

Urinary tract infection in under 16s: diagnosis and management

NICE guideline

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Your responsibility

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.

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This guideline replaces CG54.

This guideline is the basis of QS36.

Overview

This guideline covers diagnosing and managing first or recurrent upper or lower urinary tract infection (UTI) in babies, children and young people under 16. It aims to achieve more consistent clinical practice, based on accurate diagnosis and effective management. It does not cover babies, children and young people with urinary catheters in situ, neurogenic bladders, significant pre-existing urinary tract disorders (uropathies), underlying renal disease or immunosuppression, or recurrent UTI in sexually active girls and young women under 16. It also does not cover babies, children and young people in intensive care units.

Who is it for?

- Healthcare professionals
- Commissioners
- Babies and children from birth up to the age of 16 years with UTI, their families and carers

Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in [NICE's information on making decisions about your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 Diagnosis

Symptoms and signs

- 1.1.1 Test the urine of babies, children and young people who have symptoms and signs that increase the likelihood that a urinary tract infection (UTI) is present (see table 1 and the explanation of how to use the table beneath it). [2022]
- 1.1.2 Consider testing the urine of babies, children and young people if they are unwell and there is a suspicion of a UTI but none of the signs or symptoms listed in table 1 are present. [2022]
- 1.1.3 Refer babies under 3 months with a suspected UTI (see table 1 and recommendation 1.1.2) to paediatric specialist care, and:
- send a urine sample for urgent microscopy and culture
 - manage in line with the [sections on management by the non-paediatric practitioner](#) and [management by the paediatric specialist in the NICE guideline on fever in under 5s: assessment and initial management](#). [2017, amended 2022]
- 1.1.4 Do not routinely test the urine of babies, children and young people 3 months and over who have symptoms and signs that suggest an infection other than a UTI. If they remain unwell and there is diagnostic uncertainty, consider urine testing. [2022]

Table 1 Symptoms and signs that increase or decrease the likelihood that a UTI is present

Symptoms and signs that increase the likelihood that a urinary tract infection (UTI) is present	Symptoms and signs that decrease the likelihood that a UTI is present
<ul style="list-style-type: none"> • Painful urination (dysuria) • More frequent urination • New bedwetting • Foul smelling (malodorous) urine • Darker urine • Cloudy urine • Frank haematuria (visible blood in urine) • Reduced fluid intake • <u>Fever</u> • Shivering • Abdominal pain • Loin tenderness or suprapubic tenderness • Capillary refill longer than 3 seconds • Previous history of confirmed urinary tract infection 	<ul style="list-style-type: none"> • Absence of painful urination (dysuria) • Nappy rash • Breathing difficulties • Abnormal chest sounds • Abnormal ear examination • Fever with known alternative cause

When using the table, be aware that:

- The symptoms and signs in this table should be used to inform a decision about whether urine collection and testing is necessary.
- It is not an exhaustive list of symptoms or signs and should be used as a guide alongside clinical judgement.

- The presence or absence of a single symptom or sign in isolation in either column should not necessarily be used to decide whether or not to test for UTI.
 - Multiple symptoms and signs will probably increase the likelihood that there is a UTI.
 - It may be useful to consider alternative diagnoses where the symptoms and signs decrease the likelihood that a UTI is present.
- 1.1.5 For babies or children under 5 with fever with no obvious cause where a UTI is no longer suspected, see the NICE guideline on fever in under 5s: assessment and initial management. [2022]
- 1.1.6 Paediatric specialists should consult the section on management by the paediatric specialist in the NICE guideline on fever in under 5s: assessment and initial management, which covers when to test urine for a UTI in babies and children under 5 with fever who are in their care. [2022]
- 1.1.7 Avoid delay when collecting and testing the urine sample. If the sample cannot be collected at the consultation, advise the parents or carers (as appropriate) to collect and return the urine sample as soon as possible, ideally within 24 hours. [2022]
- See the sections on urine collection, preservation and testing.
- 1.1.8 If a baby, child or young person has suspected sepsis, assess and manage their condition in line with the NICE guideline on sepsis: recognition, diagnosis and early management. [2022]
- 1.1.9 If a baby of up to and including 28 days corrected gestational age has suspected or confirmed bacterial infection, assess and manage their condition in line with the NICE guideline on neonatal infection: antibiotics for prevention and treatment. For early-onset neonatal infection, see the section on assessing and managing the risk of early-onset neonatal infection after birth, and for late-onset neonatal infection, see the section on risk factors for and clinical indicators of possible late-onset neonatal infection in the NICE guideline on neonatal infection: antibiotics for prevention and treatment. [2022]

