NICE National Institute for Health and Care Excellence

NICE Pathways

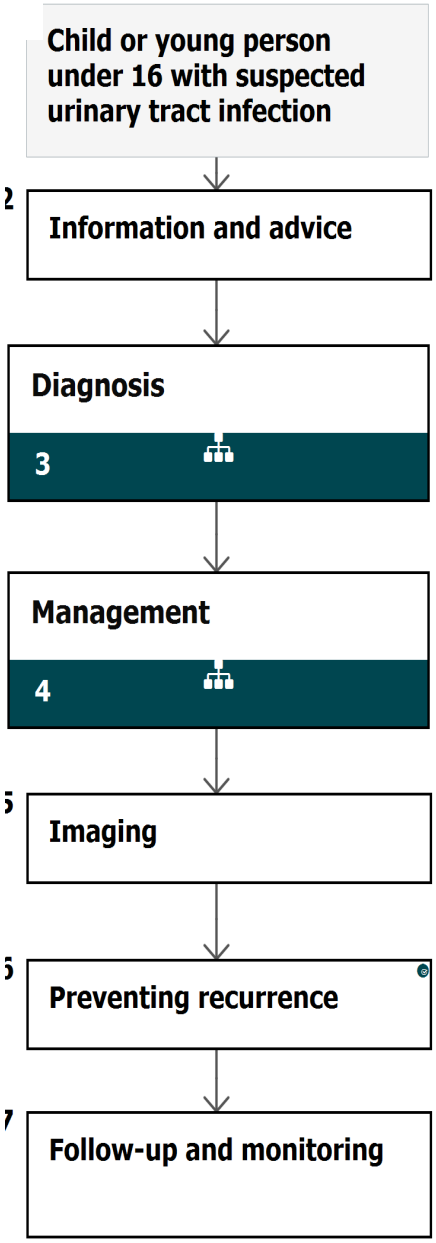
Urinary tract infections in children and young people under 16 years

NICE Pathways bring together everything NICE says on a topic in an interactive flowchart. NICE Pathways are interactive and designed to be used online.

They are updated regularly as new NICE guidance is published. To view the latest version of this NICE Pathway see:

http://pathways.nice.org.uk/pathways/urinary-tract-infections
NICE Pathway last updated: 14 February 2019

This document contains a single flowchart and uses numbering to link the boxes to the associated recommendations.



1 Child or young person under 16 with suspected urinary tract infection

No additional information

2 Information and advice

Healthcare professionals should ensure that when a child or young person has been identified as having a suspected UTI, they and their parents or carers as appropriate are given information about the need for treatment, the importance of completing any course of treatment and advice about prevention and possible long-term management.

Healthcare professionals should offer children and young people and/or their parents or carers appropriate advice and information on:

- prompt recognition of symptoms
- urine collection, storage and testing
- appropriate treatment options
- prevention
- the nature of and reason for any urinary tract investigation
- prognosis
- reasons and arrangements for long-term management if required.

NICE has written information for the public on urinary tract infection in under 16s.

3 Diagnosis

See Urinary tract infections / Diagnosing urinary tract infection in under 16s

4 Management

See Urinary tract infections / Management of urinary tract infection in under 16s

5 Imaging

Infants and children who have had a UTI should be imaged as outlined in the recommended

imaging schedules [See page 30].

Routine imaging to identify VUR is not recommended for infants and children who have had a UTI, except in specific circumstances.

The way in which the results of imaging will be communicated should be agreed with the parents or carers or the young person as appropriate.

Ultrasound

Infants and children with atypical UTI should have ultrasound of the urinary tract during the acute infection to identify structural abnormalities of the urinary tract such as obstruction, as outlined in the recommended imaging schedules [See page 30]. This is to ensure prompt management.

For infants younger than 6 months with first-time UTI that responds to treatment, ultrasound should be carried out within 6 weeks of the UTI, as outlined in the first table in the recommended imaging schedules [See page 30].

For infants and children aged 6 months and older with first-time UTI that responds to treatment, routine ultrasound is not recommended unless the infant or child has atypical UTI, as outlined in the second and third tables in the recommended imaging schedules [See page 30].

Infants and children who have had a lower UTI should undergo ultrasound (within 6 weeks) only if they are younger than 6 months or have had recurrent infections.

DMSA scan

A DMSA scan 4–6 months following the acute infection should be used to detect renal parenchymal defects.

If the infant or child has a subsequent UTI while awaiting DMSA, the timing of the DMSA should be reviewed and consideration given to doing it sooner.

MCUG

When an MCUG is performed, prophylactic antibiotics should be given orally for 3 days with MCUG taking place on the second day.

See what NICE says on sedation in children and young people.

6 Preventing recurrence

Healthcare professionals should ensure that children and young people, and their parents or carers as appropriate, are aware of the possibility of a UTI recurring and understand the need for vigilance and to seek prompt treatment from a healthcare professional for any suspected reinfection.

Children who have had a UTI should be encouraged to drink an adequate amount.

Children who have had a UTI should have ready access to clean toilets when required and should not be expected to delay voiding.

Dysfunctional elimination syndromes and constipation should be addressed in infants and children who have had a UTI.

See what NICE says on constipation.

Antibiotic prophylaxis

Antibiotic prophylaxis should not be routinely recommended in infants and children following first-time UTI.

Asymptomatic bacteriuria in infants and children should not be treated with prophylactic antibiotics.

See NICE's recommendations on antimicrobial stewardship and managing recurrent UTIs.

Quality standards

The following quality statement is relevant to this part of the interactive flowchart.

4. Information about recognising re-infection

7 Follow-up and monitoring

When to follow up

Infants and children who do not undergo imaging investigations should not routinely be followed up.

When results are normal, a follow-up outpatient appointment is not routinely required. Parents or carers should be informed of the results of all the investigations in writing.

Infants and children who are asymptomatic following an episode of UTI should not routinely have their urine re-tested for infection.

Asymptomatic bacteriuria is not an indication for follow-up.

Assessment

Infants and children who have recurrent UTI or abnormal imaging results should be assessed by a paediatric specialist.

Assessment of infants and children with renal parenchymal defects should include height, weight, blood pressure and routine testing for proteinuria.

Surgical management of vesicoureteric reflux

Surgical management of VUR is not routinely recommended.

Long-term follow-up and monitoring

Infants and children with a minor, unilateral renal parenchymal defect do not need long-term follow-up unless they have recurrent UTI or family history or lifestyle risk factors for hypertension.

Infants and children who have bilateral renal abnormalities, impaired kidney function, raised blood pressure and/or proteinuria should receive monitoring and appropriate management by a paediatric nephrologist to slow the progression of chronic kidney disease.

