

1 **NATIONAL INSTITUTE FOR HEALTH AND CARE**
2 **EXCELLENCE**

3 **Guideline**

4 **Urinary tract infection in under 16s: diagnosis**
5 **and management**

6 **Draft for consultation, May 2022**
7

This is an update to NICE guideline CG54 (published August 2007). We have:

- reviewed the evidence and made new recommendations on symptoms and signs of UTI in the section on diagnosis
- made minor changes throughout to bring the language and style up to date.

This guideline covers diagnosing and managing first or recurrent upper or lower urinary tract infections in babies, children and young people under 16. It aims to achieve more consistent clinical practice, based on accurate diagnosis and effective management.

Who is it for?

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

What does it include?

- the recommendations
- recommendations for research
- rationale and impact sections that explain why the committee made the 2022 recommendations and how they might affect practice.
- the guideline context.

Information about how the guideline was developed is on the [guideline's webpage](#). This includes the evidence reviews, the scope, details of the committee and any declarations of interest.

New and updated recommendations

You are invited to comment on the new and updated recommendations. These are marked as **[2022]**.

We have not reviewed the evidence for the recommendations shaded in grey, and cannot accept comments on them. In some cases, we have made minor wording changes for clarification.

See [update information](#) for a full explanation of what is being updated.

Full details of the evidence and the committee's discussion on the 2022 recommendations are in the [evidence reviews](#). Evidence for the 2007 and 2017 recommendations is in the [full version](#) of the guideline.

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1 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.

2 1.1 Diagnosis

3 Symptoms and signs

4 1.1.1 Test the urine of babies, children and young people who have symptoms
5 and signs that suggest a urinary tract infection (UTI) is more likely (see
6 [table 1](#) and the explanation of how to use the table beneath it).

7 See also recommendation 1.1.17 in the section on [urine testing in this](#)
8 [guideline](#). **[2022]**

9 1.1.2 Test the urine of babies under 3 months who have a fever, as
10 recommended in the section on management by the paediatric specialist
11 in the [NICE guideline on fever in under 5s: assessment and initial](#)
12 [management](#). **[2022]**

13 For information on tests for other causes of fever in babies under
14 3 months see [NICE's guideline on fever in under 5s: assessment and](#)
15 [initial management](#).

16 1.1.3 Consider testing the urine of babies, children and young people if they are
17 unwell and there is a suspicion of UTI but none of the signs or symptoms
18 listed in table 1 are present. **[2022]**

19 1.1.4 Do not routinely test the urine of babies, children and young people
20 3 months and over who have symptoms and signs that suggest an

1 infection other than a UTI. If they remain unwell and there is diagnostic
 2 uncertainty, consider urine testing. [2022]

3 **Table 1 Symptoms and signs that suggest a UTI is more likely or less likely**

Symptoms and signs that suggest a UTI is more likely	Symptoms and signs that suggest a UTI is less likely
Painful urination (dysuria) More frequent urination New bedwetting Foul smelling (malodorous) urine Darker urine Reduced fluid intake Fever Shivering Abdominal pain Loin tenderness or suprapubic tenderness Capillary refill longer than 3 seconds Previous history of confirmed urinary tract infection	Absence of painful urination (dysuria) Nappy rash Breathing difficulties Abnormal chest sounds Abnormal ear examination Fever with known alternative cause

4 When using the table, be aware that:

- 5 • It is not an exhaustive list of symptoms or signs and should be used as a guide
 6 alongside clinical judgement.
- 7 • The presence or absence of a single symptom or sign in isolation in either column
 8 should not necessarily be used to decide whether or not to test for UTI.
- 9 • Multiple symptoms and signs will probably increase the likelihood that there is a
 10 UTI.
- 11 • It may be useful to consider alternative diagnoses where the symptoms and signs
 12 make it less likely that a UTI is present.

13 1.1.5 Avoid delay when collecting and testing the urine sample. If the sample
 14 cannot be collected at the consultation, advise the parents or carers (as
 15 appropriate) to collect and return the urine sample as soon as possible,
 16 ideally within 24 hours. See also recommendation 1.1.14. [2022]

17 See the [recommendations on urine collection](#), [preservation](#) and
 18 [testing](#) Urine testing, and [indications for culture](#).

