A practical approach to catheter-associated problems


Summary

This article examines some commonly found catheter-related problems and discusses approaches to managing and preventing them.

Many patients with an indwelling catheter, either urethral or suprapubic, will at some time develop a catheter-associated problem. Problems can range from relatively minor to major complications with serious consequences for the patient's health, but all require expert knowledge and experience to minimise risk and/or deal with when they occur. Various authors have written in detail about specific catheter-associated problems but other problems have received less attention and the nurse's experience is a key factor in solving these.

Continence advisers are often contacted by nurses when a patient with a catheter in situ has a problem. In the author's experience, such patients might be cared for in nursing and residential homes or long-stay hospital wards. In the community, district nurses are generally considered to have greater knowledge in catheter care, but this depends on the nurse's experience and knowledge, no matter where they work. Godfrey and Evans (2000) state that 10 per cent of patients in hospital, 4 per cent on district nurses' caseloads and 28 per cent of patients in residential care have an indwelling catheter. Robinson (2000) suggests that regardless of the reason why a patient was catheterised, sooner or later any patient with a long-term catheter will develop a catheter-related problem.

Identifying problems

It is recommended that if at all possible, catheterisation should be avoided since it can result in increased morbidity and mortality (Lawthian 1998, Pratt et al 2001). However, catheterisation can play an important role in patient care and the management of it and there will always be some patients who will require an indwelling catheter on a permanent basis to manage urinary output (Winn 1998).

One of the difficulties concerning care of patients with indwelling, self-retaining Foley balloon catheters is knowing the best action to take when a problem arises. For example, a non-draining catheter could, at first, indicate that it is blocked. However, it could be due to a kink in the drainage system. Catheterisation is a skilled nursing procedure which requires appropriate teaching and training. Providing effective and evidence-based catheter care for patients and dealing with associated complications also require education and training.

When dealing with any catheter-related problem it is important to observe the following:

- **Patient history** – consider why the patient was catheterised, what type of catheter is in place and what plans there are to remove it, for example future surgery or initiating a trial period without the catheter.
- **Do not rush** – this could make the problem worse. The urinary tract is a delicate area and rushing may cause pain, trauma and loss of patient confidence.
- **Careful observation** – what you see can influence your decision-making process and any actions taken. The problem you are dealing with might not be the real problem. A non-draining catheter may at first indicate a blocked catheter when, in fact, the catheter or drainage system is kinked, resulting in catheter bypassing.
- **Listen** – to what the patient tells you, for example how long have they had the problem and is it causing any discomfort?
- **Knowledge** – of your own limitations and the training you have had in dealing with catheter-related problems.
- **If in doubt** – seek help and advice from a more experienced practitioner before deciding what action to take.

Types of catheter

The type of catheter used could be the first cause of a problem, so it is important to identify the...
different characteristics, such as the flexibility, length, size and balloon infill volume, of whatever catheter the patient has in situ:

- The commonest catheter used is the soft and flexible Foley catheter, for example, PTFE (polytetrafluoroethylene) better known as Teflon®, hydrogel or silicone elastomer bonded latex catheters.
- 100 per cent silicone catheters are slightly less flexible than latex ones.
- Specialised urological catheters, for example PVC (polyvinyl chloride) and nylon reinforced materials are more rigid.
- The length of the catheter is also important in determining the cause of some problems. Is the catheter length appropriate for the patient’s gender? Standard length catheters can be used in either male or female patients, but the female length catheter should only be used for female urethral catheterisation due to the length of the female urethra (Robinson 2001). However, the female length catheter can be used suprapublically in male patients, providing mobility, obesity, clothing and the drainage system are taken into consideration (ACA 2003).
- Although all catheters are licensed for urethral use, not all catheters are licensed for suprapubic use (MDA 2001, NHS Logistic Authority 2003). It is, therefore, important to check the type of catheter being used.
- The catheter size is measured in Charrière (Ch) or French gauge (Fg) units, which are equivalent to 1/2 mm (Pomfret 1996, Robinson 2001). The size used is important. The smaller the Ch or Fg, the more comfortable it will be for the patient. However, the catheter lumen must be wide enough to drain the fluid from the urinary bladder. For example, more viscous fluid or fluid containing blood clots will require the use of a larger size catheter to promote adequate drainage (Pomfret 1996, Robinson 2001). The larger the Ch size, the greater the urethra is dilated to accommodate the catheter, with less movement of the catheter inside the urethra. This can result in blockage of the paraurethral glands, resulting in urethritis, urethral abscesses, urethral pressure ulcers and offensive urethral discharge (Stewart 1998).
- The balloon infill volume is important because the greater the infill volume, the more bladder irritation can occur (Robinson 2001). Over- or under-inflation of the catheter balloon may interfere with the correct positioning of the catheter tip inside the urinary bladder (Godfrey and Evans 2000).
- Catheter balloons can also undergo changes when deflated resulting in a crease and ridge formation and increase in diameter size when deflated. A ‘cuffing’ effect may be created by the deflated balloon which causes problems removing suprapubic catheters, especially when using 100 per cent silicone catheters (MDA 2001, Parkin et al 2002, Robinson 2003a, 2003b). Another problem associated with silicone catheters is that the balloon is prone to slow diffusion, which can result in the catheter becoming dislodged or falling out completely.