Rationale: self-care for lower UTIs

- Based on experience, the committee agreed that it was reasonable to advise people with lower UTI about using paracetamol for self-management of pain as this medicine has a well-established efficacy and safety profile.
- The committee agreed, based on evidence and experience, that it was also reasonable to advise people with lower UTI about using ibuprofen for self-management of pain if this was preferred and suitable, taking account of safety concerns with NSAIDs, for example renal impairment.
- Based on committee experience that dehydration is often cited as a cause of UTIs, the committee agreed that people should be advised about drinking enough fluids to avoid dehydration.
- No evidence was found for using cranberry products or alkalinising agents to treat lower UTI or asymptomatic bacteriuria. There was only evidence assessing the efficacy and safety of cranberry products for preventing asymptomatic bacteriuria in healthy pregnant women.

For more information see self-care in the NICE guideline on urinary tract infection (lower): antimicrobial prescribing.

Catheter-associated UTI

Catheter-associated UTI is defined as the presence of symptoms or signs compatible with a UTI in people with a catheter with no other identified source of infection plus significant levels of bacteria in a catheter or a midstream urine specimen when the catheter has been removed within the previous 48 hours (adapted from Infectious Diseases Society of America's guideline on catheter-associated UTI [2009]).

Rationale: self-care for upper UTIs

- There was no evidence for the use of oral analgesia in acute pyelonephritis. However, paracetamol has a well-established efficacy and safety profile for managing pain. The committee agreed that it was reasonable to advise people about paracetamol for self-management of pain. A low-dose weak opioid, such as codeine, could be taken with paracetamol by adults and young people over 12 years for more severe pain.
- Non-steroidal anti-inflammatory drugs, such as ibuprofen, are generally not recommended for people with acute pyelonephritis because of concerns about renal safety.
- The committee discussed the need for an adequate intake of fluids to ensure a high urine output, which is believed to help resolve acute pyelonephritis through a mechanical flushing of bacteria from the kidney. No evidence was found for this and there was no evidence of what constitutes adequate hydration. However, based on committee experience that dehydration is often cited as a cause of UTIs, the committee agreed that people should be

- advised about drinking enough fluids to avoid dehydration.

For more information see self-care in the NICE guideline on pyelonephritis (acute): antimicrobial prescribing.

Recurrent UTI

Recurrent UTI in adults is defined as repeated UTI with a frequency of 2 or more UTIs in the last 6 months or 3 or more UTIs in the last 12 months (European Association of Urology (EAU) guidelines on urological infections [2017]).

Recurrent UTI is diagnosed in children and young people under 16 years if they have:

- 2 or more episodes of UTI with acute pyelonephritis/upper UTI **or**
- 1 episode of UTI with acute pyelonephritis plus 1 or more episode of UTI with cystitis/lower UTI **or**
- 3 or more episodes of UTI with cystitis/lower UTI.

Antibiotics for children and young people under 16 years with catheter-associated UTI

Antibiotic[1]	Dosage and course length[2]
Children under 3 months	
Refer to paediatric specialist and treat with intravenous antibiotics in line with the NICE recommendations on fever in under 5s.	
Children aged 3 months and over	
First-choice oral antibiotics[3]	
Trimethoprim – if low risk of resistance[4]	3 to 5 months, 4 mg/kg (maximum 200 mg per dose) or 25 mg twice a day for 7 to 10 days

	6 months to 5 years, 4 mg/kg (maximum 200 mg per dose) or 50 mg twice a day for 7 to 10 days 6 to 11 years, 4 mg/kg (maximum 200 mg per dose) or 100 mg twice a day for 7 to 10 days 12 to 15 years, 200 mg twice a day for 7 to 10 days
Amoxicillin (only if culture results available and susceptible)	3 to 11 months, 125 mg three times a day for 7 to 10 days 1 to 4 years, 250 mg three times a day for 7 to 10 days 5 to 15 years, 500 mg three times a day for 7 to 10 days
Cefalexin	3 to 11 months, 12.5 mg/kg or 125 mg twice a day for 7 to 10 days (25 mg/kg two to four times a day [maximum 1 g per dose four times a day] for severe infections) 1 to 4 years, 12.5 mg/kg twice a day or 125 mg three times a day for 7 to 10 days (25 mg/kg two to four times a day [maximum 1 g per dose four times a day] for severe infections) 5 to 11 years, 12.5 mg/kg twice a day or 250 mg three times a day for 7 to 10 days (25 mg/kg two to four times a day [maximum 1 g per dose four times a day] for severe infections) 12 to 15 years, 500 mg twice or three times a day (up to 1 to 1.5 g three or four times a day for severe infections) for 7 to 10 days
Co-amoxiclav (only if culture results available and susceptible)	3 to 11 months, 0.25 ml/kg of 125/31 suspension three times a day for 7 to 10 days (dose doubled in severe infection) 1 to 5 years, 0.25 ml/kg of 125/31 suspension or 5 ml of 125/31 suspension three times a day for 7 to 10 days (dose doubled in severe infection)

	6 to 11 years, 0.15 ml/kg of 250/62 suspension or 5 ml of 250/62 suspension three times a day for 7 to 10 days (dose doubled in severe infection) 12 to 15 years, 250/125 mg or 500/125 mg three times a day for 7 to 10 days
First-choice intravenous antibiotic (if vomiting, unable to take oral antibiotics or severely unwell). Antibiotics may be combined if susceptibility or sepsis a concern[3,5,6]	
Co-amoxiclav (only in combination unless culture results confirm susceptibility)	3 months to 15 years, 30 mg/kg three times a day (maximum 1.2 g three times a day)
Cefuroxime	3 months to 15 years, 20 mg/kg three times a day (maximum 750 mg per dose); (50 to 60 mg/kg three or four times a day [maximum 1.5 g per dose] for severe infections)
Ceftriaxone	3 months to 11 years (up to 50 kg), 50 to 80 mg/kg once a day (maximum 4 g per day) 9 to 11 years (50 kg and above), 1 to 2 g once a day 12 to 15 years, 1 to 2 g once a day
Gentamicin	Initially 7mg /kg once a day, subsequent doses adjusted according to serum gentamicin concentration[7]
Amikacin	Initially 15 mg/kg once a day, subsequent doses adjusted according to serum amikacin concentration[7]
Second choice intravenous antibiotic	

Consult local microbiologist
[1] See BNF for children (BNFC) for appropriate use and dosing in specific populations, for example, hepatic impairment and renal impairment, and administering intravenous antibiotics. See the table on antibiotics for pregnant women aged 12 years and over with catheter-associated UTI [See page 17] if a young woman is pregnant. [2] The age bands apply to children of average size and, in practice, the prescriber will use the age bands in conjunction with other factors such as the severity of the condition being treated and the child's size in relation to the average size of children of the same age. [3] Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly. If a child or young person is receiving prophylactic antibiotics, treatment should be with a different antibiotic, not a higher dose of the same antibiotic. [4] A lower risk of resistance is likely if not used in the past 3 months, previous urine culture suggests susceptibility (but this was not used), and in younger people in areas where local epidemiology data suggest resistance is low. A higher risk of resistance is likely with recent use. [5] Review intravenous antibiotics by 48 hours and consider stepping down to oral antibiotics where possible for a total antibiotic course of 10 days. [6] If intravenous treatment is not possible, consider intramuscular treatment if suitable. [7] Therapeutic drug monitoring and assessment of renal function is required (BNFC, August 2018).