For a short explanation of why the committee made these recommendations and how they might affect practice, see the [rationale and impact section on symptoms and signs of urinary tract infection](#).

Full details of the evidence and the committee's discussion for the 2017 recommendation are in [evidence review A: urinary tract infection diagnosis in infants and children under 3 months and 3 months to 3 years](#).

Full details of the evidence and the committee's discussion for the 2022 recommendations are in [evidence review B: symptoms and signs](#).

Assessment of risk of serious illness

- 1.1.10 Assess the level of illness in babies and children in accordance with the [section on clinical assessment of children with fever in the NICE guideline on fever in under 5s: assessment and initial management](#). [2007]

Urine collection

- 1.1.11 Take urine samples from children and young people before they are given antibiotics. This is in line with the [NICE antimicrobial prescribing guidelines on pyelonephritis \(acute\) and urinary tract infection \(lower\)](#). [2022]
- 1.1.12 Babies and children with a high risk of serious illness should have a urine sample taken, but treatment should not be delayed if a urine sample cannot be obtained. [2007]
- 1.1.13 Use a clean catch method for urine collection wherever possible. [2007]
- 1.1.14 If a clean catch urine sample is not possible, use other non-invasive methods such as urine collection pads. It is important to follow the manufacturer's instructions when using urine collection pads. [2007]
- 1.1.15 Do not use cotton wool balls, gauze or sanitary towels to collect urine from babies and children. [2007]
- 1.1.16 Use catheter samples or suprapubic aspiration (SPA) when it is not possible or practical to collect urine by non-invasive methods. Use ultrasound guidance to

confirm that there is urine in the bladder before SPA. [2007]

Urine preservation

- 1.1.17 Immediately refrigerate or use boric acid to preserve urine samples that are to be cultured but cannot be cultured within 4 hours of collection. [2007]
- 1.1.18 Follow the manufacturer's instructions when using boric acid to ensure the correct specimen volume and avoid potential toxicity against bacteria in the specimen. [2007]

Urine testing

- 1.1.19 Use dipstick testing for babies and children between 3 months and 3 years with suspected UTI, and:
- if both leukocyte esterase and nitrite are negative:
 - do not give antibiotics
 - do not send a urine sample for microscopy and culture unless at least 1 of the criteria in recommendation 1.1.21 apply.
 - if leukocyte esterase or nitrite, or both are positive:
 - send the urine sample for culture
 - give antibiotics. [2017]
- 1.1.20 Use the urine-testing strategy for children aged 3 years or older shown in table 2. Assess the risk of serious illness in line with the [section on clinical assessment of children with fever in the NICE guideline on fever in under 5s](#) to ensure appropriate urine tests and interpretation, both of which depend on the child's age and risk of serious illness. [2007]

Table 2 Urine dipstick testing strategies for children 3 years or older

Urine dipstick test result	Strategy
Leukocyte esterase and nitrite are both positive	Assume the child has a urinary tract infection (UTI) and give them antibiotics. If the child has a high or intermediate risk of serious illness or a history of previous UTI, send a urine sample for culture.
Leukocyte esterase is negative and nitrite is positive	Give the child antibiotics if the urine test was carried out on a fresh urine sample. Send a urine sample for culture. Subsequent management will depend on the result of urine culture.
Leukocyte esterase is positive and nitrite is negative	Send a urine sample for microscopy and culture. Do not give the child antibiotics unless there is good clinical evidence of a UTI (for example, obvious urinary symptoms). A positive leukocyte esterase result may indicate an infection outside the urinary tract that may need to be managed differently.
Leukocyte esterase and nitrite are both negative	Assume the child does not have a UTI. Do not give the child antibiotics for a UTI or send a urine sample for culture. Explore other possible causes of the child's illness.