- 1 1.1.6 If a baby, child or young person has suspected sepsis, assess and
2 manage their condition in line with [NICE's guideline on sepsis:
3 recognition, diagnosis and early management](#). [2022]
- 4 1.1.7 If a baby of up to and including 28 days corrected gestational age has
5 suspected or confirmed bacterial infection, assess and manage their
6 condition in line with the [NICE guideline on neonatal infection: antibiotics
7 for prevention and treatment](#). [2022]
- 8 1.1.8 If a baby or child under 5 has fever with no obvious cause, assess and
9 manage their condition in line with [NICE's guideline on fever in under 5s:
10 assessment and initial management](#). See also recommendation 1.1.2
11 [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 UTI](#).

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

12

13 **Assessment of risk of serious illness**

- 14 1.1.9 Assess the level of illness in babies and children in accordance with the
15 [NICE guideline on fever in under 5s: assessment and initial management](#).
16 [2007]

17 **Urine collection**

- 18 1.1.10 Use a clean catch method for urine collection wherever possible. [2007]
- 19 1.1.11 If a clean catch urine sample is not possible, use other non-invasive
20 methods such as urine collection pads. It is important to follow the
21 manufacturer's instructions when using urine collection pads. [2007]
- 22 1.1.12 Do not use cotton wool balls, gauze or sanitary towels to collect urine from
23 babies and children. [2007]

1 1.1.13 Use catheter samples or suprapubic aspiration (SPA) when it is not
2 possible or practical to collect urine by non-invasive methods. Use
3 ultrasound guidance to confirm that there is urine in the bladder before
4 SPA. **[2007]**

5 1.1.14 Babies and children with a high risk of serious illness should have a urine
6 sample taken, but treatment should not be delayed if a urine sample
7 cannot be obtained. **[2007]**

8 **Urine preservation**

9 1.1.15 Immediately refrigerate or use boric acid to preserve urine samples that
10 are to be cultured but cannot be cultured within 4 hours of collection.
11 **[2007]**

12 1.1.16 Follow the manufacturer's instructions when using boric acid to ensure the
13 correct specimen volume and avoid potential toxicity against bacteria in
14 the specimen. **[2007]**

15 **Urine testing**

16 1.1.17 Refer babies under 3 months with a suspected UTI (see table 1) to
17 paediatric specialist care, and:

- 18 • send a urine sample for urgent microscopy and culture
- 19 • manage in line with the [NICE guideline on fever in under 5s:](#)
20 [assessment and initial management](#). **[2017]**

21 1.1.18 Use dipstick testing for babies and children between 3 months and
22 3 years with suspected UTI, and:

- 23 • if both leukocyte esterase and nitrite are negative:
 - 24 – do not give antibiotics
 - 25 – do not send a urine sample for microscopy and culture unless at
26 least 1 of the criteria in recommendation 1.1.22 apply.
- 27 • if leukocyte esterase or nitrite, or both are positive:
 - 28 – give antibiotics
 - 29 – send a urine sample for culture. **[2017]**

For a short explanation of why the committee made these 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 for UTI diagnosis in children under 3 years](#).

1

2 1.1.19 Use the urine-testing strategy for children aged 3 years or older shown in
3 table 2. Assess the risk of serious illness in line with the [NICE guideline](#)
4 [on fever in under 5s](#) to ensure appropriate urine tests and interpretation,
5 both of which depend on the child's age and risk of serious illness. **[2007]**

6 1.1.20 Interpret microscopy results as shown in table 3. **[2007]**

7 1.1.21 Use clinical criteria for decision making if a urine test does not support
8 findings, because in a small number of cases, this may be the result of a
9 false negative. **[2007]**

10 **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.

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

1 **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 a 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

2 **Indications for culture**

3 1.1.22 Send urine samples for culture if a baby or child:

- 4 • is thought to have acute upper UTI (pyelonephritis; see
- 5 recommendation 1.1.24 and 1.1.25)
- 6 • has a high to intermediate risk of serious illness
- 7 • is under 3 months old
- 8 • has a positive result for leukocyte esterase or nitrite
- 9 • has recurrent UTI
- 10 • has an infection that does not respond to treatment within 24 to
- 11 48 hours, if no sample has already been sent
- 12 • has clinical symptoms and signs but dipstick tests do not correlate.

