Indwelling urinary catheterisation: current best practice

Ann Yates

Indwelling urinary catheterisation is a common procedure especially within a community setting. However, healthcare professionals are sometimes unaware of what is current best evidenced-based practice. This article outlines the clinical indicators for insertion of a urinary catheter, rationale for catheter selection, including Charrière (Ch) or French gauge (Fg), length, balloon size and material of choice including any coating. Catheter insertion requirements are outlined and drainage and supporting/secureing devices discussed. Complications of indwelling catheters, such as catheter-associated infections and encrustation are also discussed with recommendations for treating, and, finally, new innovations which may benefit in future care are identified — all with reference to current national guidance and best clinical evidence-based practice.

KEYWORDS:
- Urinary catheterisation
- Catheter management
- Catheter blockage
- Best practice guidance
- Innovations in catheter care

Indwelling urinary catheterisation is a clinical procedure that involves the invasive insertion of a hollow flexible tube into a dysfunctional bladder, either via the urethra or a small incision via the abdominal wall (suprapubic). There are approximately 1.2 million people in the UK who have indwelling catheters in situ (Shackley et al, 2017; Carr, 2019). This procedure is frequently undertaken for individuals within a community setting to relieve bladder problems and numbers on community caseloads have doubled between 2012–2015 (Shackley et al, 2017; Carr, 2019), with some areas reporting as much as 40% of their caseload. Even though their use is common, indwelling urinary catheters are not without significant complications, which can include tissue damage, bypassing and blockage, bladder spasms, loss of bladder tone and catheter-associated urinary tract infections (CAUTIs), which can increase significant risk of morbidity and mortality of the individual (Shuman, 2010; Chang et al, 2011; Yates, 2016). Due to these risks, catheters should only be used after all other options have been explored (Loveday et al, 2014), an individual risk assessment undertaken, and, if required, inserted by a competent practitioner (Royal College of Nursing [RCN], 2019). Even when used, best practice suggests earliest removal of the catheter (if possible) to prevent long-term complications. As long-term catheters are mostly used in a community setting, it is vital that community and district nursing professionals are aware of current best evidence-based practice, which this article outlines for clinical staff to implement.

CLINICAL INDICATIONS

Indwelling urinary catheters are also called Foley catheters after the American urologist, Frederick Foley, who popularised their use in the 1930s due to their retaining balloon. They are now used for a variety of clinical reasons (Boxes 1 and 2), but should only be used when absolutely necessary and, as said, after all other options have been considered and rejected (Pratt et al, 2007; RCN, 2019).

Within the community setting, before inserting a new or changing an already existing catheter, the patient should have had a through individual assessment (Feneley et al, 2015; Yates 2016) and risk assessed for any foreseeable complications, e.g. contraindications of insertion (Table 1), inability to care for catheter and supporting drainage devices, limited availability of carer support if not self-caring, cognitive impairment, increased risk of expulsion of catheter due to deliberate removal (Leaver, 2017). If there is a high risk of these complications, it may be more prudent to look at suitable alternatives, such as sheaths, pad products, or urinals if appropriate and feasible for the individual.

CATHETER SELECTION

There are numerous variations of indwelling urinary catheters available, which include different:
- Diameter size — French gauge (FG) or Charrière (Ch)
- Lengths
- Balloon sizes
- Materials
- External coatings.

Selection depends on patient assessment, which should include any allergy or sensitivity, especially to latex (Elvy and Colville, 2009), clinical indication for catheterisation and required length of time in situ (Tables 2 and 3). Recommendation is that the smallest size gauge (measured
discretion for user, being easily concealed; similarly, there is less movement in and out of the urethra (Yarde, 2015).

Paediatric: 30cm. Available up to a size 10 Ch.