Rationale: antibiotics for lower UTIs

- The committee recognised the equality considerations for managing a lower UTI in transgender people, due to anatomical differences between women and men.

Non-pregnant women with lower UTI

- Based on evidence and experience, the committee agreed that either a back-up antibiotic

- prescription or an immediate antibiotic prescription could be prescribed for non-pregnant women with a lower UTI. The committee discussed that sending a urine sample for culture and susceptibility testing is not usual practice in most young, non-pregnant women with a first lower UTI. Lower UTI is generally confirmed by symptoms and signs of infection together with dipstick testing of urine for some people. If urine culture has been taken, delaying the antibiotic until microbiological results are available could also be considered, depending on the severity of symptoms. Decisions around prescribing strategies should be individualised, taking account of the severity of symptoms, the risk of developing complications or having treatment failure, and preference for back-up or immediate antibiotics, or awaiting the results of urine culture.
- The committee discussed that the evidence for back-up prescribing was only in non-pregnant women aged 18 to 70 years (mean age of 39 to 45 years) with, on average, moderate symptoms of an acute uncomplicated lower UTI, where immediate antibiotic treatment was not necessary. In this population, back-up empirical antibiotics were as effective as immediate empirical antibiotics for the severity or duration of UTI symptoms and the time to reconsultation. Back-up antibiotics (particularly a forward dated prescription) also reduced antibiotic use.
- The committee agreed that a back-up antibiotic prescription could be used if symptoms do not start to improve within 48 hours (by which point most UTIs should be starting to improve) or if they worsen at any time.
- Based on evidence, the committee agreed that antibiotics were effective in curing lower UTI symptoms and reducing relapse in non-pregnant women, but increased adverse events. There was no significant difference between antibiotics and placebo for the development of pyelonephritis (a complication of lower UTI). However, due to the very low incidence of pyelonephritis, it is likely the studies lacked statistical power to detect a clinically important difference.
- Based on experience, the committee agreed that if a urine culture has been taken, and results suggest the bacteria are resistant to the antibiotic given, the woman should be contacted and the antibiotic changed if symptoms are not already improving. The committee agreed that for non-pregnant women where 3-day courses of antibiotics are given, only changing antibiotics according to susceptibility results if symptoms are not already improving is appropriate. Often, susceptibility results may not be back before short courses are nearly completed, and because of differences between the in vitro and in vivo effectiveness of antibiotics, susceptibility results may not always be accurate. For some populations, where symptoms of the UTI are already improving, an additional course of antibiotics may be unnecessary treatment.

Pregnant women and men with a lower UTI

- The committee discussed that no evidence was identified on antibiotic treatment for pregnant women with a symptomatic lower UTI. However, evidence in pregnant women with asymptomatic bacteriuria showed that antibiotics were effective in reducing persistent bacteriuria, pyelonephritis and the delivery of a preterm baby.
- Based on limited evidence and experience, the committee agreed that pregnant women

- with a lower UTI should be offered an immediate antibiotic, and urine should be sent for culture to confirm susceptibility of the bacteria and inform treatment choice.
- Based on experience, the committee agreed that when results of urine cultures are available, if the results suggest the bacteria are resistant to the antibiotic given, pregnant woman should be contacted and the antibiotic changed regardless of whether symptoms are improving or not. The committee agreed there was a greater risk from UTIs in pregnant women and antibiotics should be changed to ensure cure.
- The committee discussed that no evidence was identified on antibiotic treatment for men with a lower UTI, apart from 1 systematic review where about 10% of the study population were men.
- Based on experience, the committee agreed that men with a lower UTI should be offered an immediate antibiotic, and urine should be sent for culture to confirm susceptibility of the bacteria and inform treatment choice.
- Based on experience, the committee agreed that when results of urine cultures are available, if the results suggest the bacteria are resistant to the antibiotic given, men should be contacted and, if symptoms are not already improving, the antibiotic should be changed. The committee agreed that for men, only changing antibiotics according to susceptibility results if symptoms are not already improving is appropriate. Often, susceptibility results may not be back for some days, and because of differences between the in vitro and in vivo effectiveness of antibiotics, susceptibility results may not always be accurate. For some populations, where symptoms of the UTI are already improving, an additional course of antibiotics may be unnecessary treatment.

Children and young people with a lower UTI

- The committee was aware that the NICE guideline on urinary tract infection in under 16s makes recommendations on diagnosing lower UTIs (including the use of dipsticks and urine culture).
- Based on experience, the committee agreed that if a urine culture has been taken, and results suggest the bacteria are resistant to the antibiotic given, the child or young person should be contacted and, if symptoms are not already improving, the antibiotic changed. The committee agreed that for children and young people where 3-day courses of antibiotics are given, only changing antibiotics according to susceptibility results if symptoms are not already improving is appropriate. Often, susceptibility results may not be back before short courses are nearly completed, and because of differences between the in vitro and in vivo effectiveness of antibiotics, susceptibility results may not always be accurate. For some populations, where symptoms of the UTI are already improving, an additional course of antibiotics may be unnecessary treatment.

For more information see antibiotics in the NICE guideline on urinary tract infection (lower): antimicrobial prescribing.

