LRI Emergency Department and Children's Hospital

UHL Single Front Door for Children
Guideline for the management of :
Urinary Tract Infection (UTI) in Children

Staff relevant to:	Children's Hospital and ESM Medical and Nursing Staff
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Contents

1. INTRODUCTION AND WHO THIS GUIDELINE APPLIES TO

UTI is common in childhood. The age of the child affects their presentation and treatment, as does the presence of any renal tract anomalies. This guideline is not applicable to children with complex urological problems or anatomy, please discuss with the paediatric urology/renal teams.

Renal scarring and subsequent nephropathy are important causes of later hypertension and renal failure. Early diagnosis is essential, especially in infants, because this is the most vulnerable age for renal scarring.

Healthcare professionals should ensure that when a child or young person has been identified as having a suspected UTI, they and their parents or carers as appropriate are given information about the need for treatment, the importance of completing any course of treatment and advice about prevention and possible long term management. NICE has provided comprehensive guidance on this topic, which largely seeks to minimize perceived unnecessary management and investigations, whilst maintaining good clinical governance. These guidelines should be followed.

See also: NICE Guidelines 2022 ng224 urinary-tract-infection-in-under-16s-diagnosis-and-management

These local guidelines are in conjunction with NICE UTI Algorithms

Related guidelines:
Sepsis UHL Childrens Hospital Guideline UHL B31/2016
Urine Sample Collection UHL Childrens Guideline UHL C90/2005

2. DIAGNOSIS

- Test urine in babies, children and young people who have symptoms or signs that increase the likelihood of UTI (see table below).
- Consider testing urine if there is a suspicion of UTI, but none of the signs or symptoms in the table are present.
- Do not routinely test the urine of babies, children and young people who have signs and/or symptoms which suggest an alternative source of infection, unless they remain unwell and the diagnosis is uncertain.

Table 1: Symptoms and signs that increase or decrease the likelihood of UTI

Increased likelihood of UTI	Decreased likelihood of UTI
• Painful urination • More frequent urination • New bedwetting • Offensive urine • Dark urine • Cloudy urine • Blood in urine • Fever of 38°c or higher • Shivering • Abdominal pain • Loin or suprapubic tenderness • Prolonged capillary refill time • Previous history of confirmed UTI	• Absence of painful urination • Nappy rash • Breathing difficulties • Abnormal chest examination • Abnormal ear examination • Identified alternative cause for fever

This table is a guide only, not an exhaustive list, and should be used alongside clinical judgment.

Record the presence or absence of:

- Family history of vesicoureteric reflux or renal disease
- Any antenatal urinary tract abnormality
- History suggestive of, or confirmed, previous UTI
- Recurrent fever of uncertain origin
- Poor urine flow or dysfunctional voiding
- Constipation

EXAMINATION

The child should be assessed according to the Fever in under 5s: assessment and initial management (NICE 2019 https://www.nice.org.uk/guidance/ng143)
Particular attention should be made to:
• Blood pressure – see guideline on Hypertension UHL Childrens Medical Guideline

- Abdominal mass or enlarged bladder
- Evidence of spinal lesion and lower limb neurology
- Faecal loading
- Genitalia examination (when appropriate)
- Growth measurements and centiles

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

- Acute pyelonephritis/upper urinary tract infection
- fever ≥38°C or with loin pain/tenderness
- Cystitis/ Lower UTI
- absence of systemic features

Indications for urine examination (also see algorithm and NICE fever guidelines)

- Urinary symptoms - frequency, dysuria
- Unexplained prolonged fever
- Fever in an infant
- Unexplained vomiting or abdominal pain or enuresis
- Haematuria
- Hypertension
- Prolonged neonatal jaundice
- Faltering growth
- Suspected sexual abuse

Urine Specimens

- Consider in-out catheter for children under 1 year awaiting a urine sample in Children's ED.
- In children over 1 year, clean catch is the routine method of collection.
- Cotton wool balls, gauze and sanitary towels **should not** be used to collect urine in infants and children.
- Urine collection pads/bags should be discouraged, as there is a high contamination rate.
- Suprapubic aspirate can also be considered. Before this is attempted, ultrasound should be used to demonstrate the presence of urine in the bladder.

In an infant or child with a high risk of serious illness it is highly preferable that a urine sample is obtained; however, treatment should not be delayed for this. Using in-out catheter to obtain a sample can expedite the process.

If urine is to be cultured but cannot be cultured within 4 hours of collection, the sample should be immediately refrigerated or preserved with boric acid.

Use RED-TOPPED CONTAINERS (containing boric acid) where possible, which inhibits bacterial growth in the container and allows longer storage. If the urine volume is very low, please send in a universal container (especially from a very young infant).

