NHS
Vale of York
Clinical Commissioning Group

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Referral Support Service

Paediatrics

PA05 Urinary Tract Infections in Children

Paediatric Normal Values (adapted from APLS)			
Age	Resp Rate	Heart Rate	Systolic BP
Neonate <4w	40-60	120-160	>60
Infant <1 y	30-40	110-160	70-90
Toddler 1-2 yrs	25-35	100-150	75-95
2-5 yrs	25-30	95-140	85-100

Definition

UTI is defined as clinical suspicion plus growth of ≥ 10^5 organisms/ml of a single bacteria on a clean catch urine or mid-stream urine

Exclude Red Flag Symptoms

- < 3 months
- Features suggestive of upper UTI
- Severe systemic illness

Low Threshold for Admission

- Age 3-6 months
- Poor urine flow, dysfunctional voiding
- Abdominal mass
- Failure to response to antibiotics in 24-48h
- Non-E.coli organisms

General Points

- UTI is common in infants and children, around 1 in 10 girls and 1 in 30 boys will have a UTI before aged 16 years
- UTI is more common in girls than boys, except for the first 6 months of life when it is more common in boys
- Around 3% of girls and 1% of boys will have had an upper UTI before aged 7 years
- It can be difficult to recognise UTI in children because the presenting symptoms and/or signs are non-specific, particularly in young children
- Urine collection and interpretation of urine tests in children are not easy and therefore it may not always be possible to unequivocally confirm the diagnosis
- If already receiving prophylaxis use a different antibiotic to treat presenting infection
- Only consider prophylaxis if recurrent UTIs on advice of paediatrics

Presenting Features

Age		Symptoms and signs		
		Most common		Least common
<3m		Fever Vomiting Lethargy Irritability	Poor feeding Failure to thrive	Abdominal pain Jaundice Haematuria Offensive urine
≥3m	Pre-verbal	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

Important Features in the History

- Poor urine flow, dysfunctional voiding
- Family history of vesicoureteric reflux or renal disease
- Any antenatal urinary tract abnormalities
- History suggestive of, or confirmed previous UTI
- Recurrent fever of uncertain origin
- Poor urine flow or dysfunctional voiding
- Constipation
- Persistent dysuria/anogenital symptoms in absence of confirmed pathology (UTI, threadworms) – consider sexual abuse

Examination

- Blood pressure checked with appropriate cuff size – if the child is co-operative (if not, the reading may be falsely elevated) and especially in children with recurrent UTI.
- Abdominal mass or enlarged bladder
- Evidence of spinal lesion and lower limb neurology
- Abdominal impression of faecal loading (do not perform digital rectal examinations in children) – constipation will lead to more episodes of UTI
- Growth measurements and centiles
- Genitalia examination (when appropriate)

Assessment

- Treatment should be provided according to the risk of serious illness
- The child should be managed in accordance with the highest risk level
- Children with atypical UTIs should have early imaging

Traffic light system for identifying severity of illness		
Green – Low Risk	**Amber – Upper UTI**	**Red – High Risk**
• Bacteriuria but not systemic signs of symptoms	• ≥ 6 months • Bacteriuria + T ≥ 38°C • Bacteriuria + loin pain/tenderness	• Under 3 months with clinical suspicion of UTI
All green	**Any amber and no red**	**If any red**
• Treat with oral antibiotics • Trimethoprim or nitrofurantoin • If lower UTI treat for 3 days • If upper UTI treat for 7-10 days • Second line: amoxicillin, cefalexin • *Seek advice if known to have chronic renal disease* • Use modified release nitrofurantoin capsules where possible or standard release capsules (can be opened and contents dissolved – off license use)	• If 3-6m low threshold for referral • Consider referral to acute paediatrics • Urine culture • Consider need for IV antibiotics and refer urgently if required	• Immediate referral to acute paediatrics • Microscopy and culture

In toddlers

- Clean catch urine (CCU) using potties washed in hot water (60°C) with washing up liquid are suitable
- Collecting a sample using cotton wool inside the nappy, there is an increased risk of contamination but provides another option if CCU us not possible.

In infants

- Clean catch urine is preferable
- A nappy collection pad can be used but is less accurate
- Bag urines are less comfortable and more expensive

Urine Dipstick

- Should be done on **freshly voided** urine (to avoid false positive nitrite result)
- All children with a T>38°C without a clear source should have urinalysis the same day
- If children have another source of pyrexia but response poorly to treatment then check urine
- Do not routinely re-check after the initial infection has been treated if they remain asymptomatic

Nitrites	Leucocytes	Management
Positive	Positive	Treat while awaiting culture
Positive	Negative	Treat while awaiting culture
Negative	Positive	Treat only if clinically good evidence of UTI. Look for another focus of infection
Negative	Negative	UTI unlikely. Look for another focus of infection

Indications for culture

- Suspected upper UTI
- Medium to high risk of serious illness
- <3y
- Single positive result for leukocyte or nitrite
- Recurrent UTI
- Infection not responding to treatment within 48h, if not sample has already been taken
- When clinical symptoms and dipstick tests don't correlate

