

URINARY TRACT INFECTIONS

UTI in Children

UTI is associated with a higher risk of underlying congenital renal anomalies, pyelonephritis, acquired renal scarring and recurrent infection. This is particularly so in young children or if the UTI is associated with recurrence or atypical features. Diagnosis should be considered in all febrile children or if there are features suggestive of UTI. **It requires a [carefully collected urine sample](#) (MSU, CSU or Bag Urine) taken prior to antibiotic therapy.**

A clinical assessment should be made as to the likelihood of a:

Lower UTI (cystitis) – significant bacteriuria with no systemic features.

Upper UTI (acute pyelonephritis) – significant bacteriuria with fever $\geq 38^{\circ}\text{C}$.

Or significant bacteriuria with fever $< 38^{\circ}\text{C}$ and loin pain/tenderness.

Particular attention should be paid to the following features, which may warrant paediatric follow-up or referral for further investigation:

- Poor urine flow, dysfunctional voiding, enlarged bladder or abdominal mass
- History suggesting previous UTI or confirmed previous UTI
- Recurrent fever of uncertain origin
- Antenatally diagnosed renal abnormality
- Family history of vesicoureteric reflux or renal disease
- Constipation
- Evidence of spinal lesion or lower limb neurology
- Poor growth
- High blood pressure.

Assessment should be made as per NICE guideline NG143, Fever in under 5s: assessment and initial management.

Some children will require referral during acute illness for treatment in the hospital. Others can be treated at home but will need a referral at the time or afterwards for further investigations (see NICE NG224).

Admit to hospital for treatment during the acute illness if:

< 3 months of age with a suspected UTI

- Manage in line with the [sections on management by the non-paediatric practitioner](#)
- Send a urine sample for urgent microscopy and culture
- Severely ill or with a high risk of serious illness ([see the section on assessment of the risk of serious illness](#)).
- [Atypical feature](#) (unless the non-*E.coli* organism is the only atypical feature):
- Failure to respond to a suitable antibiotic within **48 hours**
- Seriously ill ([refer to NICE NG143 for more information](#))
- Suspected or confirmed septicaemia or raised creatinine ([see NICE NG51 for more information](#))
- Poor urine flow +/- palpable bladder or abdominal mass
- Non-*E.coli* UTI

Refer for further investigation if:

<6 months of age

Non-*E.coli* UTI

Recurrent UTIs (see [NICE NG224](#) for definition)

Children with:

- Any antenatal urinary tract abnormality
- Abnormal blood pressure
- Evidence of spinal lesion and lower limb neurology
- Abnormal growth/centiles

DIAGNOSIS (*avoid delay when collecting and testing the urine sample*)

- **Test the urine** of babies, children and young people if they have symptoms and signs that increase the likelihood that a urinary tract infection (UTI) is present. ([See Table 1](#)).
- **Consider urine testing**
 - Babies, children and young people: if they are unwell and there is a suspicion of a UTI (*even if the signs and symptoms do not increase the likelihood that a UTI is present*).

- Babies, children and young people 3 months and over: if they remain unwell, and there is diagnostic uncertainty (*even when the signs and symptoms suggest an infection other than a UTI*).
- **Do not routinely test the urine** of babies, children and young people 3 months and over with symptoms and signs suggesting an infection other than a UTI.

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

| Increase the likelihood that UTI is present | 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 - fever - shivering - abdominal pain - loin tenderness or suprapubic tenderness - capillary refill longer than 3 seconds - previous history of confirmed UTI | <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 |

URINE TESTING: Dipstick for leukocyte esterase and nitrite – safe and diagnostically as useful as microscopy and culture

Table 2. For babies and children between 3 months and 3 years with suspected UTI, and

| Urine dipstick test result | Strategy |
|---|--|
| If both leukocyte esterase and nitrite are negative | Do not give antibiotics Do not send a urine sample for microscopy and culture unless the child meets one or more of the criteria in table 4 . |
| If leukocyte esterase or nitrite, or both are positive | Send the urine sample for culture and give antibiotics. |

Table 3. For children aged 3 years or older. Use the urine-testing strategy below.