Rationale: choice of antibiotics for upper UTIs

- Based on evidence and experience, the committee agreed that acute pyelonephritis is a bacterial infection needing treatment with antibiotics that reach therapeutic concentrations in the kidney. Antibiotics that don't achieve adequate levels in renal tissue, such as nitrofurantoin, fosfomycin and pivmecillinam, are to be avoided.
- A urine sample should be sent for culture to confirm susceptibility of the bacteria and inform treatment choice.
- The committee reviewed the available evidence comparing different antibiotics in adults and children and agreed that it was limited by its setting (most studies in adults were undertaken in a hospital, and in children the setting of the studies was not reported). The studies included various different antibiotics, which may not reflect those chosen in UK practice. The committee discussed the evidence for a benefit of the intravenous third-generation cephalosporins, ceftolozane/tazobactam or ceftazidime, over an intravenous fluoroquinolone, but this was mainly limited to a benefit for composite cure (which included clinical cure, microbiological eradication and microbiological cure) and the absolute benefits were small.
- The committee agreed, based on experience, that several oral and intravenous antibiotics should be available for people with acute pyelonephritis. This enables antibiotics to be selected based on the severity of illness, antibiotic susceptibilities from culture results when available, local resistance patterns, risk of resistant bacteria, the setting, and known patient factors (such as whether the person has a higher risk of developing complications). In line with antimicrobial stewardship, narrower-spectrum antibiotics should be used wherever possible.
- Nationally for England, resistance of *E. coli* (the main causative organism of acute pyelonephritis) in laboratory-processed urine specimens to the following antibiotics is:
    - cefalexin: 9.9% (varies by area from 8.1 to 11.4%)
    - ciprofloxacin: 10.6% (varies by area from 7.8 to 13.7%)
    - co-amoxiclav: 19.8% (varies by area from 10.8 to 30.7%)
    - trimethoprim: 30.3% (varies by area from 27.1 to 33.4%)

(Public Health England. Antimicrobial resistance quarterly surveillance: March 2018)

- The committee also discussed that prescribers should be aware of their local antimicrobial prescribing data, because resistance rates do vary by area.
- The committee agreed that any recent previous urine culture and susceptibility results, and antibiotic prescribing, should be reviewed before choosing an antibiotic.
- Based on experience, the committee agreed that if the results of urine culture suggest the bacteria are resistant to the antibiotic given, people with acute pyelonephritis should be contacted and the antibiotic changed regardless of whether symptoms are improving or not. The committee agreed that acute pyelonephritis is a serious infection and antibiotics should be changed to ensure cure.

Non-pregnant women and men with acute pyelonephritis

- Based on evidence, their experience and resistance data, the committee agreed to recommend a choice of first-line **oral antibiotics**, at usual doses for acute pyelonephritis. These are:
    - **cefalexin** (a first-generation cephalosporin); based on its broad spectrum of activity and acceptable levels of resistance
    - **co-amoxiclav** (a penicillin with a beta-lactamase inhibitor); which is only suitable if culture results are available and bacteria are susceptible, because resistance rates are high
    - **trimethoprim**; which is only suitable if culture results are available and bacteria are susceptible, because resistance rates are high
    - **ciprofloxacin** (a fluoroquinolone); based on its broad spectrum of activity and acceptable levels of resistance (particularly for people who have had previous treatment with penicillins, or cannot tolerate or are allergic to penicillins).
- The committee noted that use of broad-spectrum antibiotics, such as later-generation cephalosporins, fluoroquinolones or co-amoxiclav, can create a selective advantage for bacteria resistant to these second-line broad-spectrum agents, allowing such strains to proliferate and spread. And, by disrupting normal flora, broad-spectrum antibiotics can leave people susceptible to harmful bacteria such as *Clostridium difficile* in community settings. However, these antibiotics are appropriate for the empirical treatment of acute pyelonephritis, where coverage of more resistant strains of common bacterial pathogens is required.
- The committee was aware of the European Medicines Agency's Pharmacovigilance Risk Assessment Committee recommendation to restrict the use of fluoroquinolone antibiotics following a review of disabling and potentially long-lasting side effects mainly involving muscles, tendons and bones and the nervous system. However, they discussed that fluoroquinolone antibiotics are a valuable option for the treatment of acute pyelonephritis, which is a severe infection. Resistant gram-negative organisms are a particular concern in acute pyelonephritis. The committee agreed that ciprofloxacin should remain a first-choice option because gram-negative organisms are likely to be sensitive to it and acute pyelonephritis can be a complex infection. The committee was keen to point out, however, that cefalexin, co-amoxiclav and trimethoprim are also first-choice options, and antibiotics should be chosen on an individual patient basis, taking fluoroquinolone safety concerns, as well as susceptibility and resistance, into account.
- Based on evidence, experience and resistance data, the committee agreed to recommend a choice of first-line **intravenous antibiotics**, at usual doses, for people with acute pyelonephritis who are unable to take oral antibiotics due to vomiting, or are more severely unwell. These are:
    - **co-amoxiclav** (only in combination or if culture results are available and bacteria are susceptible)
    - **cefuroxime** (a second-generation cephalosporin) or **ceftriaxone** (a third-

- – generation cephalosporin)
  - **ciprofloxacin** (taking safety concerns into account)
  - **gentamicin** or **amikacin** (aminoglycosides); which may be appropriate for some people with acute pyelonephritis, particularly those with severe infection or sepsis, but that efforts should be made to identify the causal bacteria and use reviewed at 48 hours. Gentamicin is the preferred aminoglycoside in the UK, but shortages of certain antibiotics may result in the use of alternatives; for example amikacin in place of gentamicin.
- The committee agreed, based on experience, that it may be necessary to combine antibiotics in the care of people with suspected sepsis. This should be done according to local policy or on the advice of a microbiologist, taking into account local antimicrobial resistance data.

Pregnant women with acute pyelonephritis

- Based on experience and resistance data, the committee agreed to recommend **cefalexin** (a first-generation cephalosporin) as the first-choice oral antibiotic for pregnant women who don't require intravenous antibiotics, and **cefuroxime** (a second-generation cephalosporin) as the first-choice intravenous antibiotic.
- Ciprofloxacin and trimethoprim are not recommended because they should be avoided in pregnancy. Co-amoxiclav was not recommended because of high resistance levels nationally and the risks of treatment failure in pregnancy.
- The committee agreed, based on experience, that local microbiologists should be consulted for advice on second-choice antibiotics, or combining antibiotics if susceptibility or sepsis is a concern.

Children and young people with acute pyelonephritis

- The committee was aware that the NICE guideline on urinary tract infection in under 16s makes recommendations on diagnosing acute pyelonephritis and considering referral to a paediatric specialist.
- Based on evidence, their experience and resistance data, the committee agreed to recommend **cefalexin** or **co-amoxiclav** (only if culture results are available and bacteria are susceptible) at usual doses for acute pyelonephritis, as first-choice **oral antibiotics**.
- Based on evidence, experience and resistance data, the committee agreed to recommend a choice of first-line **intravenous antibiotics**, at usual doses, for children and young people who are unable to take oral antibiotics due to vomiting, or are more severely unwell. These are:

  – **co-amoxiclav** (only in combination or if culture results are available and bacteria are susceptible); which can be given intravenously

  – **cefuroxime** (a second-generation cephalosporin) or **ceftriaxone** (a third-generation

- cephalosporin); which would be suitable alternatives to co-amoxiclav

  – **gentamicin** or **amikacin** (aminoglycosides); which may be appropriate for some children and young people with acute pyelonephritis, particularly those with severe infection or sepsis, but that efforts should be made to identify the causal bacteria and use reviewed at 48 hours.