13 **[2017]**

For a short explanation of why the committee made this recommendation and how it 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 for UTI diagnosis in children under 3 years](#).

14 **History and examination on confirmed UTI**

15 1.1.23 Record the following risk factors for UTI and serious underlying pathology:

- 16
- poor urine flow

- 1 • history suggesting previous UTI or confirmed previous UTI
- 2 • recurrent fever of uncertain origin
- 3 • antenatally diagnosed renal abnormality
- 4 • family history of vesicoureteral reflux (VUR) or renal disease
- 5 • constipation
- 6 • dysfunctional voiding
- 7 • enlarged bladder
- 8 • abdominal mass
- 9 • evidence of spinal lesion
- 10 • poor growth
- 11 • high blood pressure. **[2007]**

12 **Clinical differentiation between acute upper UTI and lower UTI**

13 1.1.24 Assume a diagnosis of acute upper UTI in babies or children who have
14 either:

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

17 1.1.25 Assume that babies and children who have bacteriuria but no systemic
18 symptoms or signs have lower UTI (cystitis). **[2007]**

19 **Laboratory tests for localising UTI**

20 1.1.26 Do not use C-reactive protein alone to differentiate acute upper UTI from
21 lower UTI in babies and children. **[2007]**

22 **1.2 Acute management**

23 Note that the antibiotic requirements for babies and children with conditions that are
24 outside the scope of this guideline (for example, babies and children already known
25 to have significant pre-existing uropathies) have not been addressed and may be
26 different from those given here. Immediately refer babies and children with a high risk
27 of serious illness to a paediatric specialist. **[2007]**

28 1.2.2 Immediately refer babies under 3 months with a possible UTI to a
29 paediatric specialist.

- 1 1.2.3 Give babies under 3 months with a possible UTI parenteral antibiotics in
2 line with the [NICE guideline on fever in under 5s: assessment and initial](#)
3 [management](#). **[2007]**
- 4 1.2.4 Consider referring babies and children over 3 months with upper UTI to a
5 paediatric specialist. **[2007]**
- 6 1.2.5 Give babies and children over 3 months with an acute upper UTI
7 antibiotics in line with the [NICE guideline on pyelonephritis \(acute\):](#)
8 [antimicrobial prescribing](#). **[2007, amended 2018]**
- 9 1.2.6 Give babies and children over 3 months with lower UTI antibiotics in line
10 with the [NICE guideline on urinary tract infection \(lower\): antimicrobial](#)
11 [prescribing](#). **[2007, amended 2018]**
- 12 1.2.7 For information about treating babies and children who were already on
13 prophylactic antibiotics who then developed a UTI see the [NICE](#)
14 [guidelines on pyelonephritis \(acute\): antimicrobial prescribing](#), [urinary](#)
15 [tract infection \(lower\): antimicrobial prescribing](#) and [urinary tract infection](#)
16 [\(recurrent\): antimicrobial prescribing](#).
- 17 1.2.8 Do not use antibiotics to treat asymptomatic bacteriuria in babies and
18 children. **[2007]**
- 19 1.2.9 Laboratories should monitor patterns of urinary pathogen resistance and
20 make this information routinely available to prescribers. **[2007]**

21 **Preventing recurrence**

- 22 1.2.10 Manage dysfunctional elimination syndromes and constipation in babies
23 and children who have had a UTI. **[2007]**
- 24 1.2.11 Encourage children who have had a UTI to drink enough water to avoid
25 dehydration. **[2007]**
- 26 1.2.12 Ensure that children who have had a UTI have access to clean toilets
27 when needed and do not have to delay voiding unnecessarily. **[2007]**

1 Prophylactic antibiotics

2 1.2.13 Do not routinely give prophylactic antibiotics to babies and children
3 following first-time UTI. **[2007]**

4 1.2.14 See the [NICE guideline on urinary tract infection \(recurrent\): antimicrobial
5 prescribing](#) for prophylactic antibiotic treatment for recurrent UTI in babies
6 and children.