| Urine dipstick test result | Strategy |
|--|--|
| Leukocyte esterase and nitrite are both positive | Assume the child has a UTI and give them antibiotics. If the child meets one or more of the criteria in table 4 , 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 the 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. Do not send a urine sample for culture unless the child meets one or more of the criteria in table 4 . Explore other possible causes of the child's illness. |

Table 4. Send urine samples for culture if a baby or child:

- is thought to have acute upper UTI (pyelonephritis)
- has a high to intermediate risk of serious illness ([section on clinical assessment of children with fever in the NICE guideline on fever in under 5s: assessment and initial management](#))
- 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.
- has an antenatally detected renal tract abnormality
- has a known renal tract abnormality

For full guidance on the referral, investigation and follow-up of children with UTI, please refer to [NICE NG224 Urinary Tract Infection in Children](#). See below for first-line treatments and dosing guidance.

Table 5. UTI Treatments and Dosing Guidance

| Drug | Dose | | Duration | Comments |
|---|--------------------|---|---------------------|---|
| Lower UTI (3 months – 11 years) – Review at 48 hours to check the response to treatment, noting trimethoprim resistance rates are over 30% | | | | |
| If <15kg OR unable to take tablets | | | | |
| Trimethoprim <i>Do not use if trimethoprim resistance or failed trimethoprim treatment.</i> | 3 – 5 months | 25mg twice daily | 3 days | Liquid for doses<100mg |
| | 6 months – 5 years | 50mg twice daily | | |
| | 6 – 11 years | 100mg twice daily | | |
| If >15kg and able to take tablets | | | | |
| Pivmecillinam <i>Avoid if penicillin allergy.</i> | >15kg and <40kg | 200mg three times daily | 3 days (9 tablets) | Unsuitable in carnitine deficiency or patients who are taking sodium valproate. Tablets should be swallowed whole with half a glass of water whilst sitting or standing. |
| If known trimethoprim resistance or failed trimethoprim treatment (and unable to take pivmecillinam) | | | | |
| Nitrofurantoin | 3 months – 11yrs | 750 micrograms/kg four times daily | 3 days | Not suitable for G6PD deficiency or acute porphyria. The liquid is very expensive but may be clinically necessary. |
| Lower UTI (12 -17 years) | | | | |
| First-line | | | | |
| Nitrofurantoin | 12 – 17 years | 100mg MR twice a day (50mg four times daily if supply problem with MR capsules) | 3 days | Not suitable in G6PD deficiency or acute porphyria <i>N.B. The liquid is very expensive and, therefore, not recommended. Use tablets or capsules, or consider an alternative agent.</i> |
| Second line | | | | |
| Pivmecillinam <i>Avoid if penicillin allergy.</i> | >15kg and <40kg | 200mg three times daily | 3 days (9 tablets) | <i>if >15kg and able to take tablets Avoid if penicillin allergy Unsuitable in carnitine deficiency or patients taking sodium valproate</i> |
| | > 40kg | 400mg stat, then 200mg three times daily | 3 days (10 tablets) | |
| OR | | | | |
| Fosfomycin | 12 – 17 years | 3g one-off | Single-dose | <i>As an option when we can't use Nitrofurantoin</i> |
| Upper UTI | | | | |
| Cefalexin | 3 – 11 months | 125mg twice daily | 7-10 days | Review children at 48 hours to check the response to the chosen antibiotic. |
| | 1 – 4 years | 125mg three times daily | | |
| | 5 –11 years | 250mg three times daily | | |
| | 12 – 17 years | 500mg three times daily | | |

| Version Control- UTI in Children | | | |
|----------------------------------|--|----------|---|
| Version | Author(s) | Date | Changes |
| V2.1 | Shary Walker, Interface and Formulary Pharmacist | 19/08/21 | 1. Updated children's and adult's doses in line with the new age updates from BNF. |
| V3.1 | Shary Walker | 30/08/22 | 1. Updated in line with NG224 : Published 27/06/22. 2. Links to associated NICE guidance added for more information. 3. Added the following: a) Diagnosis b) Table 1: signs and symptoms that increase/decrease the likelihood of UTI c) Tables 2 & 3: Urine dipstick strategies d) Table 4: Criteria for sending urine samples |
| | | 26/10/22 | 4. Table 5: Abbreviations written in full words |