- The committee agreed, based on experience, that it may be necessary to combine antibiotics in the care of children and young people with suspected sepsis. This should be done according to local policy or on the advice of a microbiologist, taking into account local antimicrobial resistance data.

For more information see choice of antibiotic in the NICE guideline on pyelonephritis (acute): antimicrobial prescribing.

Antibiotics for pregnant women aged 12 years and over with catheter-associated UTI

Antibiotic[1]	Dosage and course length
First-choice oral antibiotic[2]	
Cefalexin	500 mg twice or three times a day (up to 1 to 1.5 g three or four times a day for severe infections) for 7 to 10 days
First-choice intravenous antibiotic (if vomiting, unable to take oral antibiotics, or severely unwell)[2,3]	
Cefuroxime	750 mg to 1.5 g three or four times a day
Second-choice antibiotics or combining antibiotics if susceptibility or sepsis a concern	
Consult local microbiologist	

[1] See BNF for appropriate use and dosing in specific populations, for example, hepatic impairment and renal impairment, and administering intravenous antibiotics.

[2] Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly.

[3] Review intravenous antibiotics by 48 hours and consider stepping down to oral antibiotics where possible.

Antibiotics for non-pregnant women and men aged 16 years and over with catheter-associated UTI

Antibiotic[1]	Dosage and course length
First-choice oral antibiotic if no upper UTI symptoms[2]	
Nitrofurantoin – if eGFR ≥45 ml/minute[3,4]	100 mg modified-release twice a day for 7 days
Trimethoprim – if low risk of resistance[5]	200 mg twice a day for 7 days
Amoxicillin (only if culture results available and susceptible)	500 mg three times a day for 7 days
Second-choice oral antibiotic if no upper UTI symptoms (when first-choice not suitable)[2]	
Pivmecillinam (a penicillin)[4]	400 mg initial dose, then 200 mg three times a day for a total of

	7 days
First-choice oral antibiotic if upper UTI symptoms[2]	
Cefalexin	500 mg twice or three times a day (up to 1 to 1.5 g three or four times a day for severe infections) for 7 to 10 days
Co-amoxiclav (only if culture results available and susceptible)	500/125 mg three times a day for 7 to 10 days
Trimethoprim (only if culture results available and susceptible)	200 mg twice a day for 14 days
Ciprofloxacin (consider safety issues[6])	500 mg twice a day for 7 days
First-choice intravenous antibiotic (if vomiting, unable to take oral antibiotics or severely unwell). Antibiotics may be combined if susceptibility or sepsis a concern[2,7]	
Co-amoxiclav (only in combination, unless culture results confirm susceptibility)	1.2 g three times a day
Cefuroxime	750 mg to 1.5 g three or four times a day
Ceftriaxone	1 to 2 g once a day
Ciprofloxacin (consider safety issues[6])	400 mg twice or three times a day

Gentamicin	Initially 5 to 7 mg/kg once a day, subsequent doses adjusted according to serum gentamicin concentration[8]
Amikacin	Initially 15 mg/kg once a day (maximum per dose 1.5 g once a day), subsequent doses adjusted according to serum amikacin concentration (maximum 15 g per course)[8]
Second-choice intravenous antibiotic	
Consult local microbiologist	

[1] See BNF for appropriate use and dosing in specific populations, for example, hepatic impairment, renal impairment and breastfeeding, and administering intravenous antibiotics.

[2] Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly.

[3] May be used with caution if eGFR 30–44 ml/minute to treat uncomplicated lower UTI caused by suspected or proven multidrug-resistant bacteria and only if potential benefit outweighs risk (BNF, August 2018).

[4] Nitrofurantoin and pivmecillinam are only licensed for uncomplicated lower UTIs, and are not suitable for people with upper UTI symptoms or a blocked catheter.

[5] A lower risk of resistance is likely if not used in the past 3 months, previous urine culture suggests susceptibility (but this was not used), and in younger people in areas where local epidemiology data suggest resistance is low. A higher risk of resistance is likely with recent use and in older people in care homes.

[6] The European Medicines Agency's Pharmacovigilance Risk Assessment Committee has recommended restricting the use of fluoroquinolone antibiotics following a review of disabling and potentially long-lasting side effects mainly involving muscles, tendons, bones and the nervous system (press release October 2018), but they are an option in catheter-associated

UTI with upper UTI symptoms, which is a severe infection.

[7] Review intravenous antibiotics by 48 hours and consider stepping down to oral antibiotics where possible.

[8] Therapeutic drug monitoring and assessment of renal function is required (BNF, August 2018).

Rationale: antibiotic prophylaxis for preventing catheter-associated UTI

- The committee discussed the evidence on antibiotic prophylaxis for catheter-associated UTI in various populations.
- Based on evidence, their experience and resistance data, the committee agreed that antibiotic prophylaxis should not be routinely offered to people with a **long-term (indwelling or intermittent) catheter**.
    - The benefit of antibiotic prophylaxis for symptomatic bacteriuria was mixed.
    - The committee noted that although there was evidence of benefit (reduced rate of UTIs per year) from 1 RCT in adults who used intermittent self-catheterisation and had recurrent UTI, there was also evidence of increasing antibiotic resistance in the microorganisms found in the group taking antibiotics for prophylaxis. The committee discussed that routine antibiotic prophylaxis would be a change in practice, which is not warranted because of increasing resistance. Decisions around prophylaxis for people who self-catheterise and have recurrent UTIs may, however, be made on an individual basis, with shared decision-making and a discussion of the risks and benefits.
    - The committee discussed that people should be advised to seek medical help if symptoms of a UTI develop, which would be managed as an acute UTI, rather than people receiving long-term antibiotic prophylaxis.
    - The committee was aware of recommendations in the NICE guideline on healthcare-associated infections that antibiotic prophylaxis should not be offered routinely when changing long-term indwelling catheters, but should be considered for people with a history of symptomatic UTI after catheter change or an experience of trauma (frank haematuria after catheterisation or 2 or more attempts of catheterisation). The committee for the healthcare-associated infections guideline agreed that for these groups, the benefits of antibiotic prophylaxis outweigh the risks of antimicrobial resistance. These groups are likely to be at high risk of a UTI and at risk of complications if a UTI develops.
- Based on evidence, the committee agreed not to recommend routine antibiotic prophylaxis to prevent catheter-associated UTI in people with a short-term catheter in hospital.