Dipstick testing for leukocyte esterase and nitrite is diagnostically as useful as microscopy and culture, and can safely be used.

1.1.21 Send urine samples for culture if a baby or child:

- is thought to have acute upper UTI (pyelonephritis; see the [section on clinical differentiation between acute upper UTI and lower UTI](#))
- has a high to intermediate risk of serious illness (see the [section on assessment of risk of serious illness](#))
- is under 3 months old

- has a positive result for leukocyte esterase or nitrite
- has recurrent UTI
- has an infection that does not respond to treatment within 24 to 48 hours, if no sample has already been sent
- has clinical symptoms and signs but dipstick tests do not correlate. [2017]

For a short explanation of why the committee made the 2017 recommendations and how they might affect practice, see the [rationale and impact section on urine testing](#).

Full details of the evidence and the committee's discussion are in the [evidence review A: urinary tract infection diagnosis in infants and children under 3 months and 3 months to 3 years](#).

1.1.22 Interpret microscopy results as shown in table 3. [2007]

1.1.23 Use clinical criteria for decision making if a urine test does not support findings, because in a small number of cases, this may be the result of a false negative. [2007]

Table 3 Interpreting microscopy results

Microscopy results	Interpretation
Pyuria and bacteriuria are both positive	Assume the baby or child has a urinary tract infection (UTI)
Pyuria is positive and bacteriuria is negative	Start antibiotic treatment if the baby or child has symptoms or signs of a UTI
Pyuria is negative and bacteriuria is positive	Assume the baby or child has a UTI
Pyuria and bacteriuria are both negative	Assume the baby or child does not have a UTI

History and examination of confirmed UTI

1.1.24 Record the following risk factors for UTI and serious underlying pathology:

- poor urine flow
- history suggesting previous UTI or confirmed previous UTI
- recurrent fever of uncertain origin
- antenatally diagnosed renal abnormality
- family history of vesicoureteral reflux (VUR) or renal disease
- constipation
- dysfunctional voiding
- enlarged bladder
- abdominal mass
- evidence of spinal lesion
- poor growth
- high blood pressure. [2007]

Clinical differentiation between acute upper UTI and lower UTI

1.1.25 Assume a diagnosis of acute upper UTI in babies or children who have either:

- bacteriuria and fever of 38°C or higher or
- bacteriuria, fever lower than 38°C and loin pain or tenderness. [2007]

1.1.26 Assume that babies and children who have bacteriuria but no systemic symptoms or signs have lower UTI (cystitis). [2007]

Laboratory tests for localising UTI

1.1.27 Do not use C-reactive protein alone to differentiate acute upper UTI from lower UTI in babies and children. [2007]

1.2 Acute management

Note that the antibiotic requirements for babies and children with conditions that are outside the

scope of this guideline (for example, babies and children already known to have significant pre-existing uropathies) have not been addressed and may be different from those given here.

- 1.2.1 Immediately refer babies and children with a high risk of serious illness (see the [section on assessment of risk of serious illness](#)) to a paediatric specialist. [2007]
- 1.2.2 Immediately refer babies under 3 months with a suspected UTI to a paediatric specialist. [2007]
- 1.2.3 Paediatric specialists should give babies under 3 months with a suspected UTI parenteral antibiotics in line with the [section on management by the paediatric specialist in the NICE guideline on fever in under 5s](#). [2007, amended 2022]
- 1.2.4 Consider referring babies and children over 3 months with upper UTI to a paediatric specialist. [2007]
- 1.2.5 Give babies and children over 3 months with an acute upper UTI antibiotics in line with the [NICE guideline on pyelonephritis \(acute\): antimicrobial prescribing](#). [2007, amended 2018]
- 1.2.6 Give babies and children over 3 months with lower UTI antibiotics in line with the [NICE guideline on urinary tract infection \(lower\): antimicrobial prescribing](#). [2007, amended 2018]
- 1.2.7 For information about treating babies and children who were already on prophylactic antibiotics who then developed a UTI see the [NICE guidelines on pyelonephritis \(acute\): antimicrobial prescribing, urinary tract infection \(lower\): antimicrobial prescribing and urinary tract infection \(recurrent\): antimicrobial prescribing](#). [2018]
- 1.2.8 Do not use antibiotics to treat asymptomatic bacteriuria in babies and children. [2007]
- 1.2.9 Laboratories should monitor patterns of urinary pathogen resistance and make this information routinely available to prescribers. [2007]