Problems with catheters

This section describes some of the problems experienced with catheters and offers advice on dealing with such complications when they arise and problem prevention.

**Difficulties inserting a urethral catheter**

*Gender objection* Patients have the right to be catheterised by someone of their own sex.
*Catheter length* Check that the correct length of catheter has been chosen. Then check that the Ch size is correct. It should be 12-14Ch for a woman and 12-16Ch for a man (Robinson 2001). Occasionally, men have been catheterised with a female length catheter, which can result in the balloon being inflated in the urethra rather than inside the bladder. The patient may then experience trauma to the bladder neck and prostatic urethra (Lowthian 1998). The other end of the catheter, where the inflation valve channel and connecting port are situated, will then be pulled into the urethral orifice causing discomfort. If the man has an erection, pressure will increase at both the bladder area and penis tip causing further trauma (Robinson 2003c).
*Urethral strictures* If it is difficult to insert a catheter, do not try to force the catheter in, refer the patient to the urology department. Depending on the severity, urethral dilation might need to be undertaken or a catheter introducer used. In some cases a suprapubic catheter might have to be inserted.
*Prostatic enlargement* If urethral catheter insertion is difficult, the patient should be referred to a urology department for further assessment and catheter placement. Depending on the severity of the prostate enlargement, the catheter tip may hit the obstruction causing a curling effect – the catheter turns around and follows the urethral route back to the urethral orifice (Lowthian 1995).

**Fore skin** It is important to identify whether a male patient is circumcised or not. Phimosis is a tight or pinhole opening to the foreskin and could be further complicated if a hypospadias is also present (Pomfret 1999a). In some males a large section of foreskin may dangle and not retract, making the urethral orifice difficult to locate. The foreskin should not be forced back as this will result in trauma. If catheter insertion is successful, in uncircumcised men when the foreskin can be retracted, it is important to replace the foreskin back to its forward position. Otherwise there is a risk of a paraphimosis – a painful tightening band behind the glans penis – developing. Should a paraphimosis occur, cold compression should be applied to the affected area.

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**Box 1. Catheter-related problems**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesion to bladder wall</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Autonomic dysreflexia symptoms, especially in spinal cord injury patients</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Bacteriuria</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Balanitis: inflammation of the glans penis</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Bladder calculi</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Bladder neck erosion</td>
<td>Problems with catheters</td>
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<tr>
<td>Bladder spasm</td>
<td>Adhesions to bladder wall</td>
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<tr>
<td>Bladder wall erosion</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Bypassing: passing of urine between the catheter and urethral wall or cystostomy channel in suprapubic catheters</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Catheter dislodgement</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Catheter falls out</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Catheter not licensed for suprapubic use*</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Clot retention</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Constipation</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Depression caused by being catheterised and change in body image/lifestyle</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Encrustation, resulting in blocked catheter, infection and formation of bladder calculi</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Enlarged prostate</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Gender objection</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Haematuria</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Inappropriate length of catheter*</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Infection</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Interpersonal relationships</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Kinkage</td>
<td>Adhesions to bladder wall</td>
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<tr>
<td>Large balloon infill*</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Large Charrière size*</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Latex allergy*</td>
<td>Problems with catheters</td>
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<tr>
<td>Loss of bladder function</td>
<td>Adhesions to bladder wall</td>
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<tr>
<td>Paraphimosis</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Penile retraction</td>
<td>Adhesions to bladder wall</td>
</tr>
<tr>
<td>Phimosis</td>
<td>Problems with catheters</td>
</tr>
<tr>
<td>Urethral perforation</td>
<td>Adhesions to bladder wall</td>
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<tr>
<td>Weak pelvic floor</td>
<td>Problems with catheters</td>
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</tbody>
</table>

* Practitioner responsibility at catheter insertion
to help reduce the swelling (Pomfret 1999a). Occasionally, the catheter might have to be removed to aid reduction of the paraphimosis. If unsuccessful in returning the foreskin to its correct position, medical advice should be sought.