- Prophylaxis is not recommended routinely before insertion of a short-term catheter for surgical, non-surgical or urodynamic procedures, while the catheter is in place, or at the time of removal.
    - Before or during short-term catheterisation, there is only limited evidence of benefit with antibiotic prophylaxis for symptomatic bacteriuria in surgical patients.
    - During short-term catheterisation for urodynamic studies, antibiotic prophylaxis did not reduce episodes of symptomatic UTI.
    - At the time of catheter removal, there is evidence of benefit for antibiotic prophylaxis for symptomatic UTI, but in subgroup analysis this was limited to surgical patients, and predominantly those who had either prostate surgery or had a catheter in place for longer than 5 days. The committee discussed that antibiotic prophylaxis for all short-term catheter removal in hospital would be a change in practice, and widespread prophylaxis is not warranted taking into account the principles of antimicrobial stewardship.

For more information see antibiotic prophylaxis for preventing catheter-associated UTI in the NICE guideline on urinary tract infection (catheter-associated): antimicrobial prescribing.

Antibiotics for pregnant women aged 12 years and over

When prescribing an antibiotic for acute pyelonephritis, take account of local antimicrobial resistance data and follow the table below for pregnant women aged 12 years and over.

Antibiotic[1]	**Dosage and course length**
First-choice oral antibiotic[2]	
Cefalexin	500 mg twice or three times a day (up to 1 to 1.5 g three or four times a day for severe infections) for 7 to 10 days
First-choice intravenous antibiotic (if vomiting, unable to take oral antibiotics, or severely unwell)[2,3]	
Cefuroxime	750 mg to 1.5 g three or four times a day
Second-choice antibiotics or combining antibiotics if susceptibility or sepsis a concern	

Consult local microbiologist
[1] See BNF for appropriate use and dosing in specific populations, for example, hepatic impairment and renal impairment, and administering intravenous antibiotics. [2] Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly. [3] Review intravenous antibiotics by 48 hours and consider stepping down to oral antibiotics where possible.

Rationale: antibiotics for managing catheter-associated UTI

- Based on evidence and experience, the committee agreed that people with a symptomatic catheter-associated UTI should be offered an antibiotic.
- Urine should be sent for culture to confirm susceptibility of the bacteria and inform treatment decisions. The committee discussed and agreed that a comment should be added to the microbiology request form to alert the laboratory to a suspected catheter-associated infection and the name of any antibiotic prescribed.
- The committee agreed that the evidence for antibiotic treatment for catheter-associated UTI specifically was limited, but that evidence for antibiotic treatment for acute pyelonephritis could be extrapolated. The evidence for acute pyelonephritis included some people with complicated UTI, some of whom had a catheter (see the NICE guideline on acute pyelonephritis: antimicrobial prescribing).
- Limited evidence suggested that catheters should be removed or changed before antibiotics are given, but the committee discussed safety concerns with this approach and practical considerations about possible delays in primary care settings. They agreed that catheter removal or change should not delay treatment with antibiotics. The longer a catheter is in place, the more likely bacteria will be found in the urine, and the committee agreed that catheters should be removed rather than changed, where possible. Changing the catheter is based on evidence from 1 small RCT, which found higher cure or improvement rates and reduced mortality (from urosepsis) when the catheter was changed before starting antibiotics. The committee based when to remove or change the catheter (after 7 days) on their experience.
- Based on evidence and experience, the committee agreed that screening and antibiotic treatment for asymptomatic bacteriuria is not routine in people with a catheter because it is not generally a risk factor for harm. Pregnant women (including those with a catheter) have routine screening and antibiotic treatment for asymptomatic bacteriuria because it is a risk factor for pyelonephritis and preterm labour.

Committee discussion on choice of antibiotic

- The committee agreed, based on evidence, experience and resistance data, that several oral and intravenous antibiotics should be available for people with a catheter-associated UTI. Having a choice enables antibiotics to be selected based on the severity of illness, presence or absence of upper UTI symptoms, antibiotic susceptibilities from culture results when available, local resistance patterns, risk of resistant bacteria, setting and known patient factors. In line with antimicrobial stewardship, narrower-spectrum antibiotics should be used wherever possible.
- Nationally for England, resistance of *E. coli* (the main causative organism of UTIs) in laboratory-processed urine specimens to the following antibiotics is:
    - nitrofurantoin: 2.5% (varies by area from 2.0 to 3.6%)
    - trimethoprim: 30.3% (varies by area from 27.1 to 33.4%)
    - pivmecillinam: 7.5% (varies by area from 4.1 to 15.7%)
    - cefalexin: 9.9% (varies by area from 8.1 to 11.4%)
    - ciprofloxacin: 10.6% (varies by area from 7.8 to 13.7%)
    - co-amoxiclav: 19.8% (varies by area from 10.8 to 30.7%)

(Public Health England. Antimicrobial resistance quarterly surveillance: March 2018)

- The committee also discussed that prescribers should be aware of their local antimicrobial prescribing data, because resistance rates do vary by area.
- The committee agreed that any recent previous urine culture and susceptibility results, and antibiotic prescribing, should be reviewed before choosing an antibiotic.
- Based on experience, the committee agreed that when results of urine cultures are available, if the results suggest the bacteria are resistant to the antibiotic given, the antibiotic should be changed, using a narrow-spectrum antibiotic where possible.

Non-pregnant women and men with catheter-associated UTI

- Based on evidence, their experience and resistance data, the committee agreed to recommend **nitrofurantoin**, **trimethoprim** or **amoxicillin** at usual doses as first-choice **oral antibiotics** for adults with a catheter-associated UTI but no upper UTI symptoms.
    - Nitrofurantoin is not recommended for people with an eGFR <45 ml/minute. It may be used with caution if eGFR is 30 to 44 ml/minute to treat uncomplicated lower UTI caused by suspected or proven multidrug-resistant bacteria, and only if the potential benefit outweighs risk (BNF, August 2018). The committee noted that nitrofurantoin is only licensed for uncomplicated lower UTI. However, they agreed that for adults with a catheter-associated UTI without upper UTI symptoms, nitrofurantoin is an option (unless they have a blocked catheter, where *Proteus mirabilis* could be the causative organism). Based on experience, the committee felt it was important to offer 'lower UTI' antibiotics as an option for adults with

