Management of urinary tract infection (UTI) in the community

Marian DiVito

Urinary tract infection (UTI) is caused by the presence and multiplication of bacteria in the urinary tract, with associated tissue invasion. It is most common in women but can be more complicated in male and catheterised patients. This article highlights the importance of the correct diagnosis of UTI, which will identify ‘red flags’ to aid community nurses’ choice of management options and avoid the unnecessary prescription of antibiotics. In addition, the author makes recommendations for reducing catheter-associated UTIs (CAUTIs) in the community.

KEYWORDS: Continenice UTIs Catheter care Antibiotics

The Health Protection Agency (now Public Health England) defined urinary tract infection (UTI) as ‘the presence and multiplication of bacteria in one or more structures of the urinary tract with associated tissue invasion’ (HPA, 2012). Urine is stored in the bladder and is normally sterile, however, UTIs can develop when part of the urinary system becomes colonised with pathogenic bacteria. In non-catheterised patients, bacteria mostly enter the urinary system through the urethra and, more rarely, through the bloodstream.

COMMON CAUSES OF UTI

UTI is more common in women than men. *Escherichia coli*, usually found in the colon, is the commonest cause of UTIs in women and accounts for a large proportion of uncomplicated UTIs. Due to the shorter length of the female urethra and its proximity to the rectum, bacteria from faecal incontinence, sexual intercourse or poor personal hygiene can easily travel along the perineum into the urethra and up to the bladder, thereby causing UTIs.

The following underlying factors may also predispose individuals to UTIs:

- An obstruction in the urinary system, e.g. renal/ bladder stones, benign prostatic hyperplasia (prostate enlargement)
- Static ‘reservoir’ of urine due to incomplete bladder emptying (Getliffe and Dolman, 2003)
- Weakened immune system (through conditions such as diabetes, chemotherapy, etc (Whittaker, 2009)
- Sexual intercourse (Bethel, 2012)
- The presence of a foreign body, i.e. urinary catheter (Department of Health [DH], 2003; National Institute for Health and Clinical Excellence [NICE], 2006)
- The presence of anatomical abnormalities or trauma (i.e. urethral stricture — narrowing of the urethra caused by injury or disease)
- Other common causes in women include hormonal changes such as the menopause (Nicolle, 2002).

DIAGNOSIS

A diagnosis of UTI is primarily based on symptoms and known as lower UTI or upper UTI (see below for more information on both types). It is important to exclude any differential diagnosis that may present with similar symptoms of UTI.

Differential diagnosis in men

Conditions such as prostatitis (inflammation, swelling or infection of the prostate gland), epididymitis (swelling of the tube that connects a testicle with the vas deferens) and urethritis (urethral inflammation) should be considered as differential diagnoses in men presenting with acute dysuria (pain, or a burning sensation during voiding) or frequency of urination, and appropriate diagnostic tests should be considered.

Pain or discomfort in the perineum, thighs or penis is a common symptom of prostatitis (Getliffe and Dolman, 2003). In addition, sexually transmitted diseases and, more rarely, cancer should also be considered, especially if recurrent UTIs are reported.

Differential diagnosis in women

A differential diagnosis must be considered in women presenting with symptoms of UTI who also have vaginal itchiness or discharge. Peri- and postmenopausal women, with declining oestrogen levels may experience vaginal and vulval changes that may result in vulvo-vaginal itch ing and dryness (NICE, 2014a). In addition, sexually transmitted diseases and, more rarely, cancer should also be considered, especially if patients report recurrent UTIs.

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There is evidence that antibiotic treatment can do more harm than good due to the adverse effects such as rashes, gastrointestinal symptoms and the development of antibiotic resistance. Therefore, in adult patients a diagnosis of UTI should be based on a full clinical assessment, including vital signs (SIGN, 2006) and antibiotics only prescribed when symptoms are present (Table 2).

### Table 2: Suggested antibiotic treatments for UTI

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder</td>
<td>Bacterial cystitis is inflammation of the bladder, usually caused by a bladder infection</td>
</tr>
<tr>
<td></td>
<td>Intercanalicular cystitis is inflammation of the bladder of unknown cause. This is sometimes referred to as ‘painful bladder syndrome’. Patients may present with symptoms similar to cystitis of urgency and frequency but with additional discomfort in the bladder and pelvic area</td>
</tr>
<tr>
<td>Urethra</td>
<td>Urethritis describes urethral inflammation and can be infectious or non-infectious. This is often caused by a sexually transmitted disease</td>
</tr>
<tr>
<td>Prostate</td>
<td>Prostatitis is inflammation of the prostate gland and can be bacterial or non-bacterial</td>
</tr>
<tr>
<td>Epididymis and testes</td>
<td>Epididymo-orchitis is an inflammation of the epididymis (the coiled tube that collects sperm from the testicle and passes it on to the vas deferens) and/or the testes. It is usually due to infection or a sexually transmitted disease. It can be acute or chronic</td>
</tr>
<tr>
<td>Kidneys and renal pelvis</td>
<td>Pyelonephritis is an infection of the upper urinary tract (Bethel, 2012)</td>
</tr>
</tbody>
</table>