Preventing recurrence

- 1.2.10 Manage dysfunctional elimination syndromes and constipation in babies and children who have had a UTI. [2007]
- 1.2.11 Encourage children who have had a UTI to drink enough water to avoid dehydration. [2007]
- 1.2.12 Ensure that children who have had a UTI have access to clean toilets when needed and do not have to delay voiding unnecessarily. [2007]

Prophylactic antibiotics

- 1.2.13 Do not routinely give prophylactic antibiotics to babies and children following first-time UTI. [2007]
- 1.2.14 See the [NICE guideline on urinary tract infection \(recurrent\): antimicrobial prescribing](#) for prophylactic antibiotic treatment for recurrent UTI in babies and children. [2018]
- 1.2.15 Do not give prophylactic antibiotics to babies and children with asymptomatic bacteriuria. [2007]

Imaging tests for localising UTI

- 1.2.16 Do not routinely use imaging to localise UTI. [2007]
- 1.2.17 In rare instances when it is clinically important to confirm or exclude acute upper UTI, use either:
 - power doppler ultrasound or
 - a dimercaptosuccinic acid (DMSA) scintigraphy scan if power doppler ultrasound is not available or the diagnosis has not been confirmed. [2007]

1.3 Imaging tests

- 1.3.1 Send babies and children with atypical UTI (see [box 1](#)) for a urinary tract ultrasound during the acute infection, to identify structural abnormalities such

as obstruction and to ensure prompt management, as outlined in tables 4, 5 and 6. [2007]

- 1.3.2 Send babies younger than 6 months with first-time UTI that responds to treatment for ultrasound within 6 weeks of the UTI, as outlined in table 4. [2007]

Box 1 Definitions of atypical and recurrent urinary tract infection (UTI)

Atypical UTI includes:

- Seriously ill (for more information, refer to the [NICE guideline on fever in under 5s: assessment and initial management](#))
- 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

Recurrent UTI:

- Two or more episodes of UTI with acute upper UTI (acute pyelonephritis), or
- One episode of UTI with acute upper UTI plus 1 or more episodes of UTI with lower UTI (cystitis), or
- Three or more episodes of UTI with lower UTI

- 1.3.3 Do not routinely send babies and children over 6 months with first-time UTI who respond to treatment for an ultrasound, unless they have atypical UTI as outlined in tables 5 and 6. [2007]

- 1.3.4 Babies and children who have had a lower UTI should be sent for ultrasound (within 6 weeks) only if they:
- are younger than 6 months or
 - have had recurrent infections. [2007]
- 1.3.5 Use a DMSA scan 4 to 6 months after the acute infection to detect renal parenchymal defects in babies and children, as outlined in tables 4, 5 and 6. [2007]
- 1.3.6 If the baby or child has a subsequent UTI while waiting for a DMSA scan, review the timing of the scan and consider doing it sooner. [2007]
- 1.3.7 Do not routinely use imaging to identify VUR in babies and children who have had a UTI, except in specific circumstances as outlined in tables 4, 5 and 6. [2007]
- 1.3.8 When a micturating cystourethrogram (MCUG) is done, give prophylactic antibiotics orally for 3 days with the MCUG on the second day. [2007]
- 1.3.9 Send babies and children who have had a UTI for imaging, as outlined in tables 4, 5 and 6. [2007]

Table 4 Recommended imaging schedule for babies younger than 6 months

Test	Responds well to treatment within 48 hours	Atypical urinary tract infection	Recurrent urinary tract infection
Ultrasound during the acute infection	No	Yes	Yes
Ultrasound within 6 weeks	Yes If abnormal consider micturating cystourethrogram (MCUG)	No	No

Test	Responds well to treatment within 48 hours	Atypical urinary tract infection	Recurrent urinary tract infection
Dimercaptosuccinic acid scintigraphy scan 4 to 6 months after the acute infection	No	Yes	Yes
Micturating cystourethrogram	No	Yes	Yes

See [box 1](#) for definitions of atypical and recurrent urinary tract infection.

