



Clinical Practice Guideline

Urinary tract infections in elderly people outside hospitals

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Definitions

A urinary tract infection is defined as an infection anywhere in the urinary system, from the urethra to the kidneys. Cystitis is most common, with symptoms such as a burning sensation, frequent urination, suprapubic pain, and new or increasing urinary incontinence. Kidney infection (*pyelonephritis*) is a less common but more serious infection where symptoms can include fever, chills, back pain, and general symptoms such as nausea and vomiting. Kidney infections are not always accompanied by bladder symptoms. Urinary tract infections may also be associated with the use of urinary catheters.

Urinary tract infections are relatively common among older people. The annual prevalence of urinary tract infections among women aged 65 and over is about 10% and is even higher in women over the age of 85.(1) Urinary tract infections are also among the most common causes of hospital admissions for infections in older people, and a common reason for prescribing antibiotics.(2)

Increasing age, in and of itself, does not seem to be a risk factor for urinary tract infection becoming serious, but rather the general physical health of the person.(3) Therefore, an attempt is made to distinguish between urinary tract infections with **less and increased risk of complications/severe infections** (table 1).(4) Sex along with comorbidity and urinary catheter use are the most important risk factors. The vast majority of nursing home residents have chronic diseases and often significant functional impairment. Indwelling urinary catheters are also quite common in this population. They are also at a higher risk for infections caused by antibiotic-resistant pathogens and with a poor response to antibiotic treatment.

Table 1. Definitions of urinary tract infections among elderly people (>65 years).(5)

Definitions of urinary tract infections among older people	
Urinary tract infections with a lower risk of complications	Women: Healthy women >65 years <ul style="list-style-type: none"> • Living at home, self-sufficient, no bladder emptying difficulties.
Urinary tract infections with increased risk of complications/severe infections	Men: Everybody men >65 years Women >65 years with: <ul style="list-style-type: none"> • Recurrent urinary tract infections. • Bladder emptying difficulties and/or diseases of the urinary tract. • Indwelling urinary catheter. • Comorbidity/motor impairment. • Immunosuppression.

Recurrent urinary tract infections are defined as ≥ 3 infections in the last 12 months or 2 infections in the last 6 months.(6) Recurrent urinary tract infections are a challenge, both because of the discomfort for the affected person, but also because of the increased risk of serious infections and the risk of antibiotic resistance due to repeated antibiotic treatments.

Risk factors for recurrent urinary tract infections in older women include previous infections, menopause, sexual intercourse, diabetes, urinary incontinence, urinary retention, and bladder disease.(6, 7)

Urinary tract infections in **men** are less common and are often associated with diseases of the urinary tract, for example, prostate enlargement.(8)

The main **pathogens** associated with urinary tract infections in the community are *Escherichia coli* (75%–95%), other types of *Enterobacteriales* (e.g. *Proteus mirabilis* and *Klebsiella pneumoniae*), *Enterococcus* and *Staphylococcus saprophyticus*.(2, 9) It is therefore particularly important to consider the antibiotic resistance profile of Icelandic *E. coli* strains when selecting antibiotics. [The Department of Epidemiology and Virology](#) at Landspítali Hospital and the [Chief Epidemiologist](#) publish an annual summary of antibiotic resistance on their respective websites.

Asymptomatic bacteriuria in older people

Asymptomatic bacteriuria is common among older people, especially in people who live in nursing homes and who have multiple chronic diseases and functional impairment.(10) Table 2 shows the prevalence of bacteriuria in different groups.

Table 2. Prevalence of asymptomatic bacteriuria in selected groups.(11)

Population	Prevalence (%)
Older individuals in the community (≥ 70 years)	
Women	11–16
Men	4–19
Older individuals in institutions (≥ 70 years)	
Women	25–50
Men	15–50
Individuals with a urinary catheter	
Temporary	3–5
Indwelling	100

The criteria for asymptomatic bacteriuria include:

- Bacterial culture of mid-stream urine is positive; growth of ≥ 1 pathogen is $>100,000$ CFU/ml (*CFU: colony forming units*; number of bacterial colonies in culture)
- The individual does **not** have typical symptoms of a urinary tract infection (e.g., discomfort during urination, frequent urination, suprapubic pain, urinary incontinence).

According to the formal definition of asymptomatic bacteriuria in females, at least two positive urine cultures are required.