Balloon size
The size of the balloon is important when choosing the catheter device, as there are varying sizes from 5–30mls. The most common size is a 10ml balloon, as larger balloons can increase trauma and infection risk, especially to bladder neck, sphincter or suprapubic entry site, and leave a higher residual volume of urine within the bladder which, in turn, increases the risk of infection (Feneley et al, 2015). They can also increase risk of bladder spasms, pain and discomfort and bypassing (Simpson, 2017). Larger 30ml balloons are normally used in urology and should not be found in patients within a community setting. Guidance from the manufacturer should be followed with regards to fluid instilled into the balloon and it should never be over/underinflated.

CATHETER MATERIALS

Latex catheters
Latex catheters are made from natural rubber and have been traditionally popular due to their flexibility. However, sensitivity and allergy to latex is common, so they are restricted to short-term use and each patient needs to be assessed individually for risks associated with latex materials (Health and Safety Executive [HSE], 2011; National Institute for Health and Care Excellence [NICE], 2012). They can cause discomfort due to the high surface friction that can increase the risk of catheter encrustation, particularly around the catheter tip, which can increase pain and discomfort for patients (Feneley et al, 2015; Yates, 2016).

Polytetrafluoroethylene-coated catheters (PTFE)
These are latex catheters coated in polytetrafluoroethylene [PTFE], which is smoother than latex and designed to protect the urethra/ suprapubic site from uncoated latex.

INDICATIONS FOR URETHRAL CATHETERISATION

- Acute/chronic urinary retention
- Patients with voiding difficulties due to neurological disorders/obstructions
- Monitoring renal function hourly during critical illness
- Monitoring/recording/draining residual volumes (a bladder scan is preferred option)
- During and post-surgery/bladder lavage, for a variety of reasons, e.g. following prostate surgery
- Allowing instillation of medications
- Enabling bladder function tests, e.g. urodynamic assessment
- Facilitating continence and maintaining skin integrity (when all conservative treatments have failed)
- Improving comfort for end-of-life care
- Obtaining a sterile urine specimen

(adapted from EAUN, 2012; Yates, 2016; RCN, 2019)

INDICATIONS FOR SUPRAPUBIC CATHETERISATION

- Acute/chronic urinary retention, which cannot be drained by a urethral catheter
- Patient preference, i.e. wheelchair users, sexual function
- Pelvic trauma
- Complications of long-term urethral catheterisation, e.g. penile cleaving (splitting of the penis), dilated urethra/damage to bladder neck
- Acute prostatitis, obstruction, stricture, abnormal urethral anatomy
- Complex urethral/abdominal surgery
- Faecally incontinent patients

(adapted from EAUN, 2012; Yates, 2016)

Lengths
Catheters are available in three lengths:

- Standard: 40–44cm. This length should always be used for adult males aged 16 and above, as insertion of a shorter catheter may result in haematuria, swelling, retention and trauma if the balloon is inflated within the prostatic urethra (National Patient Safety Agency [NPSA], 2009). It is also the length appropriate for immobile females, e.g. wheelchair, obese and female transgender patients who have undergone urethral reconstructive surgery (Holroyd, 2018)
- Female: 23–26cm. Used for mobile females and assists with
Due to the smoothness, they can be useful in reducing encrustation and discomfort for the wearer. However, there is still the risk of latex allergy and so must be avoided in patients with a known allergy or sensitivity.

**Hydrogel-coated catheters**

Hydrogel-coated catheters are usually soft, hydrophilic and biocompatible (EAUN, 2012). They are typically a latex catheter with an integral hydrogel coating that offers a smooth catheter surface aimed at reducing friction and trauma on insertion. However, the coating provides little or no protection for patients with a known allergy or sensitivity, and so should be avoided.

**Silicone catheters**

One hundred percent silicone catheters have a wider internal lumen (which reduces tendency to encrustation), thinner walls compared to latex or coated catheters and are hypoallergenic and so produce the least allergic reactions (Loveday et al, 2014). All silicone catheters are slightly more rigid than latex, but there is a tendency for the balloon to ‘cuff’ or form ridges on deflation as it does not tend to lie flat. This, in turn, can attach to the entry site, which can cause trauma on removal (EAUN, 2012; Feneley et al, 2015; Yates, 2016).