In a baby with a non-*E. coli* urinary tract infection that is responding well to antibiotics and has no other features of atypical infection, a non-urgent ultrasound can be requested, to happen within 6 weeks.

Table 5 Recommended imaging schedule for babies and children between 6 months to under 3 years

Test	Responds well to treatment within 48 hours	Atypical urinary tract infection	Recurrent urinary tract infection
Ultrasound during the acute infection	No	Yes	No
Ultrasound within 6 weeks	No	No	Yes
Dimercaptosuccinic acid scintigraphy scan 4 to 6 months after the acute infection	No	Yes	Yes
Micturating cystourethrogram	No	No	No

See [box 1](#) for definitions of atypical and recurrent urinary tract infection.

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.

In babies and children with a non-*E. coli* urinary tract infection that is responding well to antibiotics and has no other features of atypical infection, a non-urgent ultrasound can be requested, to happen within 6 weeks.

Table 6 Recommended imaging schedule for children 3 years or older

Test	Responds well to treatment within 48 hours	Atypical urinary tract infection	Recurrent urinary tract infection
Ultrasound during the acute infection	No	Yes	No
Ultrasound within 6 weeks	No	No	Yes
Dimercaptosuccinic acid scintigraphy scan 4 to 6 months after the acute infection	No	No	Yes
Micturating cystourethrogram	No	No	No

See [box 1](#) for definitions of atypical and recurrent urinary tract infection.

Ultrasound in toilet-trained children should be performed with a full bladder with an estimate of bladder volume before and after urination.

In a child with a non-*E. coli* urinary tract infection that is responding well to antibiotics and has no other features of atypical infection, a non-urgent ultrasound can be requested, to happen within 6 weeks.

1.4 Surgical intervention

1.4.1 Do not routinely use surgery for management of VUR. [2007]

1.5 Follow up

1.5.1 Do not routinely follow up babies and children who have not had imaging investigations. [2007]

- 1.5.2 Discuss and agree with parents, carers or the young person (as appropriate) how the results of imaging will be communicated. [2007]
- 1.5.3 Do not routinely offer follow-up outpatient appointments when the results of investigations are normal. [2007]
- 1.5.4 Give parents or carers the results of all investigations in writing. [2007]
- 1.5.5 Refer babies and children who have recurrent UTI or abnormal imaging results for assessment by a paediatric specialist. [2007]
- 1.5.6 When assessing babies and children with renal parenchymal defects, include height, weight, blood pressure and routine testing for proteinuria. [2007]
- 1.5.7 Do not offer long-term follow up to babies and children with minor, unilateral renal parenchymal defects, unless they have recurrent UTI, family history or lifestyle risk factors for hypertension. [2007]
- 1.5.8 Babies and children who have bilateral renal abnormalities, impaired kidney function, raised blood pressure or proteinuria should have monitoring and appropriate management by a paediatric nephrologist to slow the progression of chronic kidney disease. [2007]
- 1.5.9 Do not routinely retest babies' and children's urine for infection if they are asymptomatic after an episode of UTI. [2007]
- 1.5.10 Do not follow up babies and children based only on the presence of asymptomatic bacteriuria. [2007]

1.6 Information and advice

- 1.6.1 Healthcare professionals should ensure that when a child or young person has a suspected UTI, they and their parents or carers (as appropriate) are told about the need for treatment, the importance of completing any course of treatment and given advice about prevention and long-term management. [2007]
- 1.6.2 Ensure that children and young people, and their parents or carers (as appropriate), know that UTIs can recur and that it is important to remain

vigilant and to seek prompt treatment for any suspected reinfection. [2007]

1.6.3 Offer children and young people, and their parents or carers (as appropriate) advice and information on:

- prompt recognition of symptoms
- urine collection, storage and testing
- treatment options
- prevention
- the nature of and reason for any urinary tract investigation
- prognosis
- reasons and arrangements for long-term management if required. [2007]

Terms used in this guideline

Bacteriuria

Bacteria in the urine with or without UTI.