Asymptomatic bacteriuria is more common in females than in males. Other **risk factors** for asymptomatic bacteriuria include e.g. advanced age, residence in a nursing home, indwelling urinary catheter, post-menopausal vaginal dryness/atrophy, immunosuppression, functional impairment due to neurological disorders, impaired mobility, and diabetes.(12–14)

Asymptomatic bacteriuria in the elderly should not be treated with antibiotics, regardless of underlying health conditions or the presence of an indwelling urinary catheter. Studies show that treatment does not reduce morbidity or the likelihood of reinfection.(15–17) An exception to this would be scheduled urinary tract interventions with expected mucosal bleeding, or in the first six months after a kidney transplant.

Diagnostic urinalysis

Diagnosing simple cystitis in a healthy elderly individual follows essentially the same diagnostic process as in a healthy younger adult. The most important factor is the presence of current clinical symptoms and whether those symptoms indicate a urinary tract infection.(18)

All professionals must perform a careful assessment in the case of **general or vague symptoms** in frail elderly individuals. Keep in mind that various diseases and infections other than urinary tract infections can cause general symptoms of illness, such as weakness and fever.

Symptoms of cystitis include; discomfort during urination, frequent need to urinate, suprapubic pain, urinary incontinence, and visible hematuria. It should be noted that foul-smelling urine and altered urine colour are not considered clear symptoms of a urinary tract infection in the absence of other symptoms.

- Starting antibiotic treatment without further delay is often recommended if symptoms are **significant** and urine dipstick results indicate the presence of infection.
- In the case of **mild and new-onset** symptoms, immediate treatment with antibiotics may not be necessary. Analgesics are recommended for symptomatic treatment along with increased fluid intake. Symptoms should be re-evaluated within 24 hours.

Urine dipstick test

A urine dipstick test is a test based on colour indicators and is used to indicate the presence, and roughly estimate the amount of various elements in the urine such as; sugar (glucose), protein, nitrite, white blood cells, and red blood cells, along with pH.

- **White blood cells** in urine: The test measures esterase, an enzyme that is only found in white blood cells. The colour indicator of the strip is a semi-quantitative indicator of white blood cell concentration in the urine and receives a score from 0-4 depending on the intensity of the colour after a defined time.
- **Nitrite** in urine is shown on the indicator as 0/+ (present or absent). A positive test indicates pathogens in the urine that convert nitrates to nitrites. Only Gram-negative bacteria such as *E. coli* and *Klebsiella* have this property.

Colloquially between professionals, a urine dipstick test is called positive when white blood cells (*pyuria*) and/or nitrites are detected in the urine, but **red blood cells** in the urine can also indicate urinary tract infection. It is preferable to state exactly which substances/cells are detected in the urine. The predictive value of a positive test is highest when all these three factors are detected on a urine dipstick test. The negative predictive value of a urine dipstick test is high in all patient groups.(19, 20)

Due to the high prevalence of bacteriuria in nursing home residents and individuals with urinary catheters, the **positive predictive value** of a positive urine dipstick test is much lower than in healthy individuals (Table 2). Therefore, one should avoid relying too much on a positive urine dipstick test for this group. Clinical guidelines in England and Scotland have advised against urine dipstick testing in individuals >65 years of age, and other countries encourage caution in interpreting the test in this group.(21) Urine dipstick tests also have limited value in individuals with a urinary catheter.

Urine culture

If treatment with antibiotics is decided based on symptoms, treatment is usually started immediately, without waiting for the results of urine culture and antibiotic susceptibility tests.(21)

- Urine culture is **not necessary** in the case of cystitis in healthy individuals without risk factors, except for recurrent infections.
- Urine culture, along with antibiotic susceptibility testing, **should be done** in the presence of underlying risk factors or severe/recurrent infections.(22)
- **Kidney infection** is suspected: Urine can be sent to the Landspítali microbiology laboratory with the following comment on the form: "*Urine general culture obs pyelonephritis*" so the sample will be prioritized and more antibiotic susceptibility tests will be performed.

