

UTI in Children

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Risk factors for UTI

- Poor urine flow
- Previous proved or suspected UTI
- Recurrent fever of unknown origin
- Antenatally diagnosed renal abnormality
- Family history of vesico-ureteric reflux
- constipation

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Risk factors for UTI

- Dysfunctional voiding
- Enlarged bladder
- Abdominal mass
- Evidence of spinal lesion
- Poor growth high blood pressure

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When to suspect UTI

- <3/12 UTI should be suspected if signs and symptoms are present, including fever, vomiting, lethargy or irritability, poor feeding or failure to thrive.
- >3/12 UTI should be suspected if signs and symptoms are present, including fever, frequency, dysuria, abdominal pain, loin tenderness, vomiting, poor feeding, dysfunctional voiding, or changes to continence

*Pyelonephritis should be suspected in all children with unexplained fever of 38°C or more, or loin pain/tenderness

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In children with UTI, ask about (and make a record of) factors which may indicate recurrent infection and/or an underlying pathology, including:

- Poor urine flow.
- History of suspected or confirmed UTI.
- Recurrent fever of uncertain origin.
- Antenatally diagnosed renal abnormality.
- Family history of vesicoureteric reflux (VUR) or renal disease.
- Constipation.
- Dysfunctional voiding.
- Enlarged bladder.
- Abdominal mass.
- Spinal lesion.
- Poor growth.
- High blood pressure.

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Symptoms or signs that indicate a high risk of serious illness in children under the age of 5 years include:

- Temperature of 38°C or higher in an infant younger than 3 months of age.
- Pale/mottled/ashen/blue skin, lips, or tongue.
- No response to social cues.
- Appearing ill to a healthcare professional.
- Not waking, or if roused not staying awake.
- Weak, high-pitched or continuous cry.
- Grunting.
- Respiratory rate greater than 60 breaths per minute.
- Moderate or severe chest indrawing.
- Reduced skin turgor.
- Bulging fontanelle

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Symptoms or signs that indicate an intermediate risk of serious illness in children under the age of 5 years include:

- Temperature of 39°C or higher in an infant aged 3–6 months (indicates at least intermediate risk).
- Tachycardia (indicates at least intermediate risk).
 - Defined as >160 bpm in infants aged less than 12 months, >150 bpm in children aged 12–24 months, and >140 bpm in children aged 2–5 years.
- Respiratory rate more than 50 breaths/minute in children aged age 6–12 months or more than 40 breaths/minute in children aged over 12 months.
- Pallor of skin, lips or tongue reported by parent or carer.
- Not responding normally to social cues.
- Not smiling.
- Waking only with prolonged stimulation.
- Decreased activity.
- Nasal flaring.
- Dry mucous membranes.
- Poor feeding in infants.
- Reduced urine output.
- Rigors

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A low risk of serious illness is implied in children who have none of the high- or intermediate-risk features, and all of the following features:

- Normal colour of skin, lips and tongue.
- Normal response to social cues.
- Content/smiling.
- Staying awake or waking quickly.
- Strong normal cry.
- Normal skin and eyes.
- Moist mucous membranes

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Vesicoureteral Reflux

- Urine normally flows from the kidney down the ureters and into the bladder. This one-way flow is usually maintained because of a "flap-valve" where the ureter joins the bladder. With vesicoureteral reflux, the urine flows backwards from the bladder up the ureters to the kidneys. This urine may carry bacteria from the bladder up to the kidneys and cause a more serious kidney infection (pyelonephritis).

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Urine sampling

- A clean catch sample should be obtained
- If not possible
 - Use non invasive method i.e. Urine collection pad
 - Do not use cotton wool balls, gauze or sanitary towels.
- If non invasive method not possible
 - Use catheter sample or suprapubic aspiration

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Urine Samples

- Specimens should be transported and processed with 4 hours unless boric acid preservative is used — if this is not possible it should be refrigerated at 4°C. Urine that has been refrigerated at 4°C for 48 hours remains suitable for culture.
- If the sample is preserved with boric acid, it can be stored at room temperature prior to transport. Urine preserved with boric acid remains suitable for culture and microscopy for up to 96 hours.
- **Note:** boric acid may be inhibitory to some organisms and may inhibit tests for leukocyte esterase. It is essential to follow the manufacturer's instructions on sample volume in boric acid container

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Symptoms and signs

- Age < 3/12
- Most common
 - Fever, vomiting, lethargy, irritability
- Less common
 - Poor feeding, failure to thrive
- Least common
 - Abdominal pain, jaundice, haematuria, offensive urine.

