Acute urinary retention: causes, clinical features and patient care


Summary
This article provides an overview of acute urinary retention (AUR), which can cause patients severe pain and distress. It examines potential causes and risk factors. The main strategies for the treatment and clinical management of patients are discussed. Nurses have a key role in identifying patients at risk of AUR. Therefore, the nursing role in assessment and management is explored.

Author
Martin J Steggall is acting head and senior lecturer in applied biology and urology, Department of Applied Biological Sciences, City University, and clinical nurse specialist in erectile dysfunction, Barts and The London NHS Trust, London.
Email: m.j.steggall@city.ac.uk

Keywords
Infection control; Nursing: care; Patient assessment; Urinary catheters; Urinary system and disorders
These keywords are based on the subject headings from the British Nursing Index. This article has been subject to double-blind review. For author and research article guidelines visit the Nursing Standard home page at www.nursing-standard.co.uk. For related articles visit our online archive and search using the keywords.

Normal physiology of urination
The urinary system comprises two kidneys, two ureters, a bladder (Figure 1) and urethra. In men the urethra is approximately 2.5cm long. It is curved and passes through the prostate gland which lies under the bladder (Figure 2). As a result of changes in testosterone levels, the prostate begins to enlarge in all men after the age of 40 years. This enlargement is gradual, but will eventually give rise to the classic urinary signs of prostate enlargement, that is, urinary frequency, hesitancy, poor flow, incomplete bladder emptying and abdominal straining. In women, the urethra is much shorter, straight and approximately 10cm in length (Figure 3).

Normally the bladder fills with urine at approximately 0.5ml/kg/hour. When a critical volume is reached (between approximately 200ml and 400ml in adults), the bladder wall is stretched. This triggers a nerve impulse to travel to the spinal cord and into the brain – pons and cerebrum – providing the signal that the bladder is getting full. To empty the bladder, a nerve impulse comes from the spinal cord to the bladder muscle (detrusor) and the internal and external urinary sphincters. At this point the detrusor contracts and the internal and external sphincters open, allowing urine to flow out of the bladder.

Urinary retention can develop if there is obstruction to outflow or interruption or damage to neural pathways.

Pathophysiology of acute urinary retention
The precise mechanisms that contribute to AUR have yet to be fully identified. However, the possible causes can be broken down into three categories (Box 1):

- Resistance to outflow, for example, in prostate enlargement, clot retention or urethral stricture (a narrowing of the lumen of the urethra).
- Bladder distension caused by immobility, constipation or secondary to medications such as anaesthetic agents (Box 2).
> Interruption to nerve pathways, for example, in spinal cord injury.

For some individuals a single event will trigger AUR, for example, surgery or an episode of pain or immobility. This is called precipitated AUR. However, in most cases AUR is spontaneous. In men it is usually caused by benign prostatic enlargement (Anderson and Khadra 2006) and excessive fluid intake, for example, alcohol (Elhilali et al 2004). AUR can also occur as a result of anaesthesia, cystitis, urinary tract infection (UTI) or urinary stones (calculi) in both sexes and all age groups (Emberton and Anson 1999).

The distinction between precipitated and spontaneous AUR has clinical relevance because the clinical management and expected outcome is different for each group (Fitzpatrick and Kirby 2006), in terms of medication and catheter removal.

### Diagnosis

For some clinicians, the volume of urine retained in the bladder is the key factor in determining a diagnosis of AUR. If, after catheterisation, a urinary volume of between 500-800ml is drained, the patient will be deemed to have been in AUR. A volume less than 500ml would indicate that the bladder, the spinal cord or brain were not interpreting neural signalling correctly, so urodynamic studies would be required. Where a volume of more than 800ml is drained, the patient will have what is termed acute-on-chronic urinary retention (Reynard 2001). If patients are still able to void, but are unable to empty the bladder completely, and after each void consistently retain more than 500ml of urine, they are in chronic urinary retention (Reynard 2001).

### Assessment

Nurses are in a key position to monitor urinary function both in the community and hospital. In community areas, if men report lower abdominal pain, passing very small quantities of urine (less than 50ml) and have suprapubic tenderness, they may be at greater risk of developing AUR (Roehrborn 2005). The sensation of incomplete bladder emptying, having to void again after less than two hours and a weak urinary stream are the best independent symptom predictors of urinary problems (Gray 2000). Use of medications with adrenergic or anticholinergic effects, for example, hyoscine or atropine which are used during pre-medication before anaesthetics, is also a predictor for AUR. This is because these drugs alter sensation of fullness in the bladder (Roehrborn 2005). For men experiencing these symptoms, a strategy for management includes