Fever

Elevation of body temperature above the normal daily variation unless otherwise specified in a particular recommendation.

Pyuria

White cells in the urine.

Recommendations for research

The guideline committee has made the following recommendations for research. The committee's full set of recommendations for research is detailed in the [full guideline](#).

Key recommendations for research

1 Symptoms and signs of urinary tract infection in children and young people aged 5 years and above but under 16 years

What are the symptoms and signs of urinary tract infection (UTI) in children and young people aged 5 years and above but under 16 years? [2022]

For a short explanation of why the committee made this recommendation for research, see the [rationale section on symptoms and signs](#).

Full details of the evidence and the committee's discussion are in [evidence review B: symptoms and signs](#).

2 Long-term risk of renal scarring and impaired renal function

A well designed cohort study investigating long-term outcomes including renal scarring and renal function of children who have had UTI should be conducted in the UK. [2017]

Why this is important

Urinary tract infection and vesicoureteral reflux (VUR) in young children have been shown to be associated with both congenital and acquired renal damage. Progressive scarring is well documented in children with high grade VUR and recurrent UTI. Scarring has been associated with severe hypertension, proteinuria, complications in pregnancy and progression to established renal failure. These risks are likely to be greater in children with bilateral renal parenchymal defects. However, the frequency and magnitude of these risks for children with unilateral and bilateral renal damage are unclear. Knowledge of the risk of serious or progressive complications would be useful to determine the management of children with first-time and recurrent UTIs.

3 Symptoms and signs of recurrent UTI

Do the symptoms and signs of UTI in babies, children and young people aged under 16 years differ in those with a history of recurrent UTIs compared with those without a history of recurrent UTI? [2022]

For a short explanation of why the committee made this recommendation for research, see the [rationale section on symptoms and signs](#).

Full details of the evidence and the committee's discussion are in [evidence review B: symptoms and signs](#).

4 Symptoms and signs of long-term (chronic) UTI

What symptoms and signs do children and young people with long-term (chronic) UTI report and what do they perceive is the impact on their health and quality of life? [2022]

For a short explanation of why the committee made this recommendation for research, see the [rationale section on symptoms and signs](#).

Full details of the evidence and the committee's discussion are in [evidence review B: symptoms and signs](#).

Rationale and impact

These sections briefly explain why the committee made the recommendations and how they might affect practice.

Symptoms and signs

[Recommendations 1.1.1 to 1.1.9](#)

Why the committee made the recommendations

The committee discussed evidence from studies that looked at symptoms and signs of urinary tract infections (UTIs). They agreed that it is important to diagnose UTI quickly and accurately to prevent unnecessary suffering and serious complications like renal scarring.

Table 1 shows several symptoms and signs that increase, or decrease, the likelihood of a UTI being present. The committee agreed that the table gives more certainty about which symptoms and signs increase or decrease the likelihood of a UTI being present. The committee also highlighted that many symptoms and signs from the 2007 version of the guideline (dysuria [painful urination], urinary frequency, loin tenderness and bedwetting) are still useful. However, the evidence around many of these symptoms and signs as indicators of UTI was low- or very-low quality. This was because many of the studies were not designed to assess diagnostic accuracy and had poor definitions of the symptoms and signs they reported. Therefore, the committee agreed that due to the remaining uncertainty, the table should be used as a guide alongside clinical judgement.

Because the list in table 1 is not exhaustive, the committee were concerned that some unwell babies, children and young people with a possible UTI might not have further tests if they lack symptoms or signs from the table. There are other symptoms and signs that could suggest a UTI for which no evidence was found or for which data was not reported in the studies. The committee therefore agreed that it may still be necessary to test for UTI, if healthcare professionals suspect UTI despite the absence of any symptoms or signs listed in the table.