Vaginal entry Occasionally when catheterising a female patient the catheter may enter the vagina accidentally. Leave the catheter in situ, it will act as a marker and recommence the procedure using a new sterile catheter. Once the patient has been catheterised correctly, remove the vaginal catheter. Because of the risk of cross-infection, never remove a catheter from the vagina and insert it into the urethra.

Retracting penis This is caused by the lower pelvic muscles becoming weaker and the shaft of the penis retracting inside the pelvic cavity. Placing the fingers on either side of the pubic area and pressing backwards will bring the penis out of the pubic cavity. When inserting a urethral catheter in men with this condition, it is important to grasp the penis cavity. When inserting a urethral catheter in men with this condition, it is important to grasp the penis behind the glans penis and gently pull forward. Otherwise, the penis will retract making insertion difficult or incur a curling effect to the catheter tip.

Catheter inserted but urine not draining Patients undergoing initial urethral catheterisation usually have a certain amount of urine inside the bladder. However, if the patient is on continual drainage using a drainage bag, when the catheter is removed the bladder will be empty. At recatheterisation with no drainage of urine occurring, the practitioner inserting the new catheter may wonder if it is in the correct position. This problem may be avoided by using a catheter valve at recatheterisation as the bladder does not need to be empty before catheter removal. At recatheterisation with the catheter valve open and a volume of urine inside the bladder, urine will drain with the catheter inserted correctly.

The full length of the catheter should be inserted. If no urine drains, and providing the catheter has not curled (turned around inside the urethra and backtracked down to its orifice), attach a syringe and slowly inflate the catheter balloon. If the patient suddenly complains of pain during this, deflate the balloon and resite the catheter. If the patient experiences no pain or discomfort while the catheter is in situ, gently undertake a bladder washout using saline to clear the drainage eyes of possible occlusion caused by the anaesthetic gel or possible debris, for example, a blood clot. It has been suggested that the best way to change a catheter is to put sodium chloride washout solution into the bladder and leave it there while removing the old catheter (Robinson 2003d).

Encrustation Encrustation, caused by mineral deposits, not only affects catheters on the inside (lumen), which causes blockage and non-drainage, but also affects the catheter surface. Encrustation on the surface of the catheter can break away into the urinary bladder and form a focus for bladder calculi and infections on catheter removal. Encrustation can cause scratching to the delicate urethral wall while the catheter is being removed, resulting in bleeding, scarring, urethral strictures and infection (Getliffe et al 2000). Encrustation trapped inside the urethra may also cause further trauma on insertion of a new catheter. As previously mentioned, catheter balloons alter shape and may increase the catheter’s overall diameter on deflation. Recurrent encrustation causes a further problem of catheter blockage (Getliffe 2002, 2003, Robinson 2003d). There may be potential for greater proactive catheter care for patients with this recurrent problem (Getliffe 1993).

There is much debate on the use of acidic bladder instillations to dissolve encrustation (Evans and Godfrey 2000, Pomfret 1996) but, in the author’s experience, they can play an important part in preventing encrustation forming and catheter blockage. Morris et al (1997) state that no matter which catheter material is used, if encrustation is present it will block eventually. Evans et al (2001) suggest that nurses should keep a catheter diary, anticipating when the catheter will block and changing it before it does.

Patients with recurrent catheter blockage should, however, be investigated. Using an acidic catheter maintenance solution dissolves encrusted particles and when the bladder is drained these particles will be flushed out. Depending on the severity and amount of encrusted particles, a bladder washout using sodium chloride 0.9% could be used to clear the bladder and flush out any remaining debris. Consider if the Ch size being used is adequate to prevent blockage (Morris et al 1997, Robinson 2001).