- Hematuria often requires further investigation, however, it may be necessary to take into account various factors, such as the underlying medical condition and treatment goals, when deciding whether to carry out burdensome tests.(23–25)

Special challenges

Collection of urine samples

Elderly individuals with cognitive impairment or urinary tract disorders may have difficulty submitting a mid-stream urine sample and may need assistance with sample collection. In certain cases, it may be appropriate to collect urine with a urinary catheter.(26) In general, it is not recommended to culture urine from diapers due to the risk of contamination.(27)

Individuals with cognitive impairment

It can be difficult to confidently assess the presence or absence of urinary tract symptoms in an elderly person with dementia or other **cognitive impairment**. As a result, it may not always be possible to base the diagnosis and treatment of urinary tract infections on the clinical presentation. **Individual assessment** is a key factor and the high prevalence of asymptomatic bacteriuria in elderly people must also be taken into account.(28, 29)

- Studies have not confirmed that antibiotics affect **nonspecific symptoms** such as delirium and decreased appetite in this population.
- However, antibiotics are recommended when bacteriuria is accompanied by **fever and other symptoms** of a serious infection.(11)

Individuals with a urinary catheter

Urinary tract infection in individuals with a urinary catheter (*urinary catheter-associated UTI, CAUTI*) is defined as symptoms of infection (such as fever, chills, weakness, pain, blood in the urine) that are not explained by other causes, along with an increase in urine **>100,000 CFU/mL**. It is difficult to diagnose urinary tract infections in individuals with indwelling urinary catheters, as the prevalence of bacteriuria is close to 100% (table 2) and localized symptoms from the urinary tract are often absent or difficult to interpret.(4, 10, 11)

The Infectious Diseases Society of America (IDSA) recommends the following diagnostic criteria for the diagnosis of urinary tract infections in individuals with urinary catheters:(11)

- In patients with an **indwelling** urinary catheter, several types of pathogens may be present in a urine culture, some in low numbers. Pathogens present in low numbers (low CFU counts) probably reflect microbes lining the urinary catheter (*biofilm*) and not infection. Here, the diagnostic criterion **>100,000 CFU/mL** is used to confirm bacteriuria in connection with urinary tract infection.

- However, lower CFU counts (≥ 100 than $< 100,000$ CFU/mL) in urine samples from an **intermittent** ("in and out") or from a **new** urinary catheter can indicate the presence of a urinary tract infection. However, the clinical significance of these lower parameters has not been fully studied.

Ideally, the urinary catheter should be replaced if symptoms of urinary tract infection are present and a urine sample taken with a new intermittent urinary catheter.

Treatment

Acute treatment

Antibiotic treatment without urine culture results is only recommended when clear symptoms are present. In other cases, it is recommended to wait for the result of the urine culture. Analgesics should be considered if symptoms warrant.(30) Unnecessary treatment with antibiotics can eliminate "beneficial" bacteria (normal microbial flora) and increase the likelihood of infections caused by antibiotic-resistant pathogens.

Guidelines for antibiotic treatment are presented in Table 3.(31) In Iceland, trimethoprim, pivmecillinam, or nitrofurantoin are recommended for **cystitis**. The usual length of treatment in the elderly is about 5–7 days. If a **kidney infection** is suspected an infectious disease specialist should be consulted.

Table 3. Treatment of urinary tract infections with antibiotics.

Diagnosis	Antibiotics
Cystitis	
Women	Nitrofurantoin 50mg x3 for 5 days* Mecillinam 200mg x3 for 5 days Trimetoprim 160mg x2 for 3 days
Men	Nitrofurantoin 50mg x3 for 7 days* Mecillinam 200mg x3 for 7 days Trimetoprim 160mg x2 for 7 days
Kidney infection**	
Mild	Ceftriaxone 2g x1 intravenously (single dose) or Gentamicin 3–5mg/kg intravenously (single dose) Then Trimethoprim/sulfa tablets 400/80mg 2 tablets x2 for 7 days
Serious	Ceftriaxone 2g x1 intravenously for 2 days (then re-evaluate) or Gentamicin 3-5mg/kg x1 intravenously for 2 days (then re-evaluate)

* Not recommended in the presence of renal failure.

*** Please consult an infectious disease specialist and re-evaluate antibiotic treatment based on the results of antibiotic susceptibility tests.*

Few studies have been published on the optimal **treatment duration** for urinary tract infections in elderly people. A common duration for cystitis is five days for older females and seven days for males. However, elderly people with underlying risk factors may need longer treatment. For kidney infection, a 10 to 14-day treatment is recommended.