**Antimicrobial-coated catheters**

Silver alloy-coated catheters can be either latex-based or silicone, with a thin layer of silver alloy coated onto the catheter. Some evidence suggests that these catheters are clinically effective in reducing CAUTIs (Pellowe, 2009). While it has been acknowledged that silver alloy catheters may reduce the incidence of asymptomatic bacteriuria in the short term (no longer than 28 days) (Loveday et al, 2014; Feneley et al, 2015), other evidence suggests it is only effective for 2–10 days (International Federation of Infection Control [IFIC], 2016). This means that the catheter may have no added benefit in reducing infections after 28 days (or even earlier), which would have a cost implication. There is no evidence that they decrease symptomatic infections and therefore they should not be used routinely. They should not be used for patients who require continual long-term catheterisation (IFIC, 2016).

Nitrofurazone antibiotic-impregnated catheters may reduce asymptomatic bacteriuria when used as a short-term measure. However, there is no clinical evidence to suggest any significant reduction in the incidence of symptomatic infection, so they are not routinely recommended (EAUN 2012; Feneley et al, 2015).

**CATHETER INSERTION**

Catheters should only be inserted with very clear clinical indicators (Box 1), as they have severe complications and risks associated with them, including CAUTIs, encrustation, loss of bladder tone, bypassing, blockage, trauma, spasm and pain. Thus, professionals should adhere to the correct procedures relating to indwelling catheterisation, as summarized in Box 3.

**CLEANSING SOLUTIONS**

Loveday et al (2014) and the Healthcare Infection Control Practice Advisory Committee (HICPAC, 2009) advise the cleansing of the insertion site to be undertaken with sterile normal saline or sterile water. However, it is always advisable to check local policy as there is

### Table 1: Contraindications for catheterisation (EAUN, 2012; Yates, 2016)

<table>
<thead>
<tr>
<th>Urethral catheters</th>
<th>Suprapubic catheters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute prostatitis</td>
<td>Known/suspected carcinoma of the bladder</td>
</tr>
<tr>
<td>Susception of urethral trauma</td>
<td>Absence of easily palpable bladder</td>
</tr>
<tr>
<td>Benign skin growths</td>
<td>Previous lower abdominal surgery</td>
</tr>
<tr>
<td>Decreased cell turnover</td>
<td>Coagulopathy (until corrected)</td>
</tr>
<tr>
<td>Reduced sebum (dry skin)</td>
<td>Ascites</td>
</tr>
<tr>
<td></td>
<td>Prosthetic devices in lower abdomen</td>
</tr>
</tbody>
</table>

### Table 2: Lifespan of indwelling urinary catheters

<table>
<thead>
<tr>
<th>lifespan</th>
<th>type</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term</td>
<td>Can be left in situ for up to seven days</td>
<td>Catheter (PVC), specialised catheters</td>
</tr>
<tr>
<td>Medium term</td>
<td>Can be left in situ for up to 28 days</td>
<td>Polytetrafluoroethylene (PTFE), silver alloy, nitrofurazone impregnated</td>
</tr>
<tr>
<td>Long term</td>
<td>Can be left in situ up to a maximum of 12 weeks</td>
<td>Silicone-elastomer, hydrogel, all silicone, all silicone with open tip and integral balloon</td>
</tr>
</tbody>
</table>