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Symptoms and signs

- Age > 3/12 preverbal
- Most common
 - Fever
- Less common
 - Abdominal pain, loin tenderness, vomiting, poor feeding.
- Least common
 - Lethargy, irritability, haematuria, offensive urine, failure to thrive.

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Symptoms and signs

- Age > 3/12 verbal
- Most common
 - Frequency, dysuria
- Less common
 - Dysfunctional voiding, changes to continence. Abdominal pain, loin tenderness.
- Least common
 - Fever, malaise, vomiting, haematuria, offensive urine, cloudy urine

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	Pyuria positive	Pyuria negative
Bacteria positive	Treat as though has UTI	Treat as though has UTI
Bacteria negative	Antibiotic treatment to start if clinically has UTI	Treat as though does not have UTI

Microscopy results

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Management

- < 3/12
 - Refer to paediatricians

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Management

- Age > 3/12 < 3yrs
 - Specific urinary symptoms
 - Urine for urgent c&s
 - Start antibiotic treatment

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Management

- Age > 3/12 < 3yrs
 - Non specific symptoms high risk of serious illness
 - Urgent referral to paed
 - Urine for c&s
 - Manage in line with guidelines for feverish illness in children

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Management

- Age > 3/12 < 3yrs non specific symptoms
 - Intermediate risk of serious illness
 - Consider urgent referral paed
 - If referral not required
 - Urgent urine c&s
 - Start antibiotics if urine positive
 - If not available do dipstick testing
 - If nitrites present start antibiotics
 - Send sample for c&s

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Management

- Age > 3/12 < 3yrs low risk of serious illness
 - Urine sample of c&s
 - Start antibiotics if positive

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Management

- Children 3yrs or older use dipstick to diagnose UTI
 - Leucocyte esterase and nitrite positive
 - Start treatment for uti send sample for c&s
 - Leucocyte esterase negative nitrite positive on fresh sample
 - Start antibiotic treatment send sample for c&s

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Management

- Children 3 yrs or older
 - Leucocyte esterase positive, nitrite negative
 - Send urine sample for c&s
 - Only start antibiotics if has uti clinically
 - Both leucocyte esterase and nitrite negative
 - Explore other causes of illness
 - Do not start antibiotics for uti
 - Only send urine sample if recommended in “indications for culture”

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Antibiotics

- Do not prescribe antibiotic prophylaxis routinely for children following first-time urinary tract infection (UTI).
- When prescribing antibiotic prophylaxis for children with recurrent UTI, take account of local antimicrobial resistance data. Preferred treatment options are:
 - Trimethoprim. For children aged:
 - 3-5 months — 2 mg/kg at night (maximum 100 mg per dose) or 12.5 mg at night.
 - 6 months to 5 years — 2 mg/kg at night (maximum 100 mg per dose) or 25 mg at night.
 - 6-11 years — 2 mg/kg at night (maximum 100 mg per dose) or 50 mg at night.
 - 12-15 years — 100 mg at night.
 - Nitrofurantoin (if epi/a-sens/monosus). For children aged:
 - 3 months to 11 years — 1 mg/kg at night.
 - 12-15 years — 50-100 mg at night.
- If these are unsuitable, or inappropriate, second-line options are:
 - Cefixime. For children 3 months to 15 years — 12.5 mg/kg at night (maximum 125 mg per dose).
 - Amoxicillin. For children aged:
 - 3 months to 11 years — 62.5 mg at night.
 - 1-4 years — 125 mg at night.
 - 5-15 years — 250 mg at night.
- Review antibiotic prophylaxis for recurrent UTI at least every 6 months:
 - Assess the success of prophylaxis.
 - Discuss continuing, stopping or changing prophylaxis (taking into account the person's preferences for antibiotic use and the risk of antimicrobial resistance).
 - Remind the parents/carers about behavioural and personal hygiene measures and self-care treatments.
- If antibiotic prophylaxis is stopped, ensure that the child has rapid access to treatment if they have an acute UTI