Bladder calculi can also be a cause of recurrent urinary infection and should be removed (Steggall 2001). To avoid trauma to the urethral wall caused by encrustation, it is advisable to try to dissolve this material before catheter removal. Testing a patient’s urine for high pH (alkaline urine) using pH indicator strips and recording the results can help to identify patients with recurrent encrustation and those for whom bladder acidic maintenance solutions could be used to help prevent catheter blockage (McCarthy and Hunter 2001).

Bladder irrigation/instillation/washout The difference between bladder irrigation, bladder instillation and bladder washout can be confusing, but putting it simply:

- Bladder irrigation is a continual flushing of the urinary bladder, usually via a three-way catheter. Such irrigation is used on urology units following bladder and prostate surgery.
- Bladder instillation is the insertion of a solution into an empty bladder for a period of time, for example medication.
- Bladder washout is the insertion of a solution into the bladder which is immediately drained.
This is used to flush blood clots or debris from the bladder (Evans and Godfrey 2000). Catheter maintenance solutions are similar to instillations as the solution is held in the catheter (and bladder) for a period of time, but their main purpose is catheter care and to prevent catheter blockage. These solutions are produced by various companies and their contents are listed in Box 2.

**Internal/external occlusion** Occasionally when using bladder instillations, the solution does not drain into the bladder and yet urine drains out, or enters the bladder but does not drain out. In this case the debris could be inside the catheter lumen and, as the solution is being instilled, it is pushed toward and occludes the drainage eyes from within. However, it could also be the opposite with the debris being outside the drainage eyes. The instilled solution pushes the debris away but, when released, it blocks the drainage eyes again. In both these situations, the catheter should be changed and a gentle bladder washout administered.

**Catheter bypassing** There are many situations that can cause a catheter to bypass, including bladder and urethral spasm, low balloon infill volume, constipation and infection (Lowthian 1998). It is important to consider the reason why the catheter is bypassing. A loaded bowel can cause pressure on the catheter lumen and prevent the drainage of urine. Straining at stool can cause bypassing and bladder discomfort. It is important to maintain a healthy diet and to drink adequate fluids to help prevent constipation.

**Urine infection** Check the urine for leucocytes, protein and blood using a dipstick. If the urinalysis shows abnormal readings, send a catheter sample of urine for culture and sensitivity tests. If the patient is asymptomatic, wait for the test results because all catheterised patients have some bacteria present in their urine. However, if the patient has signs of infection, inform the patient’s doctor. Assess the patient’s standard of hygiene, his or her fluid intake and the appearance of the urine. Is it clear or concentrated? Stagnant or concentrated urine will irritate the bladder wall. In the author’s experience, if the patient has a urine infection and is taking antibiotics, the catheter should be changed to remove the bacterial biofilm formation attached to the old catheter. See Table 1 for additional causes of bypassing.

**Purple urinary bag syndrome** Older patients who are immobile and catheterised may develop a condition known as purple urinary bag syndrome (PUBS). This condition, although harmless, causes discolouration to both the catheter and drainage bags and causes a lingering odour – the longer the bag is used and the warmer the air temperature, the stronger the odour becomes. It is brought about by the bacterial decomposition in the colon of tryptophan, an essential amino acid. The by-products are absorbed, metabolised and excreted in urine. PUBS not only affects catheterised patients, it has also been seen in patients using a penile sheath, nappies and as purple rings around the toilet bowl. PUBS is used and the warmer the air temperature, the stronger the odour becomes. It is brought about by the bacterial decomposition in the colon of tryptophan, an essential amino acid. The by-products are absorbed, metabolised and excreted in urine. PUBS not only affects catheterised patients, it has also been seen in patients using a penile sheath, nappies and as purple rings around the toilet bowl. PUBS not only affects catheterised patients, it has also been seen in patients using a penile sheath, nappies and as purple rings around the toilet bowl. PUBS not only affects catheterised patients, it has also been seen in patients using a penile sheath, nappies and as purple rings around the toilet bowl. PUBS not only affects catheterised patients, it has also been seen in patients using a penile sheath, nappies and as purple rings around the toilet bowl.

