships with healthcare professionals to provide the best possible education and training about their products and listen to what their customers want. Their mission statement is to:

... provide innovative solutions to today’s healthcare challenges.

The LINC all-silicone catheter range has been designed with an integral balloon within the lumen (tube) and innovative tips, to aid patient comfort and reduce the risk of problems occurring. Being silicone as opposed to latex, means that:

- The lumen is bigger than on latex catheters to help urine drainage (Lawrence and Turner, 2006b)
- The risk of catheter-associated urinary tract infection (CAUTI) is reduced, as silicone has shown less bacterial colonisation than silicone-coated latex, and reduced biofilm (Verma et al, 2016)
- LINC catheters are suitable for more people, as just under 1% of the population may be allergic to latex (Charous et al, 2002).

As said, LINC catheters also have the ‘Unibal’. This is an integral balloon which remains within the lumen and is level with the surface of the catheter, as opposed to most catheter balloons, which are 1–2mm wider than the catheter (Robinson, 2003b). This helps to:

- Reduce cuffing upon catheter insertion and removal, following deflation
- Make the tube slimmer and thus more comfortable to insert and remove.

In the Opti-Tip catheter, the tip design also:

- Decreases the risk of damage to the bladder wall, due to the short distance from the catheter tip to the balloon. Case reports have shown that this can reduce the risk of CAUTI.

The LINC solution: integral balloon

New technology with integral balloon promotes ease of use and patient comfort.

Catheter balloon defusion, where the balloon once inflated slowly deflates, is another issue that LINC Medical have addressed. One hundred percent silicone catheters are inflated with sterile water that slowly passes through the balloon membrane (osmosis), and so slowly reduces the original balloon infill volume. To overcome this problem, LINC Medical includes within its 100% silicone catheters, a sterile pre-loaded syringe containing a 5% aqueous glycerine solution (the 12 Ch and 14 Ch sizes have a 5ml syringe, and the 16 Ch and above a 10ml syringe).

These catheters also have a number of new tips (Table 1) to help patient comfort, lessen pain and reduce the risk of infection. The range also includes a round tip with extra holes below the balloon to assist with problematic drainage.

Table 1: Innovative tips in the LINC Medical catheter range

<table>
<thead>
<tr>
<th>Tip</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opti-Tip</td>
<td>A new design that moves the balloon closer to the open catheter tip to prevent damage to the bladder mucosa and reduce spasms. There are also two extra eye holes below the balloon to allow drainage of residual urine.</td>
</tr>
<tr>
<td>Uni-Flo Xtra</td>
<td>A round tip catheter with eye holes above and below the balloon for extra urine drainage</td>
</tr>
<tr>
<td>Uni-Flo</td>
<td>A round tip catheter for easy insertion. Removal is made easier by the ‘Unibal’ integral balloon with no bonded parts</td>
</tr>
<tr>
<td>Supra-Flo</td>
<td>An open-tipped catheter that allows extra drainage for patients who are prone to blocking</td>
</tr>
</tbody>
</table>


REFERENCES


El Masri WS, Patil S, Prasanna KV, Chowdhury JR (2014) To cystoscope or not to cystoscope patients with traumatic spinal cord injuries managed with indwelling urethral or suprapubic catheters? That is the question! Spinal Cord 52: 49–53


Revalidation Alert

Having read this article, reflect on:

- Why some patients need indwelling catheterisation
- How you choose the right catheter for your patients
- Your knowledge of suprapubic catheters

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**Cost-effectiveness**
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**Barrier effectiveness**
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- Minimizes products and time required
- Cost-effective

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- Allows tapes to stick – does not decrease tape or dressing adhesion

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**References**
4. 3M data on file 2011: LIMS 6766
Urinary continence is the first thing we are actively taught to achieve as infants, this is usually accompanied by huge amounts of praise from parents when we are successful. When there is any malfunction of the lower urinary tract (LUT) resulting in either incontinence or retention, it can have a profound effect not only on an individual’s physical health, but also on their psychological health — they lose confidence in themselves and often withdraw from social situations, which can lead to depression. All too often district nurses are asked to perform assessments with the intention of providing patients with pads to contain their incontinence, rather than treat it. Pads, unfortunately (although occasionally the only option available for some individuals), reinforce the patient’s feelings of ‘being a child’.

While conservative treatments are extremely effective in the majority of cases when support is available — and district/community nurses are well placed for giving this support — unfortunately, as this article states, not all patients are suitable for conservative measures of treatment and the use of a long-term urethral or suprapubic catheter may be the only option to maintain their general physical and mental health.

The complications of indwelling urinary catheters are well documented. I was made aware of one particular problem early in my career as a specialist nurse, and this was that silicone catheters, due to their external balloon, made removal of the catheter extremely difficult through the suprapubic fibrous stomal tract.

Sixteen years ago I was introduced to the Supra-Flo catheter (LINC Medical); an open-tipped catheter with the balloon incorporated into the wall of the catheter. This not only reduces trauma on removal, whether it be a urethral or suprapubic, but also, because of the low profile tip, reduces bladder discomfort and pain, as the tip does not dig into the bladder wall to the same degree as a ‘bullet’ tip catheter when the bladder empties. This company has now brought out the Opti-Tip catheter, which again is open tipped, with the balloon when inflated being almost level with the tip of the catheter, a further two drainage holes lie beneath the balloon. This makes the catheter particularly helpful for those patient with large amounts of sediment. For example, one of my patients (a long-term user of suprapubic catheters) trialled the Opti-Tip and finds it not only very comfortable, but also that infection rates have dropped by 80% in the nine months of using it.

Another benefit of this company is that their catheters come complete with anaesthetic gel and deflation syringe, as well as the fluid to inflate the catheter balloon, saving money for the community clinical commissioning groups (CCGs).

I totally agree with the author in this article regarding the improvements to patient care which could be achieved through her suggestions around education. However, I feel it would be helpful if there were regular meetings with a multidisciplinary team comprising a community nurse from each practice in a given area, a physiotherapist, community continence advisor and a specialist nurse from the acute setting to increase all our knowledge in this area and, in so doing, increase the care and support of our patients.
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