---

**BOX 1**

**Causes of acute urinary retention**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Aetiological factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical</td>
<td>Urethral stricture, benign prostate enlargement, prostate cancer, urethral stone, urethral stricture and foreign body.</td>
</tr>
<tr>
<td>Functional</td>
<td>Spinal cord injury, spinal anaesthesia, post-operative pain, drug toxicity and alcohol toxicity.</td>
</tr>
<tr>
<td>Psychogenic</td>
<td>Emotional distress.</td>
</tr>
</tbody>
</table>

(Adapted from Hassouna et al 2005)
secondary care referral for prostate assessment and subsequent treatment advice.
In hospital settings, analgesia, for example, opiates, immobility and constipation are potential causes of AUR because they alter the sensation of fullness, allowing the detrusor to distend to the point where it cannot contract. Therefore nurses should assess patients for these risk factors. It is important to assess urinary frequency and volume of urine (recorded on a fluid balance chart). However, by its very definition, AUR tends to be spontaneous with no warning signs. If AUR does develop the patient will require urgent catheterisation.

**Treatment options**

**Catheterisation** The immediate treatment for AUR is catheterisation to decompress the bladder and allow urine to drain. This will relieve the associated pain and prevent potential renal damage. The choice of whether to catheterise urethrally or suprapubically is usually dependent on the skills of the healthcare professional (Thomas et al 2005). Suprapubic catheterisation is associated with a reduction in UTIs. Also, during a trial without catheter (TWOC), the suprapubic catheter can be clamped and the patient encouraged to void.

Before removing the catheter, a clamp can be used to prevent the catheter draining. The bladder will then fill with urine and be stimulated to begin voiding in the normal way when a volume of approximately 200ml is present. By clamping the catheter, a trial void can be attempted without the discomfort of removing the catheter, only to re-insert it if the trial fails. However, suprapubic catheterisation is a relatively complex procedure and therefore urethral catheterisation is more common.

The size of catheter introduced is usually a 12 to 16 French gauge (FG) or Charrière (Ch). Before catheterisation a local anaesthetic or a combined local anaesthetic and antimicrobial solution such as Instillagel® should be inserted into the urethra. Local anaesthetic should be inserted three to five minutes before catheterisation is started so that it has had time to be absorbed.

When catheterising the patient, the catheter should be inserted until urine starts to drain and then advanced up to the Y junction. This ensures that the catheter is in the correct position and that the tip of the catheter is in the dome of the bladder. Urine will, therefore, not flow until the catheter is pulled back to the correct position, that is, at the base of the bladder, which will allow the clinician time to attach the catheter drainage bag without urine leaking out. When the catheter is in the dome of the bladder, the 10ml balloon should be filled before the catheter is drawn back. The catheter should then be allowed to drain and the bladder will decompress.

Bladder capacity is approximately 1,000ml, but this can vary. Concerns have been expressed in the literature about risks of hypotension when the pressure in the bladder is suddenly released. For example, Gray (2000) suggests that the catheter should be clamped after 500ml has drained, with further increments of 500ml allowed every 10 minutes. However, draining the bladder in this way is not a universal recommendation. Given the nature of AUR, pragmatic management would suggest that clinical observations (temperature, pulse and blood pressure) should be recorded every 15 minutes for an hour, and then decreased in frequency according to the patient’s clinical condition. Nursing staff should observe and monitor patients to identify any signs of hypotension and/or tachycardia following catheterisation and decompression of the bladder.

The catheter should not be introduced without a plan for its subsequent removal. This will dictate the selection of catheter. Practitioners must decide between a short, medium or long-
Pharmacological intervention

Urodynamics studies. Management will depend on the findings of these studies, for example, urodynamics, to determine whether the cause of the problem is an obstruction, or whether it is related to the function of the bladder itself. Clinical management will depend on the findings of these urodynamics studies.

**Trial without catheter** The time that the catheter is left in place will vary between institutions and will depend on the cause of AUR and the clinician’s preference. However, data from Djavan et al (1998) on men who had AUR, indicate that catheters should remain in place for seven days before TWOC to facilitate recovery from the acute event. In addition, TWOC is more likely to be successful if the patient is less than 65 years and if the retained volume was less than 1,000ml.

One study found that after a successful initial TWOC, 56% of men experienced recurrence of AUR within a week, 62% after a month and 68% after a year (Choong and Emberton 2000). The higher the AUR volume and the advanced age increase the risk of recurrence. For this reason, alpha-blockers are commonly prescribed.

Depending on the results of the TWOC, the patient may need to undergo further urological studies, for example, urodynamics, to determine whether the cause of the problem is an obstruction, or whether it is related to the function of the bladder itself. Clinical management will depend on the findings of these urodynamics studies.