**Haematuria** Any degree of haematuria should not be ignored. This can be either occult (hidden), light, moderate or frank blood, with and without blood clots. Causes of haematuria include recent prostatic or bladder surgery, trauma caused by inserting catheter, prostatic enlargement, bladder calculi, prostate or bladder tumours, large Ch size and balloon infill volume, dislodged catheters, urine infection, torsion (accidental or self-inflicted) (Lowthian 1989) and blood clotting disorders. It is important to monitor whether or not the urine is clear. If the haematuria is not resolving and if it seems to be increasing, refer the patient to the urology department.

The catheter might need to be changed to a three-way catheter or the patient may require continual irrigation to clear the urinary bladder. Clearing the valves is designed for single inflation and single deflation only.

**Constipation** A loaded bowel can cause pressure on the catheter lumen and prevent the drainage of urine. Straining at stool can cause bypassing and bladder discomfort. It is important to maintain a healthy diet and to drink adequate fluids to help prevent constipation.

### Box 2. Urinary catheter maintenance solutions

- Chlorhexidine 0.02%, antibacterial. Available in 100ml sterile sachets. Bladder instillation to prevent contamination by *Escherichia coli* and *Klebsiella*
- Mandelic acid 1%, antibacterial. Available in 100ml sterile sachets. Bladder instillation to reduce growth of urease-producing bacteria such as *Proteus* and *Pseudomonas*
- Sodium chloride 0.9%. Available in 50ml and 100ml sterile sachets. Bladder washout for flushing the catheter to remove blood clots, debris and tissue
- Solution G 3.23% acidic solution. Available in 50ml and 100ml sterile sachets. Bladder instillation used to dissolve and reduce crystallisation in the catheter and/or bladder
- Solution R 6% acidic solution. Available in 50ml and 100ml sterile sachets. Bladder instillation used to dissolve persistent crystallisation in the catheter and/or bladder

(McCarthy and Hunter 2001)
Table 1. Other causes of catheter bypassing

<table>
<thead>
<tr>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tight clothing might restrict urine drainage</td>
<td>Check that clothing is worn loosely</td>
</tr>
<tr>
<td>Incorrect positioning of drainage system</td>
<td>Check that the drainage bag is in the correct position – below the bladder</td>
</tr>
<tr>
<td>Kinking in the catheter/drainage system</td>
<td>Check there is no kinking in the system</td>
</tr>
<tr>
<td>Possible latex allergy</td>
<td>Check for possible signs of an allergic reaction. Consider inserting a non-latex catheter (Waters 1997, Woodward 1997)</td>
</tr>
<tr>
<td>Sitting position</td>
<td>Check that the drainage system is positioned below the bladder. Ensure that the buttocks are above the level of the knees. If not, drainage of urine will be impeded, causing reduced drainage and a filling bladder</td>
</tr>
<tr>
<td>Catheter torsion</td>
<td>Check the catheter is not being pulled or stretched as this will also increase the risk of catheter dislodgement and trauma</td>
</tr>
<tr>
<td>Cap left on the drainage bag</td>
<td>Check that the cover has not been left on the drainage system to allow urine to drain into the drainage bag</td>
</tr>
<tr>
<td>Drainage system full of urine</td>
<td>Ensure regular emptying of the drainage system to avoid the risk of putting the patient into urinary retention or causing torsion by having a full bag</td>
</tr>
<tr>
<td>Full bladder</td>
<td>If using a catheter valve, ensure that the bladder is being drained at regular intervals</td>
</tr>
</tbody>
</table>

bladder of clots needs to be undertaken carefully to avoid bladder occlusion and clot retention, and also when using a bladder syringe (Lowthian 1991). The patient should be encouraged to drink adequate fluids and their urinary output should be monitored and recorded. It is important to check these patients for any signs of anaemia and shock (Pomfret 1999b, Stewart 1998). A blood sample may need to be taken to check haemoglobin levels. Once the urine is clear, the catheter (if required) can be changed to a smaller size.

**Conclusion**

Each patient with a catheter-related problem is different from the next, but often these problems can be solved quickly.

However, identifying a problem correctly and assessing its severity is important to avoid further complications. Learning how to solve these problems as they occur requires experience. If in doubt, get help or refer the patient elsewhere, preferably to a urology unit.

For each patient who is catheterised, nurses should also consider other possible options such as use of catheter valves, having a trial period without a catheter to assess if it is still needed, the possible teaching of intermittent self-catheterisation, and the use of penis sheaths, urinary appliances and incontinence pads.

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**REFERENCES**


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