

Diagnosis and management of urinary infections in older people

Henry J Woodford, consultant physician;
James George, consultant physician

Department of Medicine for the Elderly
Cumberland Infirmary, Carlisle

Older adults are more prone than younger individuals to developing urinary tract infections (UTIs) for several reasons, including:

- incomplete bladder emptying (often related to prostatic enlargement in men)
- higher rate of catheter use
- increased susceptibility to infection associated with frailty.

A sudden decline in physical and/or cognitive function in older people is usually ascribed to a UTI, yet this commonly adopted clinical practice is not supported by the research evidence.¹

Definitions of infection

Symptomatic UTI is defined as bacteriuria causing urinary tract symptoms. It can be classified as upper (eg pyelonephritis) or lower (eg cystitis), the former classically presenting with flank pain and renal angle tenderness, the latter as dysuria, frequency and urgency of micturition. Additionally, UTI can be divided into complicated and uncomplicated forms (Fig 1). A complicated UTI occurs in a person with an abnormal urinary tract or an increased susceptibility to infection. This includes people with catheters or diabetes, and all men (due to the frequent association with prostatic enlargement). Bacteraemic UTI occurs when the same organism is identified in the blood and urine simultaneously.

Diagnostic problems

One of the major difficulties with diagnosis of UTI in older people is the high

prevalence of asymptomatic bacteriuria (ASB): the presence of bacteria in the urine of people without attributable symptoms. ASB is rare in younger people but over the age of 75 years is found in 7–10% of men and 17–20% of women, and in up to 40–50% of non-catheterised people in care homes.^{2–4} All long-term catheter users have bacteriuria. ASB is associated with white blood cells (WBC) in the urine (pyuria) in over 90% of cases.³ A patient presenting with symptoms unrelated to the urinary tract who is found to have ASB may then mistakenly be labelled as a 'proven UTI', which propagates the myth of UTIs as a common cause for non-specific symptoms in older people. Treating ASB does not reduce either mortality or morbidity but increases the risks of antibiotic-related adverse events and colonisation with resistant organisms.^{5,6}

A second major diagnostic difficulty is that many older people presenting with a genuine UTI (even bacteraemic UTI) do not have urinary tract symptoms.^{7,8} Alternative presentations may include acute functional or cognitive decline. Possible explanations include the presence of either urinary catheters or cognitive impairment (dementia or delirium) that precludes a reliable history. In addition, older people may have chronic

urinary symptoms such as incontinence, nocturia and urgency unrelated to a UTI. This group of patients therefore falls outside the conventional ideas of either ASB or symptomatic UTI, making an accurate diagnosis particularly challenging.

Only symptoms of acute onset should be considered relevant to a diagnosis of UTI. It is helpful to distinguish ASB from a genuine UTI by evidence of a septic illness (ie pyrexia, raised serum WBC count or inflammatory markers) in the absence of an alternative more likely explanation (eg a chest infection).

Urine testing

The high prevalence of ASB means that both urine culture and urine dipstick tests are of limited diagnostic value in older people. Moreover, urine samples may be hard to obtain due to urinary incontinence or cognitive impairment, or unreliable due to contamination or the prior receipt of antibiotics.

Urine culture

A urine culture negative for growth when taken prior to the receipt of antibiotics effectively excludes UTI. Ideally, a urine