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Age > 3 Months

- With acute pyelonephritis/upper UTI
 - Consider referral to paediatricians
 - Treat with oral antibiotics for 7-10 days (cephalosporin or co-amoxiclav)
 - If oral antibiotics not suitable give IV (cefatoxime or ceftriaxone) for 2-4 days then orally

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Age > 3 months

- With cystitis/lower UTI
 - Treat with oral antibiotics for 3 days choice depending on local resistance patterns
 - Parents should be advised if child still unwell after 24-48hrs to bring back for reassessment
 - If no alternative diagnosis made a urine sample should be sent for culture. Prophylactic antibiotics should not routinely be given in children following first time UTI. Imaging should be carried out as per guidelines

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Indications for culture

- Diagnosis of acute pyelonephritis/upperUTI
- High or intermediate risk of serious illness
- Single positive result on dipstick testing
- Recurrent UTI
- Infection that does not respond to treatment in 24-48hrs
- Clinical symptoms and dipstick testing don't correlate

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Localising site of infection

- Acute pyelonephritis/upperUTI
 - Bacteriuria and fever 38°C or higher
 - Bacteriuria, loin pain/tenderness and fever less than 38°C
- Cystitis/lowerUTI
 - Bacteriuria but no systemic features

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Provide parents or carers with information and advice.

- Advise the parents or carers to bring the child for reassessment if they do not respond to treatment within 24–48 hours.
 - At this follow-up, if an alternative diagnosis is not made, a urine sample should be sent for culture if this has not already been carried out.
- Outline the importance of completing any course of treatment.
- Advise use of paracetamol for pain relief where required. Advise on adequate fluid intake to avoid dehydration.
- Advise that children who have had a UTI should have ready access to clean toilets when required and should not be expected to delay voiding.
- Ensure that they are aware of the possibility of a UTI recurring and the need to seek prompt treatment from a healthcare professional should this occur

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Preventing recurrence

Address	Address dysfunctional voiding syndromes
Manage	Manage constipation
Encourage	Encourage children to drink adequate amounts
Advise	Advise not to delay voiding

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Imaging

- Age < 6/12
 - Responded to treatment within 48hrs
 - Ultrasound at 6/52
- Atypical UTI and recurrent UTI
 - Ultrasound during acute infection,
 - DMSA 4-6/12 after infection
 - MCUG

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Imaging

- Age > 6/12 but < 3yrs
 - Responded to treatment in 48hrs
 - No imaging required
 - Atypical UTI
 - Ultrasound during acute infection
 - DMSA at 4-6/12
 - Recurrent UTI
 - Ultrasound within 6/52 of infection
 - DMSA at 4-6/12

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Imaging

- Age 3yrs or older
 - Responds well to antibiotics within 48hrs
 - No imaging required
 - Atypical UTI
 - Ultrasound during acute infection
 - Recurrent UTI
 - Ultrasound within 6/52
 - DMSA at 4-6 months

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Referral and assessment

Those who have recurrent UTI or abnormal imaging results should be assessed by paediatric specialist

Those who do not require imaging do not need specialist assessment

Asymptomatic bacteriuria does not require follow up

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Some Differentials

- **Interstitial cystitis** — urinary frequency, urgency, bladder pain with relief on voiding.
- **Kawasaki disease** — rash, mucositis, extremity swelling, cervical lymph node swelling, conjunctivitis (however, no signs may be present in those below 6 months of age). Sterile pyuria present on urine microscopy.
- **Meningitis** — photophobia, rash, neck stiffness.
- **Nephrolithiasis** — colicky pain, family history, passing of particulate matter in the urine.
- **Sepsis with no urinary tract source** — jaundice and haemodynamic instability.
- **Threadworms** — perianal itching.
- **Urethritis** — urethral discharge, pelvic pain.
- **Voiding dysfunction** — urine withholding behaviours (squatting, 'Vincent curtsy', physical holding), urgency, frequency, incontinence.
- **Vulvovaginitis or vaginal foreign body** — vaginal discharge. There may be a history of sexual activity/abuse, and/or use of bubble baths.

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Safeguarding

- **Although it is rare, clinicians should be alert to the possibility of child abuse presenting with urinary symptoms.**
- Consider sexual abuse if a girl or boy has dysuria (discomfort on passing urine) or ano-genital discomfort that is persistent or recurrent and does not have a medical explanation (such as threadworms, urinary infection, skin conditions, poor hygiene, or known allergies).