The committee also looked at evidence for several algorithms that used combinations of symptoms and signs to help with diagnosis of UTI. None of the algorithms were particularly accurate, so the committee did not recommend their use. However, in the committee's opinion the presence of multiple symptoms or signs will probably increase the likelihood that there is a UTI.

Table 1 does not specify relevant ages for particular symptoms and signs. This is because most of the evidence was for children under 5 years and the trials mostly did not report results by age. The committee agreed that the symptoms and signs could be generalised across age groups, but that clinical judgement was needed when deciding which are relevant for an individual baby, child or young person. This is because age or ability to communicate (or if their symptoms cannot be accurately assessed) will affect the usefulness of a particular symptom or sign. For example, in all ages, the presence of dysuria increased the likelihood that a UTI was present and, when absent, decreased the likelihood. But it may be more difficult to assess in babies, children or young people who are not toilet trained or cannot communicate their symptoms. The committee also chose to include a confirmed history of UTI as a symptom or sign. Although it is not strictly a symptom or sign, it is associated with an increased likelihood of UTI.

The committee looked at evidence for other symptoms and signs that are not included in table 1. These included sleepiness or lethargy, irritability, poor feeding, vomiting, failure to thrive and jaundice. However, these were not found to be clinically useful in suggesting whether a UTI is present based on the evidence included in this review.

The committee noted that some symptoms (for example haematuria [blood in the urine], cloudy urine or dark urine) that were associated with an increased likelihood of UTI, could not be assessed by healthcare professionals without a urine sample. However, the symptoms and signs recommendations in this section are intended to provide guidance about when urine collection and testing is necessary. The committee therefore agreed to include these symptoms or signs in the table, based on the child self-reporting, or parental or caregiver reporting, rather than clinician assessment.

The committee were aware that there may be limitations with these symptoms. For example, darker urine is not specific to urinary tract infection and can be common in those who are unwell and dehydrated (a poor fluid intake not being uncommon in unwell children). Additionally, a report of visible blood, in the committee's opinion, was not common in UTI and would always require further investigation. However, the committee agreed that symptoms and signs that are less specific to the urinary tract might still be useful indicators of a UTI, particularly if they are present in combination with other symptoms and signs.

The committee noted that the symptoms and signs that decrease the likelihood of a UTI may suggest a different site of infection (such as the respiratory tract) but do not necessarily rule out a UTI. The list is not exhaustive (due to limitations in the evidence base) and other symptoms and signs may be present that suggest other sources of infection. The committee agreed that the urine of babies, children and young people aged 3 months and over should not be routinely tested if they

have symptoms and signs that suggest another type of infection. This is because it would be clinically unnecessary, waste resources and could increase the stress experienced by the baby or child and their family or carers. However, if they remain unwell and there is diagnostic uncertainty, a urine test may be needed to exclude UTI.

For babies and children under 5 with fever with no obvious cause where a UTI is no longer suspected, the [NICE guideline on fever in under 5s: assessment and initial management](#) could provide guidance in identifying the cause of their fever. The guideline also contains a [section on diagnostic tests carried out by paediatric specialists](#) on babies and children with fever in their care, including when to test urine for a UTI.

The committee acknowledged that in practice there may be delays in obtaining a urine sample for testing if one cannot be obtained during consultation. They agreed that both urine collection and testing should happen without delay to ensure rapid and accurate diagnosis. However, the committee were aware that urine cultures will not necessarily detect every UTI. Therefore, there is a risk of these babies, children and young people remaining undiagnosed. But they noted that recommendation 1.1.23 addresses this situation.

When making the 2017 recommendation, the committee agreed that there are concerns about sepsis in babies under 3 months with suspected UTI, and usual practice is referral rather than the GP managing symptoms. So, the committee recommended that all babies under 3 months should be referred to specialist paediatric care and have a urine sample sent for urgent microscopy and culture.