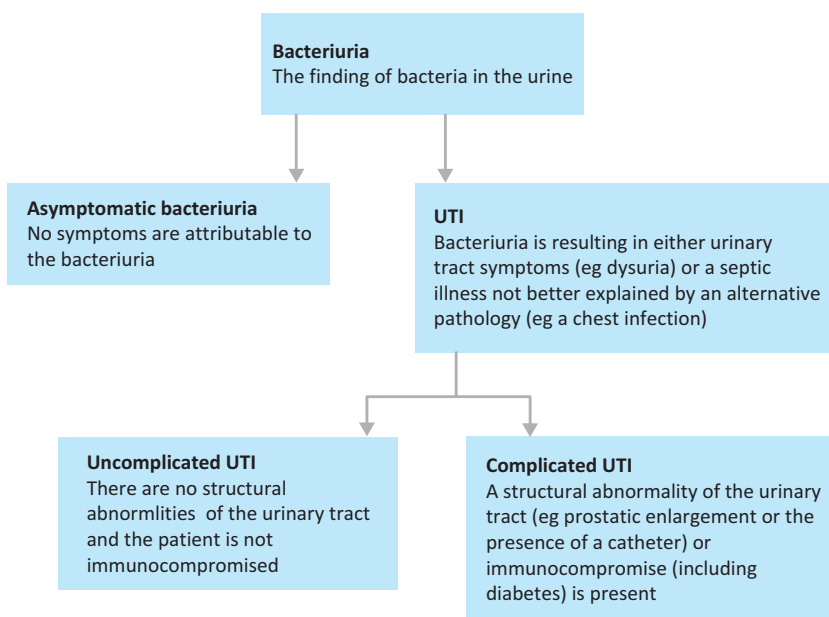


Fig 1. Diagnostic categories of bacteriuria UTI = urinary tract infection.

culture should be obtained in all older patients suspected of a UTI to guide antibiotic sensitivities.

Dipstick tests

Urine dipsticks test for both leukocyte esterase (a marker for pyuria) and urinary nitrites (coliform bacteria reduce nitrates in urine to nitrites). *Escherichia coli* is the most common causative organism in younger and older adults. Other coliforms (Gram-negative organisms found in the intestine, eg klebsiella, proteus and enterobacter) are also frequently detected. However, Gram-positive (eg enterococci) and atypical organisms (eg pseudomonas) account for a larger proportion of UTIs in older people.⁹ This is relevant because these organisms are less sensitive to commonly used antibiotics and do not reduce urinary nitrates to nitrites. This latter property means that urinary dipsticks will not test positive for nitrites.

It has been suggested that urine dipsticks negative for both leukocytes and nitrites could be used to exclude elderly people without UTI. However, the high rate of positive tests would result in only a small number of patients tested being excluded and a false negative rate of 10–20%.¹⁰ For these reasons, urinary dipsticks have only a limited role in diagnosing UTI in older people.

Blood tests

A raised WBC count or C-reactive protein level are consistent with an infective illness. A blood culture positive for a known uropathogen in the absence of an alternative more likely source suggests a UTI, especially if urine culture is also positive for the same organism.

Making a diagnosis

As discussed above, diagnosis of UTI is difficult. Unfortunately, there is no gold-standard diagnostic test for a UTI. The high prevalence of ASB and non-specific presentations (ie without urinary tract symptoms) in older people complicates the situation. The diagnosis of UTI in

acutely unwell, hospitalised older patients is probably incorrect in about 40% of cases.⁸ This results in inappropriate exposure to antibiotics and delay in establishing the correct diagnosis. Guidelines designed for diagnosing younger people often rely on the presence of urinary tract symptoms.⁴ As stated previously, this alone is insufficiently sensitive to accurately diagnose many frail older adults.

Clinical decision tools have been developed in nursing home populations to try to limit inappropriate antibiotic use.^{11,12} However, their sensitivities and specificities are poor in comparison to finding bacteriuria and pyuria on urine testing.¹³

The assessment of acutely unwell older people should be comprehensive in its nature, including cognitive assessment. Some patients with non-specific declines in cognition or functional status will have a UTI but many will not. A suggested scheme to assist diagnosis that takes all these factors into account is shown in Figure 2.¹⁴