DOCUMENT VERY CLEARLY IN THE NOTES WHEN AND HOW A URINE SAMPLE WAS OBTAINED AND WHEN IT WAS SENT TO THE LAB.

Confirming diagnosis

Infants < 3 months with a suspected UTI:

- Refer all infants <3 months with a suspected UTI to paediatrics
- Assess for Sepsis
- Send urine for urgent microscopy and culture (which will be processed during lab hours, if a sample is sent out of hours and a microscopy is required the following day, please ring Ext16520 or see User Handbook)
- Manage in line with the NICE guideline on fever in under 5s
- Start parenteral antibiotics as per sepsis guideline - Sepsis UHL Childrens Hospital Guideline

Indication for culture:

- in infants and children who are suspected to have acute pyelonephritis/upper urinary tract infection
- in infants and children with a high to intermediate risk of serious illness
- in infants under 3 months
- in infants and children with a positive result for leukocyte esterase or nitrite
- in infants and children with recurrent UTI
- in infants and children with an infection that does not respond to treatment within 24–48 hours, if no sample has already been sent
- when clinical symptoms and dipstick tests do not correlate

Child ≥ 3 months but < 3 years

If either or both leukocyte esterase and nitrite are positive	Start antibiotics, send urine sample for culture.

Be aware, in children voiding frequently (eg babies in nappies) a negative urine dipstick may not exclude UTI. In infants with a negative dipstick (for both leucocytes and nitrites), and no other explanation for the fever/presenting symptoms, send a sample for urgent microscopy and culture.

If both leukocyte esterase and nitrite are negative	Do not routinely start antibiotic treatment. Do not send a urine sample for microscopy and culture unless at least 1 of the criteria under "**Indication for culture"** apply.

Children ≥ 3 years

If both leukocyte esterase and nitrite are positive	Start antibiotic, send for culture if there is history of previous UTI and/or intermediate/high risk of serious illness
Leukocyte esterase negative and nitrite positive	Start antibiotic. If the urine test was carried out on a fresh sample of urine, send for culture. Subsequent management will depend upon the result of urine culture.
If leukocyte esterase is positive and nitrite is negative	Send urine sample for microscopy and culture. Do not start antibiotic treatment for UTI unless there is good clinical evidence of UTI.
If both leukocyte esterase and nitrite are negative	Do not start antibiotic, and do not send a urine sample for culture. Other causes of illness should be explored. The child should not be regarded as having UTI.

Follow up of children discharged home from Children's ED

Children discharged home on antibiotics for a suspected UTI require confirmation of their diagnosis through urine culture.

If seen by Children's Acute Team: add the details to the chase book in ED.

If seen by the CED team use the 'CED Chasing Book'. Use the proforma in the appendix to guide management once the urine culture result is available. This gives instructions about: who needs specialist follow-up, how to organise this, and also gives copies of letters for GPs/parents.

Parents to be contacted if child requires any change in antibiotics or any investigations. investigations to be arranged as per the guideline. The detail of this can be communicated to the family and GP via an "ED-additional information" letter on ICE."

Interpretation of microscopy results

Microscopy results	Pyuria positive	Pyuria negative
Bacteriuria positive	The infant or child should be regarded as having UTI	The infant or child should be regarded as having UTI
Bacteriuria negative	Antibiotic treatment should be started if clinically UTI	The infant or child should be regarded as not having UTI

UTI is defined as a clinical suspicion PLUS a growth of 10^5/ml of a single bacteria on a clean catch/mid-stream urine.

Every urine must be interpreted in the clinical context – lower growths may still indicate a UTI and any growth on in-out catheter or suprapubic aspirate are considered significant.However, indwelling catheters may be colonised and positive cultures should be interpreted within the clinical context.

Pyuria of greater than 10 white cells / microlitre is not diagnostic but may be useful if a child is already on antibiotics and there is no genital inflammation.

- Absence of pus cells or presence of mixed bacterial growth - UTI not demonstrated, but not excluded
- Sterile urine before treatment excludes UTI.
- Proteinuria or haematuria on urine dip are very non-specific, and not diagnostic of UTI.

MANAGEMENT

Treatment can be delayed while awaiting culture results in some cases, including if the child is not ill, and older, and the urine dipstick is not confirmatory.

Do not treat asymptomatic bacteriuria with antibiotics.

Commence treatment immediately in cases of:

- features of sepsis
- Renal angle tenderness suggesting acute pyelonephritis. (IV antibiotics are indicated if signs of sepsis also present).
- Younger children with high clinical suspicion.