The committee identified several gaps in the evidence. Most studies looked at symptoms and signs of UTI in babies and children aged under 5. Those that did include older children still had average ages closer to 5 than 16 and did not present data separately for older children. The committee therefore made a [recommendation for research on the symptoms and signs of UTI in children and young people aged 5 years and above but under 16 years](#). They also made a [recommendation for research on whether the symptoms and signs of recurrent UTI in babies, children and young people under 16 differed to acute UTI](#), because there was no evidence in this area. Finally, they made a [recommendation for research to investigate the symptoms and signs experienced by children and young people with long-term \(chronic\) UTI](#) as this was also not covered by the evidence.

How the recommendations might affect practice

The 2022 recommendations are unlikely to substantially change practice because the diagnostic pathway remains the same, although some of the symptoms and signs suggesting a UTI have

changed. The absence of a recommendation for any diagnostic algorithm combining symptoms and signs, means that there will be little impact on clinical resources or training.

The committee believed the 2017 recommendation would provide concise and clear guidance for healthcare professionals and more efficient diagnosis for babies under 3 months.

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Urine testing

[Recommendations 1.1.19 and 1.1.21](#)

Why the committee made the recommendations

Evidence showed that a positive urine dipstick test for leukocyte esterase or nitrite in children 3 months or older but younger than 3 years, greatly increases the likelihood of a positive urine culture. Sending only positive samples for culture offered a better balance of benefits and costs for these children than prescribing antibiotics and urine culture for all children. In children aged 3 months or older but younger than 3 years, symptoms are easier to identify, and antibiotics should only be started if a dipstick test is positive for either or both leukocyte esterase or nitrite. Children in this age group with a positive dipstick test should also have a urine sample sent for culture.

How the recommendations might affect practice

Recommending dipstick testing in babies and children aged 3 months or older but younger than 3 years clarifies the role of dipstick testing in this age group and encourages immediate diagnosis and treatment in primary care. The committee believe the new recommendations will provide concise and clear guidance for healthcare professionals and more efficient diagnosis. The recommendations will also be cost saving and reduce burden on laboratories by reducing the number of urine samples sent for culture.

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Context

In the past 30 to 50 years, the natural history of urinary tract infection (UTI) in children has changed as a result of the introduction of antibiotics and improvements in healthcare. This change has contributed to uncertainty about the most appropriate and effective way to manage UTI in children, and whether investigations and follow up are justified.

UTI is a common bacterial infection that causes illness in babies and children. It may be difficult to recognise UTI in children because the presenting symptoms and signs are non-specific, particularly in babies and children younger than 3 years. Collecting urine and interpreting results is not easy in this age group, so it may not always be possible to unequivocally confirm the diagnosis.

Current management, which includes imaging, prophylaxis and prolonged follow up, has placed a heavy burden on NHS resources. It is based on limited evidence, is costly and unpleasant for children and is distressing for their parents or carers. This guideline has been developed with the aim of providing guidance on several aspects of UTI in babies and children from birth up to the age of 16 years.

Finding more information and committee details

To find out what NICE has said on topics related to this guideline, see the [NICE topic page on urinary tract infection](#).

For full details of the evidence and the guideline committee's discussions, see the [evidence reviews and full guideline](#). You can also find information about [how the guideline was developed](#), including [details of the committee](#).

NICE has produced [tools and resources to help you put this guideline into practice](#). For general help and advice on putting our guidelines into practice, see [resources to help you put NICE guidance into practice](#).

Update information

July 2022: We have reviewed the evidence and made new recommendations on diagnosis for babies, children and young people under 16 with suspected urinary tract infections. We have also added a recommendation on collecting urine before children and young people have antibiotics, in the section on urine collection. These recommendations are marked [2022]. Recommendations have also been amended to improve clarity and structure and are marked either [2007, amended 2022] or [2017, amended 2022].

October 2018: Recommendations 1.2.5 and 1.2.6 have been amended to bring them in line with the [NICE guidelines on pyelonephritis \(acute\): antimicrobial prescribing](#) and [urinary tract infection \(lower\): antimicrobial prescribing](#), respectively.

September 2017: We reviewed the evidence on urine-testing strategies for babies and children under 3 years and updated recommendations in the section on urine testing.

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Accreditation