**Pharmacological intervention** For men aged over 65 years, and where benign prostate enlargement is expected, alpha-blockers such as alfuzosin, doxazosin, indoramin, prazosin and tamsulosin may be given before the TWOC. The rationale for their use is based on the fact that AUR, related to prostate growth, may be related to over stimulation of alpha1-adrenergic receptors. Decreasing the high sympathetic tone in the urethra and bladder neck can result in a reduction in bladder outlet resistance, thus making it easier to pass urine. The potential side effects of alpha-blockers are hypotension (particularly postural hypotension), headache and dry mouth.

McNeill et al (2004) identified that the use of alfuzosin improves the success rate of TWOC. In addition, Anderson et al (2001) found that long-term (more than four years) treatment with 5-alpha-reductase inhibitors reduces the incidence of AUR. These drugs, for example, finasteride, prevent the conversion of testosterone to dihydrotestosterone, which causes prostatic growth (hyperplasia), resulting in shrinkage of the prostate.

**Prostatectomy** Men with large residual volumes (greater than 1,000ml) and over 60 years of age may need to undergo a prostatectomy provided they are fit for surgery. Typically this is a transurethral resection of the prostate. Prostatectomy involves introducing a resectoscope or cutting loop down the urethra into the prostate. The prostate is then ‘cored’ out, rather like eating an apple from the inside out. The effects of prostate surgery may include incontinence, erectile dysfunction (impotence) and retrograde ejaculation.

**Nursing care**

Whether the patient has AUR as a result of pathological processes or as a side effect of medication, an accurate fluid balance chart should be completed. It is imperative to record the initial volume as well as the ongoing volume of urine drained from the bladder because this guides future clinical management.

While the catheter is in place, the patient is at risk of developing a UTI. Women are more likely to develop a UTI than men because of the proximity of the anus to the urethra and easy translocation of bacterial flora from the anus to the urethra.

Prolonged catheterisation increases the risk of haematuria, urosepsis and bypassing or leakage of urine around the catheter (Desgrandchamps et al 2006). The incidence of UTIs in patients with indwelling catheters is directly related to the duration of catheterisation (Sedor and Mulholland 1999), and the calculated chance of remaining free of infection is only 50% (Schaeffer 2002). Hospital-acquired UTI leads to prolonged hospital stay and increased treatment costs.

Build-up of debris can occur where the catheter enters the urethra, so the catheter should be cleaned twice a day using warm soapy water. Patients can be shown how to do this themselves. The patient or nurse should ensure that catheter care is completed at least twice a day. In addition, assessment of signs of catheter-associated infection (Box 4), will alert the nursing team to a developing, or actual, infection. The majority of hospital-acquired infections in the urinary tract are caused during the catheterisation procedure (Reynard 2001).

For those patients who developed AUR as a result of surgery or pharmacological intervention,
The catheter will probably be removed after a day or two. However, it is important for these patients not to be discharged until they are passing approximately 150–200ml of urine on each void on three separate occasions. This is the criterion for a successful TWOC. It is essential, therefore, for nurses to encourage fluid input and to ensure that patients drink enough fluid for an accurate urine volume assessment to be completed. Patients should be encouraged to drink, if possible, more than two litres per day, as this will help to ‘flush’ the urinary tract and limit the chances of UTI.

In areas that have access to bladder scanners nurses will be able to assess the amount of urine left in the bladder after voiding with a portable ultrasound bladder scanner. Although there does not seem to be a consensus on the minimum acceptable volume left in the bladder after voiding, for the patient to be discharged a volume of less than 50–100ml would be considered appropriate. However, normally the bladder should be emptied completely.

For patients in whom the suspected cause of AUR is pathological, that is, related to prostate enlargement, a TWOC will be arranged after a course of medication, usually an alpha-blocker. The patient should be advised of the potential side effects of the medication and given instructions about how to care for, empty and manage the catheter at home.

**Conclusion**

AUR is the sudden inability to pass urine. It is unexpected and painful. Although AUR is more common in males, UTI, anaesthesia and urinary calculi have all been implicated as causal factors. If AUR develops, the main course of treatment is immediate catheterisation followed by a TWOC. It is important to establish the volume of urine that was retained, and this should be recorded on a fluid balance chart. In men suspected of prostate enlargement-related AUR, alpha-blockers are likely to be prescribed and a TWOC arranged for a week later. For those patients who have AUR for other reasons, for example, anaesthetics, a TWOC can be planned for a day or two later. However, if any patient fails a TWOC, further urological investigation will be required and therefore when re-catheterising the patient a long-term catheter should be used NS.

---

**References**