Interpretation of Urinalysis

- Single organism ≥ 10^4 colony forming units (CFU)/ml
- Pyuria may be absent or present due to fever without UTI

Interpretation of Microscopy Results		
	WBC > 10/μ	**WBC < 10/μ**
Bacteriuria positive	UTI present	UTI present
Bacteriuria negative	Treat as UTI if clinical correlation	UTI absent

Management

When to Arrange Emergency Hospital Admission

- Under 3m, they are likely to have presented with a fever and all children under 3m with a fever should be treated as suspected sepsis

*Treatment of **Lower** UTI*

- Assess all children for risk of serious illness
- If child can be managed in primary care treat for 3 days *unless* systemically unwell then treat for 5-7 days
- Advise parents to being child for review if not improved within 48h
- If upper UTI suspected use the second table 'Treatment of Upper UTI'

Lower UTI			Refer to BNFc for full drug information
Drug	Age/weight	Dose	Comments
First Line Options			
Trimethoprim	3-5m	25mg BD for 3 days	Liquid doses for <100mg
	6m-5y	50mg BD for 3 days	
	6-11y	100mg BD for 3 days	
	12–15y	200mg BD for 3 days	
Nitrofurantoin	3m-11y	750mcg/kg QDS for 3 days	Not suitable to G6PD deficiency or acute porphyria. Liquid is expensive, not recommended. Capsules can be emptied and dissolved in water (off license use)
	≥ 12y	50mg QDS for 3 days	
Second Line Options			
Nitrofurantoin	As above	As above	2nd line only if it has not been used as a first-line option
Amoxicillin	1–11m	125 mg TDS for 3 days	if culture susceptible. Avoid in penicillin allergy
	1–4y	250 mg TDS for 3 days	
	5–15y	500 mg TDS for 3 days	
Cefalexin	3–11m	125 mg BD for 3 days	Avoid if severe penicillin allergy
	1–4y	125 mg TDS for 3 days	
	5–11y	250 mg TDS for 3 days	
	12–15y	500 mg BD for 3 days	

*Treatment of **Upper** UTI*

- Assess all children for risk of serious illness
- <3m should be admitted for intravenous antibiotics
- Consider referral but treatment in primary care may be appropriate with an older child
- If child can be managed in primary care treat for 7-10 days

Upper UTI (under 5y discuss with paediatrician)			Refer to BNFc for full drug information
Drug	Age/weight	Dose	Comments
Cefalexin	5 –11 years	250 mg TDS for 7–10 days	Avoid if severe penicillin allergy
	12–15 years	500 mg BD to TDS for 7–10 days	
Discuss with paediatrics if patient has severe penicillin			

Prevention of recurrence

- Address dysfunctional elimination syndromes and constipation
- Encourage oral intake
- Ready access to toilet when required and should not be expected to delay voiding

Investigations

- Aim is to target investigations to those most likely to have renal scarring and malformations predisposing them to UTI/pyelonephritis
- Children at most risk are those with severe systemic illness, recurrent symptomatic UTIs, infants <6m
- If the diagnosis is uncertain then decisions regarding investigation should be made by a Consultant Paediatrician

Atypical UTI

- Seriously ill and suspected/confirmed septicaemia
- Failure to respond to treatment with suitable antibiotics within 48 hours
- Poor urine flow and/or abdominal or bladder mass
- Raised creatinine
- Infection with non- *E.coli* organism

Recurrent UTI

- ≥ 2 episodes acute pyelonephritis
- 1 episode of acute pyelonephritis plus ≥ 1 episode(s) of UTI with cystitis
- ≥ 3 episodes of UTI with cystitis

Indications for Ultrasound

- Atypical UTI at any age required an USS during acute admission
- <6m single easily treated UTI will need USS within 6 weeks
- >6m recurrent UTIs will need USS within 6 weeks
- USS in toilet trained children should include a repeat scan after bladder emptying

Indications for referral

- Recurrent UTI's (≥ 3 UTIs)
- Pyelonephritis (≥ 2 episodes or 1 + a UTI)
- Requirement for imaging other than ultrasound (e.g DMSA/MCUG)
- Abnormal ultrasound
- Atypical UTIs
- Any child <6m not seen acutely

Information to include in referral letter

- Past medical history
- Details of infections and treatment with results of any urine MCS available

Investigations prior to referral

- Consider USS as above

Patient information leaflets/ PDAs

Patient.info/mens-health/urine-infection-in-men/urine-infection-in-children

Oxfordshireccg.nhs.uk/documents/patient-info/health-advice/UTI-in-Children-Leaflet.pdf

References

- BMJ Best Practice (2021) Urinary tract infections in children [Viewed 18 Aug 2021]
- National Institute for Clinical Excellent [NICE] (Updated 2018) *Urinary tract infection in under 16s: diagnosis and management [CG54]* [Viewed 18 Aug 2021]
- National Institute for Clinical Excellent [NICE] (2019) *Urinary tract infection - children.* [Viewed 18 Aug 2021]

Responsible Consultant: Dr Luke McLaughlin
Responsible GP: Dr Rebecca Brown
Responsible Pharmacist: Faisal Majothi

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