7 1.2.15 Do not give prophylactic antibiotics to babies and children with
8 asymptomatic bacteriuria. **[2007]**

9 Imaging tests for localising UTI

10 1.2.16 Do not routinely use imaging to localise UTI. **[2007]**

11 1.2.17 In rare instances when it is clinically important to confirm or exclude acute
12 upper UTI, use either:

- 13 • power doppler ultrasound **or**
- 14 • a dimercaptosuccinic acid (DMSA) scintigraphy scan if power doppler
15 ultrasound is not available or the diagnosis has not been confirmed.
16 **[2007]**

17 1.3 Imaging tests

18 1.3.1 Send babies and children with atypical UTI (see box 1) for a urinary tract
19 ultrasound during the acute infection, to identify structural abnormalities
20 such as obstruction and to ensure prompt management, as outlined in
21 tables 4, 5 and 6. **[2007]**

22 1.3.2 Send babies younger than 6 months with first-time UTI that responds to
23 treatment for ultrasound within 6 weeks of the UTI, as outlined in table 4.
24 **[2007]**

25 1.3.3 Do not routinely send babies and children over 6 months with first-time
26 UTI that responds to treatment for an ultrasound, unless they have
27 atypical UTI as outlined in tables 5 and 6. **[2007]**

1 1.3.4 Babies and children who have had a lower UTI should be sent for
2 ultrasound (within 6 weeks) only if they:

- 3 • are younger than 6 months **or**
- 4 • have had recurrent infections. **[2007]**

5 1.3.5 Use a DMSA scan 4 to 6 months after the acute infection to detect renal
6 parenchymal defects in babies and children, as outlined in tables 4, 5 and
7 6. **[2007]**

8 1.3.6 If the baby or child has a subsequent UTI while waiting for a DMSA scan,
9 review the timing of the scan and consider doing it sooner. **[2007]**

10 1.3.7 Do not routinely use imaging to identify VUR in babies and children who
11 have had a UTI, except in specific circumstances as outlined in tables 4, 5
12 and 6. **[2007]**

13 1.3.8 When a MCUG is done, give prophylactic antibiotics orally for 3 days with
14 the MCUG on the second day. **[2007]**

15 1.3.9 Send babies and children who have had a UTI for imaging, as outlined in
16 tables 4, 5 and 6. **[2007]**

17 **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
Dimercaptosuccinic acid scintigraphy scan 4 to 6 months after the acute infection	No	Yes	Yes
MCUG	No	Yes	Yes

1 See box 1 for definitions of atypical and recurrent urinary tract infection.
 2 In a baby with a non-E. coli UTI that is responding well to antibiotics and has no
 3 other features of atypical infection, a non-urgent ultrasound can be requested, to
 4 happen within 6 weeks.

5 **Table 5 Recommended imaging schedule for babies and children between**
 6 **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

7 See box 1 for definitions of atypical and recurrent urinary tract infection.
 8 While micturating cystourethrogram (MCUG) should not be performed routinely it
 9 should be considered if the following features are present:

- 10 • dilatation on ultrasound
- 11 • poor urine flow
- 12 • non-E. coli-infection
- 13 • family history of vesicoureteral reflux.

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

17 **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

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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

- 1 See box 1 for definitions of atypical and recurrent urinary tract infection.
- 2 Ultrasound in toilet-trained children should be performed with a full bladder with an
- 3 estimate of bladder volume before and after urination.
- 4 In a child with a non-E. coli UTI that is responding well to antibiotics and has no other
- 5 features of atypical infection, a non-urgent ultrasound can be requested, to happen
- 6 within 6 weeks.