### Table 3: Charrière (Ch) sizes (adapted from EAUN, 2012; Yates, 2016)

<table>
<thead>
<tr>
<th>size</th>
<th>description</th>
</tr>
</thead>
</table>
| 10 Ch | Clear urine  
| No debris, no grit, encrustation |
| 12–14 Ch | Clear urine, no grit or debris  
| Used for initial catheterisation |
| 16 Ch | Urine that contains mild debris, grit or particles  
| Cloudy urine, light haematuria, small clots or suprapubic (while rare it is still clinically indicated by EAUN if there is debris, etc)  
| Only in very rare cases would a 16 Ch be used via the urethra |
| 18 Ch | Moderate-to-heavy debris, grit  
| Haematuria with moderate clots |
| 20–24 Ch | Haematuria with moderate-to-heavy clots, and above  
| Very cloudy, very heavy grit and debris, need for flushing  
| Not to be considered for urethral use due to bladder neck trauma and urethral damage/trauma  
| There is no good evidence to suggest that size 20–24 urethral catheters aid haematuria following prostate surgery |
continuing research with regards to antimicrobial meatal cleansing solutions, but further studies need to be undertaken before these can be recommended. Routine daily cleansing of the catheter site should be part of an individual’s normal hygiene routine with unperfumed soap and water (NICE, 2017).

LUBRICATING GELS

Both urethral and suprapubic catheterisation requires the use of an appropriate lubricant to assist in the prevention of infection by friction and trauma on insertion (Loveday et al, 2014). It can also dilate the urethra, and some suggest can aid the easier visualisation of female urethra (Yates, 2015).

It has been common practice to use lubricant gels that contain chlorhexidine (an antiseptic) or lidocaine (an anaesthetic), or a combination of both. However, in recent years there have been numerous reports of adverse reactions, sensitivities and allergic

CATHETER INSERTION GUIDANCE

- Be competent in skill of insertion
- Assess clinical need for catheterisation, consider alternatives and avoid if possible
- Be aware of any allergies, i.e. latex, anaesthetic gel
- Document reason for insertion, continuing requirement and/or date of removal. Remove if appropriate as soon as possible
- Catheterisation is an aseptic technique using protective personal equipment and following aseptic non touch technique (ANTT) guidance (Rowley et al, 2010; NICE, 2017)
- Clean urethra/suprapubic site with appropriate fluid, e.g. sterile saline (check local policy) using correct wiping technique
- Use appropriate lubricant from sterile single device (male and female)
- Use smallest appropriate Ch gauge catheter that will allow free drainage of urine and correct length, i.e. standard length for men and immobile females
- Use smallest size balloon (no larger than 10mls unless post urological procedure)
- Select most appropriate drainage/securing devices for individual patient
- Record all information relating to catheter insertion and continued care
- Provide patient with information relating to catheter, i.e. catheter passport (adapted from EAUN, 2012; Loveday et al, 2014; Yates, 2016; RCN, 2019)
DRAINAGE, SECURING AND FIXATION DEVICES

Drainage devices
The drainage device that an individual will be set up with will depend on a variety of reasons, including (Yates, 2016):
- Patient preference
- Duration of catheterisation
- Care of the system
- Required bag capacity/length of tubing/tap design (if drainage bag used)
- Placement and ease of use for individual, based on dexterity/mobility/cognitive ability
- Bladder capacity for use of catheter valves
- Ability to open tap/valve.

Drainage bags are sterile and should be maintained as a closed system and changed within manufacturer’s recommendation, i.e. every five to seven days. They come in different lengths of direct, short or long tube. Within community settings, the most common capacities are 350mls, 500mls, 750mls and 2 litre. It is imperative that whichever bag is attached, the catheter remains in situ and is not disconnected, unless for a clinical reason, i.e. routine change of bag every five to seven days (Loveday, 2014). If a larger drainage bag is required for overnight, a non-drainable 2 litre bag can be connected to the outlet of the day bag. These should be disconnected, drained and disposed of each morning (Yates, 2016).

Catheter valves have gained in popularity as they allow the bladder to fill and empty over a period of time, mimicking the micturition cycle, which may contribute to a more successful trial without catheter (TWOC) (Carr, 2019). They offer patients comfort, independence and a convenient way to manage their catheter (Fader et al, 1997; Yates, 2012). However, they are not for everyone. Table 4 outlines the benefits and risks of usage.