Treatment

The use of antibiotics is associated with the development of meticillin-resistant *Staphylococcus aureus* and *Clostridium difficile* infections. This seems to be particularly true for older people and for broad-spectrum agents (eg ciprofloxacin, co-amoxiclav and cephalosporins). Resistance to commonly used antibiotics, especially amoxicillin and trimethoprim, is rising. Infections caused by multidrug

resistant organisms are more common in older adults, especially those with catheters or residing in long-term care.¹⁵ Uncomplicated UTI is typically caused by less resistant organisms, so initial treatment with a narrow-spectrum antibiotic (eg trimethoprim) is appropriate. Complicated UTI is usually best initially treated with a broad-spectrum antibiotic. If antibiotic sensitivities subsequently show a narrow-spectrum agent is appropriate, consideration should be given to changing medication to limit the risk of hospital-acquired infection. Table 1 provides a comparison of antibiotics commonly used for treating UTI in the UK.

Duration of treatment

There is good evidence that three-day courses of antibiotics are effective for patients with uncomplicated UTI.¹⁶ Courses of seven days or more are recommended for complicated UTI.⁴ Patients with a urinary catheter should have it changed prior to antibiotic treatment as this leads to more rapid improvement and less treatment failure.¹⁷ It also provides an opportunity to collect a sample of urine from the bladder that is less likely to be contaminated.

Prevention

Two small randomised trials have suggested topical oestrogens may reduce the risk of recurrent UTI. However, they are associated with poor patient concordance and are not recommended for long-term use, thus limiting any potential benefit. Long-term, low-dose antibiotics appear to

Key points

Urinary tract infection (UTI) is common in older people

Older people presenting non-specifically are often incorrectly diagnosed as having a UTI

Asymptomatic bacteriuria is common in frail older people and should not be treated

There is no reliable diagnostic test for UTI

The antibiotic chosen to treat UTI should have as narrow spectrum as possible and be prescribed for the shortest effective duration

KEY WORDS: diagnosis, frailty, older people, treatment, urinary tract infection

reduce the risk of UTI in young women but few data are available for older people.¹⁸ Concerns with this strategy include antibiotic side effects and colonisation with resistant organisms. Cranberry juice may be an alternative option, with effects that possibly impair the adherence of *E. coli* to epithelial cells,¹⁹ but a benefit has not yet been demonstrated in frail older people.

Arguably, the most important step in preventing unnecessary UTI is through limiting the use of urinary catheters. There is evidence that they are frequently

used inappropriately in older people and are associated with adverse outcomes, including longer lengths of hospital stay and higher mortality rates.²⁰ There is no convincing evidence that a particular catheter design is associated with a lower frequency of UTI.²¹

Conclusions

Older people are frequently diagnosed as having a UTI. Unfortunately they often present with non-specific illnesses without urinary tract symptoms. This

makes distinguishing a UTI from ASB challenging. Diagnosis depends on a comprehensive assessment rather than on a specific diagnostic test. Antibiotic use should be limited to the shortest effective duration with the narrowest spectrum agent. Urinary catheters should be inserted only when absolutely necessary and removed as soon as possible.

References

- 1 Ducharme J, Neilson S, Ginn JL. Can urine cultures and reagent test strips be used to diagnose urinary tract infection in elderly emergency department patients without focal urinary symptoms? *CJEM* 2007;9:87–92.
- 2 Baldassarre JS, Kaye D. Special problems of urinary tract infection in the elderly. *Med Clin N Am* 1991;75:375–90.
- 3 Nicolle LE. Urinary infections in the elderly: symptomatic or asymptomatic? *Int J Antimicrob Agents* 1999;11:265–8.
- 4 Scottish Intercollegiate Guideline Network (SIGN). *Management of suspected bacterial urinary tract infection in adults*. Guideline 88. 2006. www.sign.ac.uk/pdf/sign88.pdf
- 5 Nicolle LE, Mayhew WJ, Bryan L. Prospective randomized comparison of therapy and no therapy for asymptomatic bacteriuria in institutionalized elderly women. *Am J Med* 1987;83:27–33.
- 6 Abrutyn E, Berlin J, Mossey J *et al*. Does treatment of asymptomatic bacteriuria in older ambulatory women reduce subsequent symptoms of urinary tract infection? *J Am Geriatr Soc* 1996;44:293–5.
- 7 Barkham TM, Martin FC, Eykyn SJ. Delay in the diagnosis of bacteraemic urinary tract infection in elderly patients. *Age Ageing* 1996;25:130–2.