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 episode of UTI with lower UTI (cystitis), or
- Three or more episodes of UTI with lower UTI

1 **1.4 Surgical intervention**

2 1.4.1 Do not routinely use surgery for management of VUR. **[2007]**

3 **1.5 Follow-up**

4 1.5.1 Do not routinely follow-up babies and children who have not had imaging
5 investigations. **[2007]**

6 1.5.2 Discuss and agree with parents, carers or the young person (as
7 appropriate) how the results of imaging will be communicated. **[2007]**

8 1.5.3 Do not routinely offer follow-up outpatient appointments when the results
9 of investigations are normal. **[2007]**

10 1.5.4 Give parents or carers the results of all investigations in writing. **[2007]**

- 1 1.5.5 Refer babies and children who have recurrent UTI or abnormal imaging
2 results for assessment by a paediatric specialist. **[2007]**
- 3 1.5.6 When assessing babies and children with renal parenchymal defects,
4 include height, weight, blood pressure and routine testing for proteinuria.
5 **[2007]**
- 6 1.5.7 Do not offer long-term follow-up to babies and children with minor,
7 unilateral renal parenchymal defects, unless they have recurrent UTI or
8 family history or lifestyle risk factors for hypertension. **[2007]**
- 9 1.5.8 Babies and children who have bilateral renal abnormalities, impaired
10 kidney function, raised blood pressure or proteinuria should have
11 monitoring and appropriate management by a paediatric nephrologist to
12 slow the progression of chronic kidney disease. **[2007]**
- 13 1.5.9 Do not routinely retest babies' and children's urine for infection, if they are
14 asymptomatic after an episode of UTI. **[2007]**
- 15 1.5.10 Do not follow-up babies and children based only on the presence of
16 asymptomatic bacteriuria. **[2007]**

17 **1.6 Information and advice**

- 18 1.6.1 Healthcare professionals should ensure that when a child or young person
19 has a suspected UTI, they and their parents or carers (as appropriate) are
20 told about the need for treatment, the importance of completing any
21 course of treatment and given advice about prevention and long-term
22 management. **[2007]**
- 23 1.6.2 Ensure that children and young people, and their parents or carers (as
24 appropriate), know that UTIs can recur and that it is important to remain
25 vigilant and to seek prompt treatment for any suspected reinfection.
26 **[2007]**
- 27 1.6.3 Offer children and young people, and their parents or carers (as
28 appropriate) advice and information on:

- 1 • prompt recognition of symptoms
- 2 • urine collection, storage and testing
- 3 • treatment options
- 4 • prevention
- 5 • the nature of and reason for any urinary tract investigation
- 6 • prognosis
- 7 • reasons and arrangements for long-term management if required.
- 8 **[2007]**

9 **Terms used in this guideline**

10 **Bacteriuria**

11 Bacteria in the urine with or without UTI.

12 **Pyuria**

13 White cells in the urine.

14 **Recommendations for research**

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

17 **Key recommendations for research**

18 **1 Symptoms and signs of urinary tract infection in children and young** 19 **people aged 5 years and above but under 16 years**

20 What are the symptoms and signs of urinary tract infection (UTI) in children and
21 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 A: symptoms and signs](#).

22

1 **2 Long term risk of renal scarring and impaired renal function**

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

5 **Why this is important**

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

15 **3. Symptoms and signs of recurrent urinary tract infection**

16 Do the symptoms and signs of UTI in babies, children and young people aged under
17 16 years differ in those with a history of recurrent UTIs compared with those without
18 a history of recurrent UTI? [2022]

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

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

19 **4. Symptoms and signs of persistent urinary tract infection**

20 Do the symptoms and signs of UTI in children and young people aged under 16
21 years differ in those with a persistent UTI (i.e., refractory to treatment) compared with
22 those without a persistent UTI? [2022]

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

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

1 **Rationale and impact**

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

4 **Symptoms and signs**

5 [Recommendations 1.1.1 to 1.1.8](#)

6 **Why the committee made the recommendations**

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

11 Table 1 includes several symptoms and signs that suggest a UTI is either more likely
12 or less likely to be present. The committee agreed the table gives more certainty
13 about which symptoms and signs make UTI more or less likely and highlights that
14 many included in the 2007 version of the guideline (dysuria [painful urination], urinary
15 frequency, loin tenderness and bedwetting) were still found to be useful. However,
16 the evidence around many of these symptoms and signs as indicators of UTI was
17 low- or very-low-quality because many of the studies were not designed to assess
18 diagnostic accuracy and had poor definitions of the symptoms and signs they
19 reported. Therefore, the committee agreed that due to the remaining uncertainty the
20 table should be used as a guide, alongside clinical judgement.