Table 4: Advantages, disadvantages and contraindications of catheter valves (Simpson, 2017)

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort</td>
<td>Limited bladder capacity</td>
</tr>
<tr>
<td>Potential to maintain bladder function/tone/capacity</td>
<td>Ureteric reflux if not opened and drained</td>
</tr>
<tr>
<td>Mimics normal bladder filling/emptying</td>
<td>Reflux/renal impairment</td>
</tr>
<tr>
<td>Reduces risk of trauma by lifting bladder wall tissue away from drainage tip</td>
<td>Poor dexterity</td>
</tr>
<tr>
<td>Possible reduction in infection risk and catheter blockage</td>
<td>Impaired bladder sensation</td>
</tr>
<tr>
<td></td>
<td>Immobile</td>
</tr>
<tr>
<td></td>
<td>Poor cognitive ability</td>
</tr>
</tbody>
</table>

Reactions to chlorhexidine, with many countries switching to antiseptic-free gels (Williams, 2017). It is the healthcare professional’s responsibility to identify any risks, cautions or contraindications that may affect the individual being catheterised before the use of any lubricating gel (Yates, 2015).

Securing and fixation devices
The Wound, Ostomy and Continence Nurses Society (WOCN, 2012) advises that both catheters and drainage devices are well supported and secured in a comfortable position to prevent complications. These complications can include (Yates, 2018a):
- Catheter migration, which can lead to accidental removal of the catheter, urethral trauma including cleaving, infection due to friction, and patient discomfort
- If the catheter drainage bag is not well supported it can get too heavy and potentially damage the urethra and bladder neck
- There is a higher risk of urinary infections
- Inflammation can lead to infection, tissue necrosis, blockage, bladder irritability, spasms and bypassing, and may lead to frequent unnecessary changes of the catheter.

Securing devices include Velcro straps or sleeve devices, both of which have their own advantages and disadvantages. It is important that healthcare professionals discuss and agree with the patient what is best suited to

Table 5. Urinary catheter continuing care principles (Loveday et al, 2014; Yates, 2016)

- Hand hygiene and decontamination should be done immediately before and after each episode of patient contact using correct hand hygiene principles and use of protective equipment
- Routine personal hygiene is all that is required to maintain meatal hygiene
- Urine samples must be taken from a sample port using aseptic technique
- Catheters should be connected to sterile closed drainage system or valve
- A link system should be used overnight to keep original system intact
- Connection should not be broken other than for a good clinical reason
- Bags should be positioned below the bladder, well secured or supported and not allowed to touch the floor
- Bags should be emptied frequently enough to maintain flow and prevent reflux, usually approximately ¾ full. A separate clean container should be used for each patient and avoid contact between the tap and container
- Do not add any antiseptic or antimicrobial solutions to drainage bag
- Bladder instillations should not be used to prevent catheter infections
- Healthcare professionals must be competent in catheter insertion/care/removal
- Patients and relatives should be educated with regards to their role in preventing CAUTIs
- Review the need for the catheter daily and remove as soon as possible
their needs and apply as per manufacturers’ instructions.

All fixation devices should be used in conjunction with, not instead of, securing devices. They provide stabilisation for the catheter and prevent tension and pulling on the device. These devices come in a variety of forms from strap fixation to adhesive devices. Individuals should again be assessed for the most appropriate device (Yates, 2018a).