### Signs and symptoms of lower UTI
The signs and symptoms of lower UTI (cystitis) include (NICE, 2014b;c):
- Dysuria
- Desire to pass urine frequently or urgently
- Nocturia
- Dribbling incontinence (mainly in men)
- Feeling of incomplete bladder emptying
- Cloudy, bloody or bad-smelling urine
- Confusion (new or worsening)
- Urinary incontinence (new or worsening)
- Pain in the lower abdomen
- Mild fever (a high temperature between 37–38°C to 98.6–101°F).

### Signs and symptoms of upper UTI
The signs and symptoms of upper UTI include (Scottish Intercollegiate Guidelines Network [SIGN], 2003):
- Any of the symptoms of a lower urinary tract infection
- A high fever (a temperature of over 38°C or 101°F)
- Nausea or vomiting
- Shaking or chills
- Confusion — new or worsening
- Pain in the lower back or side that is usually only one-sided.

The type of infection and inflammation is classified by the site of colonisation (Table 1).

### MANAGEMENT OF UTI

There is no evidence that the intensive treatment of asymptomatic bacteriuria significantly reduces the risk of symptomatic episodes. Asymptomatic bacteriuria is the presence of bacteria in the urine, revealed by quantitative culture or microscopy in a sample taken from a patient without symptoms of urinary tract infection.

Haematuria (blood in the urine) is considered a ‘red flag’ (significant event that requires immediate treatment). The causes of haematuria can be both insignificant or point to life-threatening malignant diseases, being potentially glomerular (in the kidneys, the glomerulus is a network of capillaries that help to filter blood), renal, urological or haematological in origin (Turner, 2008). When haematuria is identified, community nurses must send a urine sample to a laboratory for further analysis. If UTI has been diagnosed and antibiotics prescribed, the patient’s symptoms must be reviewed after seven days of completion of antibiotics and a dipstick urinalysis repeated. This is to ensure that the therapy has been effective and any UTI eradicated. Patients must be referred to a GP for review if haematuria does not resolve (refractory haematuria) despite treatment. In women over 50 who present with microscopic or macroscopic (visible with naked eye) haematuria; or women over 40 with persistent or recurrent UTIs with haematuria, a mid-stream urine sample should be sent for microscopy and their GP informed without delay.
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lower or upper UTI and confirmed by two consecutive samples (Nicolle, 2003).

Asymptomatic bacteriuria is common, including in healthy individuals, and treatment can be more harmful than beneficial. Therefore, only pregnant women or men undergoing urological interventions should be screened for asymptomatic bacteriuria (Grabe et al, 2008). Asymptomatic bacteriuria is also common in older people and those using urinary catheters — however, as the name suggests it does not cause any symptoms and normally does not require treatment (Grabe et al, 2008).

The exception would be patients in certain at-risk groups such as renal transplant patients and pregnant women, where a mid-stream specimen of urine must be collected and sent for microscopy and culture to ascertain the risks of deterioration, then treated as appropriate.

Symptomatic bacteriuria
Symptomatic bacteriuria is an infection of the upper part of the urinary tract that includes the kidneys and the ureters. The presence of bacteriuria in urine is revealed by quantitative culture or microscopy in a sample taken from a patient with typical symptoms of lower or upper UTI.

It is important to recognise any evidence of upper UTI, particularly symptoms suggestive of pyelonephritis (kidney infection) such as one-sided costovertebral angle pain, fever, rigors or other manifestations of systemic inflammatory response. Upper UTI is potentially more serious than lower UTI due to a possibility of kidney damage (Fulop, 2013).

When patients present with symptomatic bacteriuria, their GP should be informed without delay so that empirical treatment with antibiotics can be started and a mid-stream urine sample sent for culture and sensitivity to ensure the patient is on the correct treatment. Very frail or immuno-compromised patients may require hospital admission as may anyone who does not respond to antibiotics within 24 hours and has continuing symptoms of upper UTI.

Cranberry products
The use of cranberry to prevent urinary infections has been recommended as a traditional remedy by urologists and specialist urology nurses for many years. However, cranberry products are not available on the NHS or regulated properly and the concentration of active ingredients is not always clear. There is no evidence to support the effectiveness of cranberry products for treating symptomatic UTI. Indeed, a recent systematic review by Cochrane reported that the use of cranberry appears to be less effective than previous studies have indicated for preventing UTIs and, therefore, it was not recommended (Jepson et al, 2012).