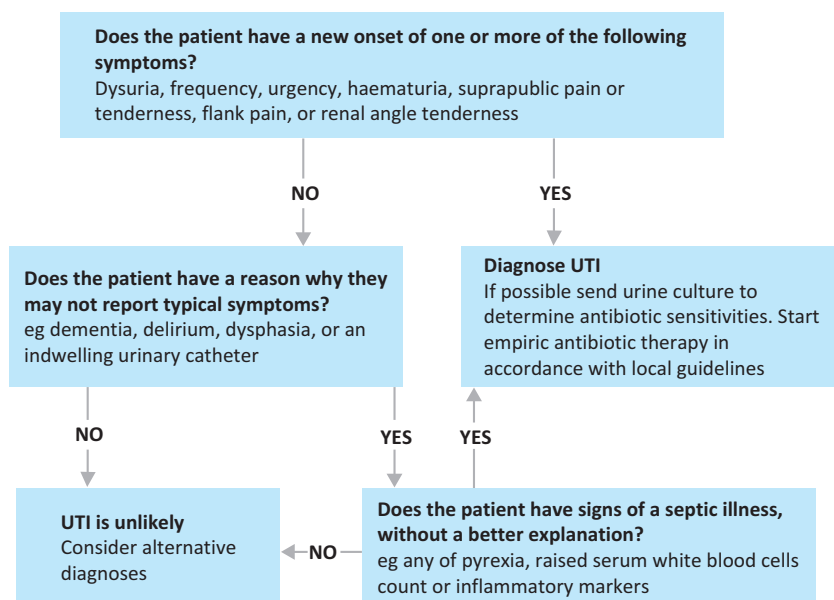


Fig 2. A suggested approach to the evaluation of an unwell older adult for suspected urinary tract infection (UTI). Reproduced with permission from Radcliffe Publishing.¹⁴

Table 1. A comparison of antibiotics commonly used to treat urinary tract infection in older adults in the UK (based on data from reference 8).

Antibiotic	Urinary tract infection		Comments
	Uncomplicated (organism sensitivity)	Complicated (organism sensitivity)	
Amoxicillin	Moderate	Low	High rates of resistance means usually unsuitable
Cephalosporins	High	Moderate	Higher risk of hospital-acquired infections
Ciprofloxacin	High	Moderate	Higher risk of hospital-acquired infections
Co-amoxiclav	High	High	Higher risk of hospital-acquired infections
Gentamicin	High	Moderate	Requires iv administration, potentially nephrotoxic
Nitrofurantoin	High	Moderate	Only effective in those with good renal function (avoid if eGFR <60 ml/min/1.73 m ²)
Trimethoprim	High	Low	Good initial choice in uncomplicated cases

Sensitivity definitions. Probabilities: high 75–100%, moderate 50–74%, low <50%. eGFR = estimated glomerular filtration rate; iv = intravenous.