Treatment with **nitrofurantoin** is not recommended in elderly people with impaired renal function due to the risk of pulmonary fibrosis. However, according to the guidelines of the American Geriatrics Society (AGS) from 2016, the drug is considered safe to use in older people with preserved kidney function and creatinine excretion >30 ml/min.(32)

Ciprofloxacin should only be used for urinary tract infections in exceptional cases, as serious side effects are associated with its use, as well as increased antibiotic resistance.(33–35) The World Health Organization (WHO) has classified ciprofloxacin as a critically important antibiotic that should only be used in selected cases.

In individuals with **indwelling urinary catheters**, urine cultures are almost always positive (asymptomatic bacteriuria, table 2) and urine dipstick tests are of limited utility. Urinary tract infection in individuals with a urinary catheter (*urinary catheter-associated UTI, CAUTI*) is defined as symptoms of infection (such as fever, chills, weakness, pain, blood in the urine) that are not explained by other causes, along with an increase in urine >100,000 CFU/mL. (see section Individuals with a urinary catheter). Antibiotic treatment should only be used when clinical signs and symptoms of urinary tract infection are present, and after the infected urinary catheter has been removed. After the urinary catheter has been removed, treatment with the following antibiotics can be started: Ceftriaxone 2g x1 IV for one day OR Gentamicin 3–5mg/kg x1 IV for two days. Further antibiotic treatment is subsequently determined based on the results of urine cultures and susceptibility tests, along with clinical symptoms. If an indwelling urinary catheter is still required, a new urinary catheter can be placed after antibiotic treatment has been started.

Occasionally, **bad-smelling** urine and **unusual colour** (blue or purple) are observed in individuals with a urinary catheter, causing concern and discomfort for the individual, relatives, and caregivers. Foul odours can even cause nausea and decreased appetite, along with other negative effects on the quality of life. A blue colour and foul odour may be associated with pathogens such as *Pseudomonas* and *Proteus*. In these circumstances, it is important to review the need for a urinary catheter and consider alternative options to an indwelling urinary catheter. Bladder irrigation may be considered. Antibiotics may be appropriate, but it is important to consider the results of susceptibility tests when selecting antibiotics. (36)

If **multiresistant pathogens** are present in urine culture, a consultation with an infectious disease specialist regarding antibiotic selection is preferable.

Recurrent urinary tract infections

In recurrent urinary tract infections, the presence of alternative underlying conditions that require treatment such as infections caused by pathogens not detected by conventional bacterial culture (e.g., chlamydia), postmenopausal atrophy of mucous membranes, or vaginitis (e.g., fungal infections) should be evaluated. Recurrent cystitis may also be associated with fistulas, cystic or vaginal prolapse.

Prophylactic treatment other than antibiotics

Studies have neither confirmed nor excluded the benefit of prophylactic treatment with **cranberries** for recurrent urinary tract infections.(37) The same applies to the prophylactic benefit of *Lactobacillus* **probiotics**.(38–40) More clinical studies are needed to address this issue.(41)

Postmenopausal topical estrogen therapy

Postmenopausal vaginal and urethral mucosal atrophy is one of the reasons why the risk of urinary tract infections increases with increasing age in females. Topical treatment with estrogen reduces vaginal and urethral dryness and strengthens mucosal protection. A meta-analysis of studies on the prophylactic effect of topical estrogen on urinary tract infections indicated a benefit of this therapy in postmenopausal women.(42) Recent guidelines of the American and European Associations of Urological Surgeons recommend topical estrogen therapy in postmenopausal women with recurrent UTIs.(43) Oral estrogen has not been shown to reduce the frequency of UTIs, but there is evidence of additional benefit from topical treatment in women taking oral estrogen.

Antibiotic prophylaxis

Antibiotic therapy is not recommended to prevent recurrent urinary tract infections except in exceptional cases.(44) One of the main reasons for this is that over time it can be assumed that antibiotic-resistant strains can become established, with the associated risk of the spread of antibiotic resistance.(45) With increased immunity, it is becoming increasingly difficult to treat infections requiring broad-spectrum and more expensive antibiotics and intravenous antibiotics may be necessary. Long-term treatment can also disturb the bacterial flora and increase the likelihood of infections caused by *Clostridium difficile*.

A review of **methenamine hippurate** (Haiprex) for the prevention of recurrent urinary tract infections indicated some benefits in the absence of urinary tract disease or neurogenic bladder.(46, 47) Methenamine may prevent recurrent urinary tract infections in this population.(48, 49) The recommended dose is 1g orally twice a day. Methenamine is not useful as prophylaxis in people with long-term indwelling urinary catheters.

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