Patients taking warfarin should avoid taking cranberry products as they may enhance the anticoagulant effect (British Medical Association/Royal Pharmaceutical Society [BMA/RPS], 2014).

Urine testing
The main value of urine culture is to identify any bacteria and their sensitivity to antibiotics and to ensure the patient is placed on the correct antibiotic therapy. Although there is no need to test low-risk people, nurses may use this tool as part of a first assessment/admission assessment to obtain a baseline reading.

Dipstick urinalysis using a reagent strip is a cheap and fast general screening tool for a variety of medical conditions. Proteinuria may indicate renal impairment or uncontrolled blood pressure and glycosuria (glucose in the urine) may reveal undiagnosed or uncontrolled diabetes (Stegall, 2007).

There is no need for dipstick testing in patients who are asymptomatic and a sample should not be sent to for analysis in the absence of UTI symptoms. However, clinical judgment must be made in patients unable to report symptoms such those with learning disabilities or dementia. Dipstick urinalysis should not be used to diagnose UTI in catheterised patients — pyuria (urine containing pus) is common in these patients and its level has no predictive value.

CATHETER-ASSOCIATED UTI (CAUTI)

Catheterisation can be indwelling (urethral or suprapubic) or intermittent (Robinson, 2009). The seminal work of Lapides et al (1972) identified that residual urine in the bladder and high bladder pressures are common causes of UTIs, which could be reduced by intermittent catheterisation. These findings are supported by the more up-to-date findings of Shaw et al (2007) and NICE (2012). Long-term Foley indwelling catheters begin acquiring bacteria soon after their introduction and the longer they are in situ the greater the likelihood of infection, which increases by 6% each day.

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that the catheter is in place (Kambal et al, 2004).

Once the organisms have attached to the catheter’s surface and formed a biofilm, they can rapidly multiply (Tenke et al, 2004; Stickler, 2008). Furthermore, biofilms can cause catheter encrustation leading to blockage, which results in trauma and bladder pain on removal of the catheter. While most catheterised patients will never develop a systemic inflammatory response to these colonising pathogens (Nicolle et al, 2005), there is a risk that CAUTIs can lead to septicemia (Pellowe et al, 2004) and even death.

**Diagnosis of CAUTIs**

Fever is the most common symptom of UTI in catheterised patients. However, the absence of fever does not appear to exclude UTI (SIGN, 2012). Consequently, clinical symptoms alone are not recommended for predicting the likelihood of symptomatic UTI in catheterised patients — professional judgement must also be used.

Symptomatic bacteriuria in patients with catheters has the following symptoms (SIGN, 2012):

- Fever
- Flank or suprapubic discomfort
- Change in voiding patterns
- Nausea
- Vomiting
- Malaise
- Confusion

**Management of CAUTIs**

In the author’s experience, patients with long-term indwelling catheters should have a clean specimen of urine (CSU) taken for culture before the catheter is changed and treatment with antibiotics for symptomatic UTI is started:

- Option 1: take CSU sample; remove catheter; start antibiotic treatment with a new catheter in situ
- Option 2: take CSU sample; remove catheter; start antibiotic treatment; consider intermittent assisted or self-catheterisation for a few days before replacing the catheter.

**Prevention**

Nurses need to be up to date with local and government recommendations for best practice evidence as they play an important part in reducing CAUTIs (DH, 2003; NICE, 2006; SIGN, 2012; HPA, 2012).

Indwelling catheterisation is a procedure frequently undertaken by nurses or delegated to carers/patients by nurses after an initial assessment — in this case NICE (2012) has recommended that patients and carers are educated in catheter management and hand decontamination techniques.

Nurses should always question the reason for catheterisation, and if appropriate, a trial without catheter (TWOC) should be undertaken (where a catheter that has been inserted via the urethra is removed from the bladder for a trial period to determine whether the patient is able to pass urine spontaneously). It is the author’s experience that patients are often discharged from hospital with a catheter in place, but the reasons for the original catheterisation are not made clear to community nurses.