21 The committee were concerned that some unwell babies, children and young people
22 with a possible UTI might not have further tests because they lack the symptoms or
23 signs listed in table 1. The list contained in the table is not exhaustive and the
24 committee therefore agreed that it may still be necessary to test for UTI, if healthcare
25 professionals suspect UTI despite the absence of any symptoms or signs in the
26 table.

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

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

20 The committee were concerned about the accurate diagnosis of UTI in unwell babies
21 aged under 3 months. In the committee's experience, these babies can often have
22 co-infection of the urinary tract and other sites (such as bacteraemia or meningitis).
23 But there was little evidence for the symptoms and signs of UTI for this specific age
24 group. The committee agreed that some of the symptoms and signs in table 1 could
25 be applied to babies under 3 months. However, the committee noted that the section
26 on management by the paediatric specialist in [NICE's guideline on fever in under 5s](#)
27 recommends carrying out a number of tests on babies under 3 months with fever,
28 including urine testing for UTI. They therefore included this in the recommendation
29 for consistency and to highlight tests for other causes of fever in babies under 3
30 months.

31 The committee looked at evidence for other symptoms and signs that are not
32 included in table 1:

- 1 • Sleepiness or lethargy, irritability, poor feeding, vomiting, failure to thrive, and
2 jaundice: these were not found to be clinically useful in determining whether a UTI
3 is present based on the evidence included in this review.
- 4 • Haematuria (blood in the urine) and cloudy urine: the evidence suggested these
5 increased the likelihood of a UTI being present. However, healthcare
6 professionals could not assess these without a urine sample (parents, carers and
7 children do not generally report these symptoms themselves), and these
8 recommendations focus on when to request a urine sample in the first place.

9 However, the committee agreed to include darker urine as a symptom or sign in the
10 table. Although it can be excluded for similar reasons to haematuria and cloudy
11 urine, and can be common in those who are unwell and dehydrated, the committee
12 felt it might be a useful indicator of UTI in babies or children who wear nappies.

13 The committee noted that the symptoms and signs that indicate a UTI is less likely
14 may suggest a different site of infection (such as the respiratory tract) but do not
15 necessarily rule out a UTI. However, they agreed that the urine of babies, children
16 and young people aged 3 months and over should not be routinely tested if they
17 have symptoms and signs that suggest they have another type of infection. This is
18 because it would be clinically unnecessary, waste resources and could increase the
19 stress experienced by the baby or child and their family and carers. However, if they
20 remain unwell and there is diagnostic uncertainty, a urine test may be needed to
21 exclude UTI.

22 The committee acknowledged that in practice there may be delays in obtaining a
23 urine sample for testing if one cannot be obtained during consultation. They agreed
24 that both urine collection and testing should happen without delay to ensure rapid
25 and accurate diagnosis. However, the committee were aware that not everyone with
26 a UTI will not necessarily be detected by a urine culture. Therefore, there is a risk of
27 these babies, children and young people remaining undiagnosed. But they noted that
28 recommendation 1.1.21 covers this situation.

29 The committee identified several gaps in the evidence. Most studies looked at
30 symptoms and signs of UTI in babies and children aged under 5. Those that did
31 include older children still had average ages closer to 5 than 16 and did not present

1 data separately for older children. The committee therefore made a [recommendation](#)
2 [for more research](#) to be carried out into the symptoms and signs of UTI in children
3 and young people aged 5 years and above but under 16 years. They also noted that
4 there was no evidence on whether the symptoms and signs of recurrent UTI in
5 babies, children and young people under 16 differed to acute UTI and made a
6 [research recommendation](#). Finally, they made a research recommendation to
7 investigate the symptoms and signs of persistent (i.e., refractory to treatment) UTI as
8 this was also not covered by the evidence.