- – catheter-associated UTI without upper UTI symptoms, otherwise all adults with a catheter-associated UTI would need to be offered a broader-spectrum 'upper UTI' antibiotic, where their symptoms may not warrant this.
  - The committee agreed to recommend the modified-release preparation of nitrofurantoin over the immediate-release preparation because of the twice-daily dosing of the modified-release preparation and, in their experience, better tolerability with this preparation.
  - Trimethoprim has high resistance levels nationally and should only be prescribed if a lower risk of resistance is thought to be likely. A lower risk of resistance is likely if trimethoprim has not been used in the past 3 months, if previous urine culture results suggest trimethoprim susceptibility (but this was not used as treatment) and in younger people in areas where local epidemiology data suggest resistance is lower. There is a higher risk of trimethoprim resistance with recent use and in older people in care homes.
  - Amoxicillin is recommended only if culture results are available and bacteria are susceptible because resistance rates are high.
- If nitrofurantoin, trimethoprim or amoxicillin are not suitable, the second-choice oral antibiotic for adults with a catheter-associated UTI but no upper UTI symptoms is **pivmecillinam** (a penicillin) at its usual dose. The committee acknowledged that prescribers may be less familiar with this antibiotic, but it is often used in other European countries. The committee noted that pivmecillinam is only licensed for uncomplicated lower UTI. However, as with nitrofurantoin, they agreed that for adults with a catheter-associated UTI without upper UTI symptoms, 'lower UTI' antibiotics are an option.
- For adults with upper UTI symptoms, nitrofurantoin, amoxicillin and pivmecillinam are not appropriate, and **cefalexin** (a first generation cephalosporin), **co-amoxiclav** (a penicillin with a beta-lactamase inhibitor), **trimethoprim** or **ciprofloxacin** (a fluoroquinolone), at usual doses, are recommended to cover a broader range of bacterial pathogens. Co-amoxiclav and trimethoprim are only suitable if culture results are available and bacteria are susceptible, because resistance rates are high.
- The committee noted that use of broad-spectrum antibiotics, such as later-generation cephalosporins, fluoroquinolones or co-amoxiclav, can create a selective advantage for bacteria resistant to these second-line broad-spectrum agents, allowing such strains to proliferate and spread. By disrupting normal flora, broad-spectrum antibiotics can leave people susceptible to harmful bacteria such as *Clostridium difficile* in community settings. However, these antibiotics are appropriate for the empirical treatment of catheter-associated UTI with upper UTI symptoms, where coverage of more resistant strains of common bacterial pathogens is required.
- The committee was aware of the European Medicines Agency's Pharmacovigilance Risk Assessment Committee recommendation to restrict the use of fluoroquinolone antibiotics following a review of disabling and potentially long-lasting side effects, mainly involving muscles, tendons and bones, and the nervous system. However, they discussed that fluoroquinolone antibiotics are a valuable option for the treatment of catheter-associated UTI with upper UTI symptoms, which is a severe infection, and it is appropriate to reserve

- fluoroquinolone use for such conditions. Resistant gram-negative organisms are a particular concern in catheter-associated UTI with upper UTI symptoms, and the committee agreed that ciprofloxacin should remain a first-choice option to cover what can be a complex infection. The committee was keen to point out, however, that cefalexin, co amoxiclav and trimethoprim are also first-choice options, and antibiotics should be chosen on an individual patient basis, taking fluoroquinolone safety concerns, as well as susceptibility and resistance, into account.
- Based on evidence, experience and resistance data, the committee agreed to recommend a choice of first-line **intravenous antibiotics**, at usual doses, for adults who are unable to take oral antibiotics because of nausea and vomiting, or are more severely unwell. These are:
    - **co-amoxiclav** (only in combination unless culture results confirm bacteria are susceptible)
    - **cefuroxime** (a second-generation cephalosporin) or **ceftriaxone** (a third-generation cephalosporin)
    - **ciprofloxacin** (taking safety concerns into account)
    - **gentamicin** or **amikacin** (aminoglycosides); which may be appropriate for some people with catheter-associated UTI, particularly those with severe infection or sepsis, but that efforts should be made to identify the causal bacteria and use reviewed by 48 hours. Gentamicin is the preferred aminoglycoside in the UK, but shortages of certain antibiotics may result in the use of alternatives; for example amikacin in place of gentamicin.
- The committee agreed, based on experience, that it may be necessary to combine antibiotics in the care of people with suspected sepsis. This should be done according to local policy or on the advice of a microbiologist, taking into account local antimicrobial resistance data.

Pregnant women with catheter-associated UTI

- Based on evidence, experience and resistance data, the committee agreed to recommend **cefalexin** (a first-generation cephalosporin) as the first-choice oral antibiotic for pregnant women who don't need intravenous antibiotics, and **cefuroxime** (a second-generation cephalosporin) as the first-choice intravenous antibiotic.
- Ciprofloxacin and trimethoprim are not recommended because they should be avoided in pregnancy. Co-amoxiclav was not recommended because of high resistance levels nationally and the risks of treatment failure in pregnancy.
- The committee agreed, based on experience, that local microbiologists should be consulted for advice on second-choice antibiotics, or combining antibiotics if susceptibility or sepsis is a concern.

Children and young people with catheter-associated UTI

- Based on evidence, experience and resistance data, the committee agreed to recommend

- **trimethoprim** (if low risk of resistance), **amoxicillin** (only if culture results are available and bacteria are susceptible), **cefalexin** or **co-amoxiclav** (only if culture results are available and bacteria are susceptible) at usual doses as first-choice **oral antibiotics** for children and young people with catheter-associated UTI.
- Based on evidence, experience and resistance data, the committee agreed to recommend a choice of first-line **intravenous antibiotics** at usual doses for children and young people who are unable to take oral antibiotics because of nausea and vomiting, or are more severely unwell. These are:
    - **co-amoxiclav** (only in combination unless culture results confirm bacteria are susceptible); which can be given intravenously
    - **cefuroxime** (a second-generation cephalosporin) or **ceftriaxone** (a third-generation cephalosporin)
    - **gentamicin** or **amikacin** (aminoglycosides); which may be appropriate for some children and young people with upper UTI symptoms, particularly those with severe infection or sepsis, but that efforts should be made to identify the causal bacteria and use reviewed at 48 hours.
- The committee agreed, based on experience, that it may be necessary to combine antibiotics in the care of children and young people with suspected sepsis. This should be done according to local policy or on the advice of a microbiologist, taking into account local antimicrobial resistance data.

Committee discussions on antibiotic course length

- The committee agreed that the shortest course that is likely to be effective should be prescribed to reduce the risk of antimicrobial resistance and minimise the risk of adverse effects.
- In line with the NICE guideline on antimicrobial stewardship and Public Health England's Start smart – then focus, the committee agreed that the use of intravenous antibiotics should be reviewed by 48 hours (taking into account the response to treatment and susceptibility results from urine culture) and switched to oral treatment where possible.

Course length for non-pregnant women, pregnant women, men, children and young people with catheter-associated UTI

- Based on evidence, experience and resistance data, the committee agreed that, for oral treatment, at least a 7-day course of all the recommended antibiotics was needed to treat catheter-associated UTI to ensure complete cure. This is because people with a catheter are more at risk of complications from a UTI. For adults with a catheter-associated UTI and upper UTI symptoms, pregnant women, and children and young people, course lengths are the same as those for acute pyelonephritis (see the NICE guideline on acute pyelonephritis).
- For intravenous treatment, antibiotics should be reviewed by 48 hours and stepped down to oral antibiotics where possible.