- 8 Woodford HJ, George J. Diagnosis and management of urinary tract infection in hospitalized older people. *J Am Geriatr Soc* 2009;57:107–14.
- 9 Ronald A. The etiology of urinary tract infection: traditional and emerging pathogens. *Am J Med* 2002;113(Suppl 1A):14S–19S.
- 10 Ouslander JG, Schapira M, Fingold S, Schnelle J. Accuracy of rapid urine screening tests among incontinent nursing home residents with asymptomatic bacteriuria. *J Am Geriatr Soc* 1995;43:772–5.
- 11 McGeer A, Campbell B, Emori TG *et al*. Definitions of infection for surveillance in long-term care facilities. *Am J Infect Control* 1991;19:1–7.
- 12 Loeb M, Brazil K, Lohfeld L *et al*. Effect of a multifaceted intervention on number of antimicrobial prescriptions for suspected urinary tract infections in residents of nursing homes: cluster randomised controlled trial. *BMJ* 2005;331:669.
- 13 Juthani-Mehta M, Tinetti M, Perrelli E *et al*. Diagnostic accuracy of criteria for urinary tract infection in a cohort of nursing home residents. *J Am Geriatr Soc* 2007;55:1072–7.
- 14 Woodford HJ. *Essential geriatrics*, 2nd edn. Oxford: Radcliffe Publishing, 2010.
- 15 Wright SW, Wrenn KD, Haynes M, Haas DW. Prevalence and risk factors for multidrug resistant uropathogens in ED patients. *Am J Emerg Med* 2000;18:143–6.
- 16 Vogel T, Verreault R, Gourdeau M *et al*. Optimal duration of antibiotic therapy for uncomplicated urinary tract infection in older women: a double-blind randomized controlled trial. *CMAJ* 2004;170:469–73.
- 17 Raz R, Schiller D, Nicolle LE. Chronic indwelling catheter replacement before antimicrobial therapy for symptomatic urinary tract infection. *J Urol* 2000;164:1254–8.
- 18 Albert X, Huertas I, Pereiró I *et al*. Antibiotics for preventing recurrent urinary tract infection in non-pregnant women. *Cochrane Database Syst Rev* 2004;(3):CD001209.
- 19 McMurdo ME, Argo I, Phillips G, Daly F, Davey P. Cranberry or trimethoprim for the prevention of recurrent urinary tract infections? A randomized controlled trial in older women. *J Antimicrob Chemother* 2009;63:389–95.
- 20 Holroyd-Leduc JM, Sen S, Bertenthal D *et al*. The relationship of indwelling urinary catheters to death, length of hospital stay, functional decline, and nursing home admission in hospitalized older medical patients. *J Am Geriatr Soc* 2007;55:227–33.
- 21 Jahn P, Preuss M, Kernig A, Seifert-Hühmer A, Langer G. Types of indwelling urinary catheters for long-term bladder drainage in adults. *Cochrane Database Syst Rev* 2007;(3):004997.

Address for correspondence: Dr J George, Department of Elderly Medicine, Cumberland Infirmary, Carlisle CA2 7HY.
Email: jim.george@ncuh.nhs.uk

Working party report

Oral feeding difficulties and dilemmas

A guide to practical care, particularly towards the end of life

Endorsed by the Association of British Neurologists, the British Association for Parenteral and Enteral Nutrition, the British Dietetic Association, the British Geriatrics Society, the Royal College of Nursing, and the Royal College of Speech and Language Therapists

Feeding is basic to life, but it can also be an artificial medical procedure in the power of health professionals. Sometimes it causes dilemmas and strong differences of opinion between patients, relatives and professionals. This report addresses these fundamental issues.

It acknowledges the confusion and uncertainty that sometimes surround decision making and practice, including the difficulties of carrying out some of the technical interventions involved.

The report provides evidence-based guidance on the mechanisms and techniques of oral and artificial nutrition in health and disease. It sets out the ethical and legal concerns that provide the framework for decision making. Case studies then illustrate dilemmas and solutions, for example on deciding whether to withhold or provide artificial nutrition.

This report is essential reading for all those involved in caring for people who have nutritional and oral feeding difficulties, including gastroenterologists, ward nurses, geriatricians, dietitians, speech therapists, neurologists, care home and community nurses, as well as carers, families and the patients themselves. ■

Published: January 2010 ISBN: 978 1 86016 371 5
Price: £20.00 UK, £22.00 overseas (inc post and packing)



**Royal College
of Physicians**

10% discount for fellows and members

Quote the reference *Clinical Medicine* when making your order