9 **How the recommendations might affect practice**

10 The recommendations are unlikely to substantially change practice because the
11 diagnostic pathway remains the same, although some of the symptoms and signs
12 suggesting a UTI have changed. The absence of a recommendation for any
13 diagnostic algorithm combining symptoms and signs, means that there will be little
14 impact on clinical resources or training.

15 [Return to recommendations 1.1.1 to 1.1.8](#)

16 **Urine testing**

17 [Recommendations 1.1.17, 1.1.18](#) and [1.1.22](#)

18 **Why the committee made the recommendations**

19 Evidence showed that a positive urine dipstick test for leukocyte esterase or nitrite in
20 children 3 months or older but younger than 3 years greatly increases the likelihood
21 of a positive urine culture. Sending only positive samples for culture offered a better
22 balance of benefits and costs for these children than prescribing antibiotics and urine
23 culture for all children. The committee agreed that there are concerns about sepsis in
24 babies under 3 months with suspected urinary tract infection (UTI), and usual
25 practice is referral rather than the GP managing symptoms. So the committee
26 recommended that all children under 3 months should be referred to specialist
27 paediatric care and have a urine sample sent for urgent microscopy and culture. In
28 children aged 3 months or older but younger than 3 years, symptoms are easier to
29 identify, and antibiotics should only be started if a dipstick test is positive for either or

1 both leukocyte esterase or nitrite. Children in this age group with a positive dipstick
2 test should also have a urine sample sent for culture.

3 **How the recommendations might affect practice**

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

11 [Return to recommendations 1.1.17 and 1.1.18](#)

12 [Return to recommendation 1.1.22](#)

13 **Context**

14 In the past 30 to 50 years, the natural history of urinary tract infection (UTI) in
15 children has changed as a result of the introduction of antibiotics and improvements
16 in healthcare. This change has contributed to uncertainty about the most appropriate
17 and effective way to manage UTI in children, and whether or not investigations and
18 follow-up are justified.

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

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

1 Areas not addressed by the guideline include children with urinary catheters in situ,
2 children with neurogenic bladders, children already known to have significant pre-
3 existing uropathies, children with underlying renal disease (for example, nephrotic
4 syndrome), children who are immunosuppressed, and babies and children in
5 intensive care units. It also does not cover preventive measures or long-term
6 management of sexually active girls with recurrent UTI.

7 In 2017, we updated the recommendations on urine-testing strategies for babies and
8 children under 3 years.

9 **Finding more information and committee details**

10 To find NICE guidance on related topics, including guidance in development, see the
11 [NICE webpage on urinary tract infection](#).

12 For details of the guideline committee see the [committee member list](#).

13 **Update information**

14 **May 2022**

15 We have reviewed the evidence on diagnosis for babies, children and young people
16 under 16 with suspected urinary tract infections.

17 Recommendations are marked **[2022]** if the evidence has been reviewed.

18 **Recommendations that have been changed without an evidence** 19 **review**

20 For recommendations shaded in grey and ending **[2007]**, **[2017]** or **[2007, amended**
21 **2018]** we have not reviewed the evidence, but minor changes have been made to
22 update links and to bring the language and style up to date. The intent of these
23 recommendation has not been changed. Minor changes are listed in [table 1](#).

24 See also the [previous NICE guideline and supporting documents](#).

1 **Table 1 Minor changes to recommendation wording (no change to intent)**

Recommendation numbers in current guideline	Comment
All recommendations	Recommendations have been edited into the direct style (in line with current NICE style for recommendations in guidelines) where possible.
All recommendations	Language has been updated to current NICE style, for example 'babies' has been used instead of 'infants'.
Tables 2 to 6	The structure and layout of the tables has been changed to improve their clarity and accessibility for users of screen readers. Information previously displayed as footnotes is now shown underneath each table.

2

3 **October 2018:** Recommendations 1.2.5 and 1.2.6 have been amended to bring
4 them into line with NICE's guidelines on [pyelonephritis \(acute\): antimicrobial](#)
5 [prescribing](#) and [urinary tract infection \(lower\): antimicrobial prescribing](#), respectively.

6 **September 2017:** We reviewed the evidence on urine testing strategies for infants
7 and children under 3 years and updated recommendations in the section on urine
8 testing.

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