For more information see antibiotics for managing catheter-associated UTI in the NICE guideline on urinary tract infection (catheter-associated): antimicrobial prescribing.

Antibiotics for pregnant women aged 12 years and over

When prescribing antibiotic treatment for lower UTI, take account of local antimicrobial resistance data and follow the table below for pregnant women aged 12 years and over.

Antibiotic[1]	Dosage and course length[2]
Treatment of lower UTI	
First-choice[3]	
Nitrofurantoin (avoid at term) – if eGFR ≥45 ml/minute[4,5]	100 mg modified-release twice a day for 7 days
Second-choice (no improvement in lower UTI symptoms on first-choice taken for at least 48 hours or when first-choice not suitable)[3,6]	
Amoxicillin (only if culture results available and susceptible)	500 mg three times a day for 7 days
Cefalexin	500 mg twice a day for 7 days
Alternative second-choices	Consult local microbiologist, choose antibiotics based on culture and susceptibility results
Treatment of asymptomatic bacteriuria	
Choose from nitrofurantoin[4,5], amoxicillin or cefalexin based on recent culture and	

susceptibility results
[1] See BNF for appropriate use and dosing in specific populations, for example, hepatic impairment and renal impairment. [2] Doses given are by mouth using immediate-release medicines, unless otherwise stated. [3] Check any previous urine culture and susceptibility results and antibiotic prescribing and choose antibiotics accordingly. [4] Avoid at term in pregnancy; may produce neonatal haemolysis (BNF, August 2018). [5] May be used with caution if eGFR 30–44 ml/minute to treat uncomplicated lower UTI caused by suspected or proven multidrug resistant bacteria and only if potential benefit outweighs risk (BNF, August 2018). [6] If there are symptoms of pyelonephritis or the person has a complicated UTI (associated with a structural or functional abnormality, or underlying disease, which increases the risk of a more serious outcome or treatment failure), see antibiotic treatment in the NICE recommendations on acute pyelonephritis.

Rationale: self-care for catheter-associated UTI

- There was no evidence for the use of oral analgesia in catheter-associated-UTI. However, paracetamol has a well-established efficacy and safety profile for managing pain. The committee agreed that it was reasonable to consider paracetamol for managing pain in people with a catheter-associated UTI.
- Based on committee experience that dehydration is often cited as a cause of UTIs, the committee agreed that people should be advised about drinking enough fluids to avoid dehydration.
- The committee agreed that the evidence for use of cranberry in preventing catheter-associated UTI (which showed no effect) was limited to a specific population in the immediate postoperative period, and could not be extrapolated to other populations or settings. The committee was, therefore, unable to make a recommendation on its use.

For more information see self-care in the NICE guideline on urinary tract infection (catheter-associated): antimicrobial prescribing.

Recommended imaging schedules

Infant under 6 months

Test	Responds well to treatment within 48 hours	Atypical UTI	Recurrent UTI
Ultrasound during the acute infection	No	Yes[1]	Yes
Ultrasound within 6 weeks	Yes[2]	No	No
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	Yes	Yes

Infant from 6 months to under 3 years

Test	Responds well to treatment within 48 hours	Atypical UTI	Recurrent UTI
Ultrasound during the acute infection	No	Yes	No
Ultrasound within 6 weeks	No	No	Yes
DMSA 4–6 months following acute infection	No	Yes	Yes
MCUG	No	No[3]	No

[1] In an infant or child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks.

[2] If abnormal consider MCUG.

[3] While MCUG should not be performed routinely it should be considered if the following features are present: dilatation on ultrasound, poor urine flow, non-*E. coli* infection, family history of VUR.

Child aged 3 or over

Test	Responds well to treatment within 48 hours	Atypical UTI	Recurrent UTI
Ultrasound during the acute infection	No	Yes[1],[2]	No
Ultrasound within 6 weeks	No	No	Yes
DMSA 4–6 months following acute infection	No	No	Yes
MCUG	No	No	No

Glossary

Atypical UTI

Includes seriously ill (for more information refer to NICE's recommendations on fever in under 5s), poor urine flow, abdominal or bladder mass, raised creatinine, septicaemia, failure to respond to treatment with suitable antibiotics within 48 hours, infection with non-*E. coli* organisms.

asymptomatic bacteriuria

the presence of significant levels of bacteria in the urine with no symptoms of UTI

Back-up antibiotic prescription

prescription given in a way to delay the use of an antibiotic, and with advice to only use it if symptoms worsen or don't improve within a specified time; the prescription may be given during the consultation (which may be a post-dated prescription) or left at an agreed location for collection at a later date

[1] Ultrasound in toilet-trained children should be performed with a full bladder with an estimate of bladder volume

before and after micturition.

[2] In a child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks.

bacteriuria

bacteria in the urine with or without urinary tract infection

BNF

British natural formulary

BNFC

British natural formulary for children

DMSA

dimercaptosuccinic acid

eGFR

estimated glomerular filtration rate

HRT

hormone replacement therapy

MCUG

micturating cystourethrogram

NSAID

non-steroidal anti-inflammatory drug

pyuria

white cells in the urine

Recurrent UTI

2 or more episodes of UTI with acute pyelonephritis/upper urinary tract infection, or 1 episode of UTI with acute pyelonephritis/upper urinary tract infection plus 1 or more episode of UTI with cystitis/lower urinary tract infection, or 3 or more episodes of UTI with cystitis/lower urinary tract

infection.

SPA

suprapubic aspiration

trigger

some people (mainly women) may be able to identify 1 or more triggers (for example, sexual intercourse) that often brings on a UTI; these triggers may vary for different people

UTI

urinary tract infection

VUR

vesicoureteric reflux

Sources

Urinary tract infection in under 16s: diagnosis and management (2007 updated 2018) NICE guideline CG54

Your responsibility

Guidelines

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline

to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Technology appraisals

The recommendations in this interactive flowchart represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, health professionals are expected to take these recommendations fully into account, alongside the individual needs, preferences and values of their patients. The application of the recommendations in this interactive flowchart is at the discretion of health professionals and their individual patients and do not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or their carer or guardian.

Commissioners and/or providers have a responsibility to provide the funding required to enable the recommendations to be applied when individual health professionals and their patients wish to use it, in accordance with the NHS Constitution. They should do so in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Medical technologies guidance, diagnostics guidance and interventional procedures guidance

The recommendations in this interactive flowchart represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare

professionals are expected to take these recommendations fully into account. However, the interactive flowchart does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the recommendations, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this interactive flowchart should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.