Diagnosis, treatment and long-term management of urinary tract infection in infants and children

Note: This algorithm should not be applied for infants or children with dilated pelvis or other urinary tract abnormalities identified from antenatal ultrasound screening or to other groups not within the scope of the guideline

Appropriate information and advice must be provided at each stage

Infants younger than 3 months	Infants and children 3 months or older but younger than 3 years	Children 3 years or older

Suspecting UTI

Symptoms and signs suggesting UTI

The presence of risk factors for UTI with serious underlying pathology should be recorded

Most common ⟷ Least common		
Fever Vomiting Lethargy Irritability	Poor feeding Failure to thrive	Abdominal pain Jaundice Haematuria Offensive urine

	Most common ⟷ Least common		
Preverbal	Fever	Abdominal pain Loin tenderness Vomiting Poor feeding	Lethargy Irritability Haematuria Offensive urine Failure to thrive
Verbal	Frequency Dysuria	Dysfunctional voiding Changes to continence Abdominal pain Loin tenderness	Fever Malaise Vomiting Haematuria Offensive urine Cloudy urine

Assess the risk of serious illness using the traffic light system described in the *Feverish Illness in Children* guideline

Collecting urine

Urine should be tested in infants and children who have symptoms suggesting UTI described above. Those with unexplained fever of 38 °C or higher should have a urine sample tested after 24 hours at the latest

Collect urine using a clean catch sample

if not possible see guideline for details

Testing urine

Infants younger than 3 months

- ***Refer to paediatric specialist care***
- ***Urine sample for urgent microscopy and culture***
- ***Manage in line with 'Feverish illness in children' (NICE clinical guideline 47)***

Infants and children 3 months or older but younger than 3 years

Use urgent microscopy and culture to diagnose UTI

Specific urinary symptoms		Urine sample for urgent microscopy and culture Start antibiotic treatment If urgent microscopy is not available, send a urine sample for microscopy and culture, and start antibiotic treatment.
Non-specific urinary symptoms	**High risk of serious illness**	Urgent referral to paediatric specialist care Urine sample for urgent microscopy and culture Manage in line with 'Feverish illness in children' (NICE clinical guideline 47).
	Intermediate risk of serious illness	Consider urgent referral to a paediatric specialist as described in 'Feverish illness in children' (NICE clinical guideline 47) When specialist paediatric referral is not required: • Urgent microscopy and culture should be arranged • Antibiotic treatment should be started if microscopy is positive • When urgent microscopy is not available, dipstick testing may be used as a substitute • The presence of nitrites suggests the possibility of infection and antibiotic treatment should be started In all cases, a urine sample should be sent for microscopy and culture.
	Low risk of serious illness	Urine sample for microscopy and culture Start antibiotic treatment if microscopy or culture is positive.

Children 3 years or older

Use dipstick test to diagnose UTI

Both leucocyte esterase and nitrite positive	Start antibiotic treatment for UTI If high or intermediate risk of serious illness or past history of UTI, send urine sample for culture
Leucocyte esterase negative and nitrite positive	Start antibiotic treatment if fresh sample was tested. Send urine sample for culture
Leucocyte esterase positive and nitrite negative	Send urine sample for microscopy and culture Only start antibiotic treatment for UTI if there is good clinical evidence of UTI Result may indicate infection elsewhere Treat depending on results of culture
Both leucocyte esterase and nitrite negative	Do not start treatment for UTI Explore other causes of illness Do not send urine sample for culture unless recommended in 'Indications for sending for culture'

Guidance on microscopy results

	Pyuria positive	**Pyuria negative**
Bacteriuria positive	Having UTI	Having UTI
Bacteriuria negative	Start antibiotics if clinically UTI	Not having UTI

Indications for sending for culture

- acute pyelonephritis/upper urinary tract infection
- a high to intermediate risk of serious illness
- younger than 3 years
- a single positive result for leucocyte esterase or nitrite
- recurrent UTI
- an infection that does not respond to treatment within 24–48 hours
- when clinical symptoms and dipstick tests do not correlate.

Symptomatic infants or children with a positive urine culture should be treated.

Acute management

Treatment required

Treatment should be provided according to the risk of serious illness as shown below. When there is doubt about the level of risk of serious illness the child should be managed in accordance with the higher risk level. *Children with atypical UTI should have early imaging (see 'Imaging strategies')

High risk of serious illness and/or **Children younger than 3 months with suspicion of UTI**	Immediately refer to paediatric specialist care Microscopy and culture Treat with IV antibiotics if younger than 3 months
Acute pyelonephritis/upper urinary tract infection Children who have bacteriuria and fever 38 °C or higher Children presenting with fever lower than 38 °C with loin pain/tenderness and bacteriuria	Consider referral to paediatric specialist care Urine culture if not already done Treat with 7–10 days oral antibiotics (if oral antibiotics cannot be used, consider IV antibiotics)
Cystitis/lower urinary tract infection All other infants and children with symptoms or signs of UTI who have bacteriuria but no systemic symptoms or signs	Treat with 3 days oral antibiotics Review if still unwell after 24–48 hours

Imaging strategies

Children with cystitis/lower urinary tract infection should undergo ultrasound (within 6 weeks) only if they are younger than 6 months or have had recurrent infection. No other investigations are required for any child with cystitis/lower urinary tract infection unless they have recurrent UTI and/or abnormality on ultrasound, in which case late DMSA should be considered

Children younger than 6 months	**Responds well to treatment within 48 hours without any features for atypical and/or recurrent UTI**	**Atypical UTI**	**Recurrent UTI**
Ultrasound during the acute infection	No	Yes[b]	Yes
Ultrasound within 6 weeks	Yes[a]	No	No
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	Yes	Yes

[a] If abnormal consider MCUG.
[b] 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.

Children 6 months or older but younger than 3 years	**Responds well to treatment within 48 hours without any features for atypical and/or recurrent UTI**	**Atypical UTI**	**Recurrent UTI**
Ultrasound during the acute infection	No	Yes[b]	No
Ultrasound within 6 weeks	No	No	Yes
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	No[a]	No[a]

[a] 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..
[b] 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.

Children 3 years or older	**Responds well to treatment within 48 hours without of features for atypical and/or recurrent UTI**	**Atypical UTI**	**Recurrent UTI**
Ultrasound during the acute infection	No	Yes[a b]	No
Ultrasound within 6 weeks	No	No	Yes[a]
DMSA 4–6 months following the acute infection	No	No	Yes
MCUG	No	No	No

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

Definitions

Atypical UTI* includes:

- seriously ill
- 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 pyelonephritis/upper urinary tract infection, or
- one episode of UTI with acute pyelonephritis/upper urinary tract infection plus one or more episode of UTI with cystitis/lower urinary tract infection, or
- three or more episodes of UTI with cystitis/lower urinary tract infection.

***Presence of any of these features should be documented**

Follow-up