NICE (2012) highlights that ‘indwelling urinary catheters are the most common cause of urinary tract infections’ and recommends that any assessment should include the reason for catheterisation. In

**Table 3: ‘Golden rules’ for preventing UTI**

<table>
<thead>
<tr>
<th>Golden rules for preventing UTI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses must question the need for an indwelling catheter and review this at each catheter change</td>
</tr>
<tr>
<td>Nurses should consider the option of the patient/carer performing intermittent catheterisation, especially where CAUTI is present</td>
</tr>
<tr>
<td>All catheterisations carried out by healthcare workers must follow an aseptic non-touch technique (ANTT) procedure</td>
</tr>
<tr>
<td>The meatus should be washed daily with soap and water</td>
</tr>
<tr>
<td>Use a catheter valve as a first choice as opposed to a free drainage bag when appropriate for the patient</td>
</tr>
<tr>
<td>Ensure that the closed urinary system is not broken except for good clinical reasons (i.e. changing the drainage bag)</td>
</tr>
<tr>
<td>Nurses should educate patients and carers on the benefits of effective hand decontamination, ANTT and maintaining a closed system</td>
</tr>
<tr>
<td>Urine samples must be obtained from a sampling port (using ANNT)</td>
</tr>
<tr>
<td>Use appropriate sterile lubricants from a single-use container for male and females</td>
</tr>
<tr>
<td>To prevent reflux, urine bags should be regularly emptied (when three-quarters full)</td>
</tr>
<tr>
<td>Urine bags should be positioned below the bladder, but not in contact with the floor</td>
</tr>
<tr>
<td>A link system for overnight drainage should be used, and the night bag disposed of each morning</td>
</tr>
<tr>
<td>Sterile bags should be used during the day and at night</td>
</tr>
<tr>
<td>ALL bags are single-use only</td>
</tr>
<tr>
<td>Bladder maintenance solutions/wash-outs must not be used to prevent CAUTIs</td>
</tr>
</tbody>
</table>

*Based on NICE guidelines (2012)*

**Expert commentary**

**Julian Spinks, GP with interest in continence, Kent**

Urinary tract infection in men and women can vary enormously in its impact on patients, from minor illness in the young adult to a major cause of unplanned admissions to hospital in the frail older person.

This article provides a concise but comprehensive guide to the diagnosis and management of the condition and, at a time when drug resistance is an increasing problem, the section on prevention is particularly timely.
view of the potential risks of the procedure, a discussion between the patient, GP and community nurse is recommended and if safe, a TWOC should be undertaken.

If the catheter needs to remain in situ, maintenance of a closed drainage system is recommended as avoiding unnecessary disconnections is still the most effective way to minimise CAUTIs (NICE, 2012).

During catheterisation and drainage system changes, effective aseptic non-touch technique (ANTT) is recommended to minimise the risk of infection (NICE, 2012). The change of a catheter bag or valve is a procedure often delegated to carers, but it still requires ANTT (RCN, 2012).

Furthermore, it is crucial that nurses eradicate poor clinical practice such as washing drainage night-bags and reconnecting them later. All catheter bags are single-use only and re-using catheter bags that have been disconnected — including seven-day bags, which are also single-use — contravenes manufacturers’ recommendations (Medicines and Healthcare products Regulatory Agency [MHRA], 2011).

There is extensive literature, although not yet any clear evidence, to support the effectiveness of catheter maintenance solutions or the use of antiseptic-coated catheters in the prevention of blockages or reduction of CAUTIs. It is evident that more research is needed in this area of practice and nurses should perform a thorough holistic assessment to provide a rationale for using these products.

Using a bladder infusion kit to administer bladder maintenance solutions via needle-free sample ports, always using ANNT, is recommended to maintain a closed system and minimise the risk of CAUTIs. In addition the author recommends that any catheter drainage bags used are sterile and single-use only (Table 3).

A small quantitative study in two hospitals suggested that the use of an anaesthetic lubricant reduced the incident of UTIs by 50% (Kambal et al, 2004). However, the NICE (2012) guidelines for infection control only recommend the use of appropriate lubricant from a sterile single-use container for male and females to minimise trauma and infection.

Although anaesthetic gel is not recommended as a first-line measure, it may be indicated for patients who have had previous traumatic and painful catheterisation experiences. Professional judgment must be used and potential allergies and side-effects taking into account as this a ‘prescription only medication’.

CONCLUSION

Community nurses should ensure that UTIs are diagnosed according to the presenting symptoms. UTIs in women are common and often caused by E. coli bacteria entering the short urethra from the nearby rectum and are normally asymptomatic.

In patients with no UTI symptoms there is no need for dipstick testing or antibiotic therapy in patients who present with asymptomatic UTIs.

However, in men and catheterised patients, UTIs can be complicated and could lead to septicemia or even death. Identifying the right diagnosis/differential diagnosis will better enable the nurse to choose the correct management options.

Similarly, comprehensive assessment will help nurses to identify ‘red flags’ such as haematuria, which need urgent referral.

The use of ANTT during catheterisation and catheter care, the maintenance of a closed drainage system, and the use of sterile single-use bags are recommended to minimise CAUTIs.

Undoubtedly, avoidance of unnecessary catheterisation and prompt catheter removal is the most effective method of eradicating bacterial contamination and preventing catheter-related complications and community nurses should closely monitor any catheterised patients to ensure that this invasive procedure does not continue for longer than is absolutely necessary....
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