**CATHETER-ASSOCIATED URINARY TRACT INFECTIONS**

CAUTIs now account for a large percentage of healthcare-acquired infections (HAIs) (Centers for Disease Control and Prevention, 2016; Health Innovations Network, 2016). The financial burden of CAUTI on the NHS has been estimated as £99 million per annum, with an estimated cost per episode of £1,968 (Loveday et al, 2014), which puts financial pressure on the healthcare economy. Abernathy (2017) estimated that 45% of *Escherichia coli* bacteraemia are attributed to the urinary tract and use of catheters. All national public health departments are committed to reducing healthcare associated Gram-negative infections. This is best done by implementing best practice continuing care principles (Table 5), and the earliest removal of catheter using the HOUDINI acronym (RCN, 2019; Adams et al, 2012).

If the individual has none of the clinical reasons from the HOUDINI acronym below, the catheter may potentially be removed (Adams et al, 2012; RCN, 2019).

- **H** Haematuria
- **O** Obstructed
- **U** Urologic surgery
- **D** Decubitus ulcers – open sacral or perineal sore in an incontinent person
- **I** Input/output monitoring
- **N** Not for resuscitation/end-of-life care/comfort
- **I** Immobility due to physical restraints.

**CATHETER BLOCKAGE AND ENCRUSTATION**

Catheter blockage, for whatever reason, is problematic for both patients and healthcare professionals and mainly falls into two main groups — mechanical or luminal (Yates, 2018a).

**Mechanical problems**
The causes of these include (Yates, 2018a):
- Constipation or straining at defecation
- Drainage tubing occluded by kinking, catheter strapping and/or tight clothing
- Drainage bag located above bladder
- Drainage bag too full
- Drainage bag and/or catheter not well supported or secured
- Drainage bag too low and producing negative pressure
- Unstable bladder/bladder overactivity and/or bladder spasm.

**Luminal problems**

This is when the catheter drainage lumen is occluded, usually by the formation of encrustation. The main focus of treating this is to first identify the cause. A catheter history of three catheters and cutting up and examining contents should be established before any interventions. Currently, there is no consensus of available research or expert opinion with regards to best outcomes. Some clinical areas use catheter patency solutions, while in others, they are avoided. Shepard et al (2017) undertook a systematic review of the literature with regards to catheter patency solutions and found that there was no evidence for or against their use; more research in this area is required. However, it is recognised that they should not be used:
- Routinely for all patients
- To prevent CAUTIs or infections
- To unblock blocked catheters.

**NEW INNOVATIONS**

There has been development in the treatment of encrustation and catheter blockage in the form of Farco-fill, a syringe filled with sterile solution of triclosan 0.3%, a broad-spectrum antimicrobial agent to instill into the balloon. A recent NICE Medtech Innovations Briefing (2018) identified in its summary that there is a lack of comparative studies and whether the outcomes measured the levels of bacteria in urine, which are of clinical importance. Thus, at present, there is little clinical evidence for its use without further clinical trials and research.

Another innovation is polihexanide — a broad spectrum antimicrobial used as a patency solution inserted into the bladder (use as per manufacturer’s instruction). Nurses should be aware of cautions/contraindications of use, which include hypersensitivity to polihexanide or chlorhexidine, presence of cystitis or haematuria, and use after bladder surgery (Yates, 2018b).

**CONCLUSION**

Urinary catheterisation is a common procedure, especially in a community setting. However, caring for an indwelling urinary catheter is multifaceted and complex. There are national and local guidance...
to assist best evidenced-based practice, and complying with these is a healthcare professional’s way of giving their patients good care, with positive outcomes and reducing the risk of any complications.

REFERENCES


CliniFix® - the Universal Hydrocolloid Securement Device

CliniFix, the unique multi-purpose medical tube holder, is the most comfortable and secure way to hold catheters and most sizes of medical tubing in place. It can be used in two distinct ways for different security needs - a hook and loop securement device for some movement or an inner adhesive strip for extra security. The resealable design allows repeated access. With a skin-friendly hydrocolloid base it can remain in place for up to seven days and no rigid plastic edges, straps or clips means CliniFix fits like a second skin anywhere on the body.

For a free sample of Clinifix, please call our free confidential careline 0800 036 0100 or visit www.clinimed.co.uk