All infants younger than 3 months with a possible UTI should be referred as soon as possible to a paediatric team and parenteral antibiotics should be given following the sepsis guidelines. Antibiotics should subsequently be reviewed with the culture results.

Empirical treatment for UTI *	FIRST LINE ANTIBIOTIC	SECOND LINE ANTIBIOTIC
Treatment for lower UTIs:	**Children 3 months to 12 years** Cefalexin for 3 days (see BNFc for doses) **Children 12-17 years :** Nitrofurantoin 100mg MR BD for 3 days [1] (If child unable to swallow tablets, consider Cefalexin suspension instead as cost of Nitrofurantoin is 40x higher than tablets)	Nitrofurantoin for 3 days (see BNFc for doses) Cefalexin 500mg BD for 3 days
Treatment for upper UTIs (pyelonephritis):	**Children over 3 months** Cefalexin for **10 days** (see BNFc for doses) **OR** Use Co-amoxiclav for **10 days** (see BNFc for doses) only if culture results available and susceptible If oral antibiotics cannot be used, IV Cefuroxime, • Consider addition of single dose of Gentamicin if clinically unwell Once the child is apyrexial for 24hrs, change to oral antibiotics (guided by sensitivity results) for a total of 10 days	

If there is a recent positive urine culture available, prescribe an antibiotic which that organism was sensitive to, or contact microbiology if no suitable antibiotic identified.

Antibiotic prophylaxis

This is **not** routinely recommended in infants and children following first episode of UTI

For infants or children already receiving prophylactic medication who develop an infection, treat with a different antibiotic – not a higher dose of the same antibiotic.

Notes:

- Amoxicillin and Trimethoprim are unsuitable as first line drugs due to high resistance rates, even in the community (Data for Leicester, 2019).
- Doses of cephalosporins may need adjustment in the presence of renal impairment, discuss with a Pharmacist if necessary.
- Change antibiotics if
  - no clinical response after 48 hours

- according to cultures, consider discussing with Microbiologists if a resistant organism is grown.

- Check blood urea, creatinine and electrolytes in ill patients. If these are deranged adjust antibiotic doses.
- HOLD gentamicin until levels available.
- Blood pressure measurement is mandatory in all patients.

Arrange imaging studies and follow up as per NICE guidance:
Appendix 1: Imaging in UTI
Appendix 2: Follow up in UTI

3. Education and Training

None required

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
1) Compliance with antibiotic prescribing guidelines	Retrospective case notes audit	S. De	3 yrly	Departmental Audit Meeting
2) Compliance with follow up imaging	Retrospective case notes audit	S. De	3 yrly	Departmental Audit Meeting

5. Supporting References

1. NICE UTI GUIDELINES (CG54) 2007, reviewed 2013 http://pathways.nice.org.uk/pathways/urinary-tract-infection-in-children
2. Jadresic,L. et al. Management of urinary tract infection in childhood. BMJ 307;761-4 (1991)
3. Ed. Webb N and Postlethwaite R. Clin Paediatr Nephrology 3rd Edition 2003 (Oxford)
4. Yzermans Joris C, van Duijn Nico P, et al. The urine dipstick test useful to rule out infections. A meta-analysis of the accuracy. BMC Urolology 2004 (Jun) Vol 4, p

6. Key Words

Dysuria, Enuresis, Haematuria, Hypertension, Leucocyte Esterase, Nitrite, Urinary Tract Infection, UTI

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) J Gosney – ED Paediatric Registrar	**Executive Lead** **Chief Nurse**
Updated symptoms and signs that increase or decrease the likelihood of UTI Updated in line with NICE ng 143 Urine specimens advice amended to - Consider in-out catheter for children under 1 year awaiting a urine sample in Children's ED. In children over 1 year, clean catch is the routine method of collection. Updated follow-up process July 2023; added appendix providing information regarding MCUG	

Appendix : Imaging in UTI

- Children with cystitis/ lower UTI should undergo ultrasound (within 6 weeks) ONLY if they are under 6 months age or have had recurrent UTI
- No other investigations are required for any child >6 months with cystitis/lower UTI unless they have recurrent UTI and /or abnormality on renal ultrasound, in which case late DMSA scan should be considered

Children younger than 6 months

Imaging	Responds well to treatment within 48 hours without any features for atypical	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 no other features of acute 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

Imaging	Responds well to treatment within 48 hours without any features for atypical	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 VU reflux
b. In a child with a non-E-coli UTI, responding well to antibiotics and no other features of acute infection, the ultrasound can be requested on a non- urgent basis to take place within 6 weeks

Children 3 years or older

Imaging	Responds well to treatment within 48 hours without any features for atypical	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 no other features of acute infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks

Definitions:

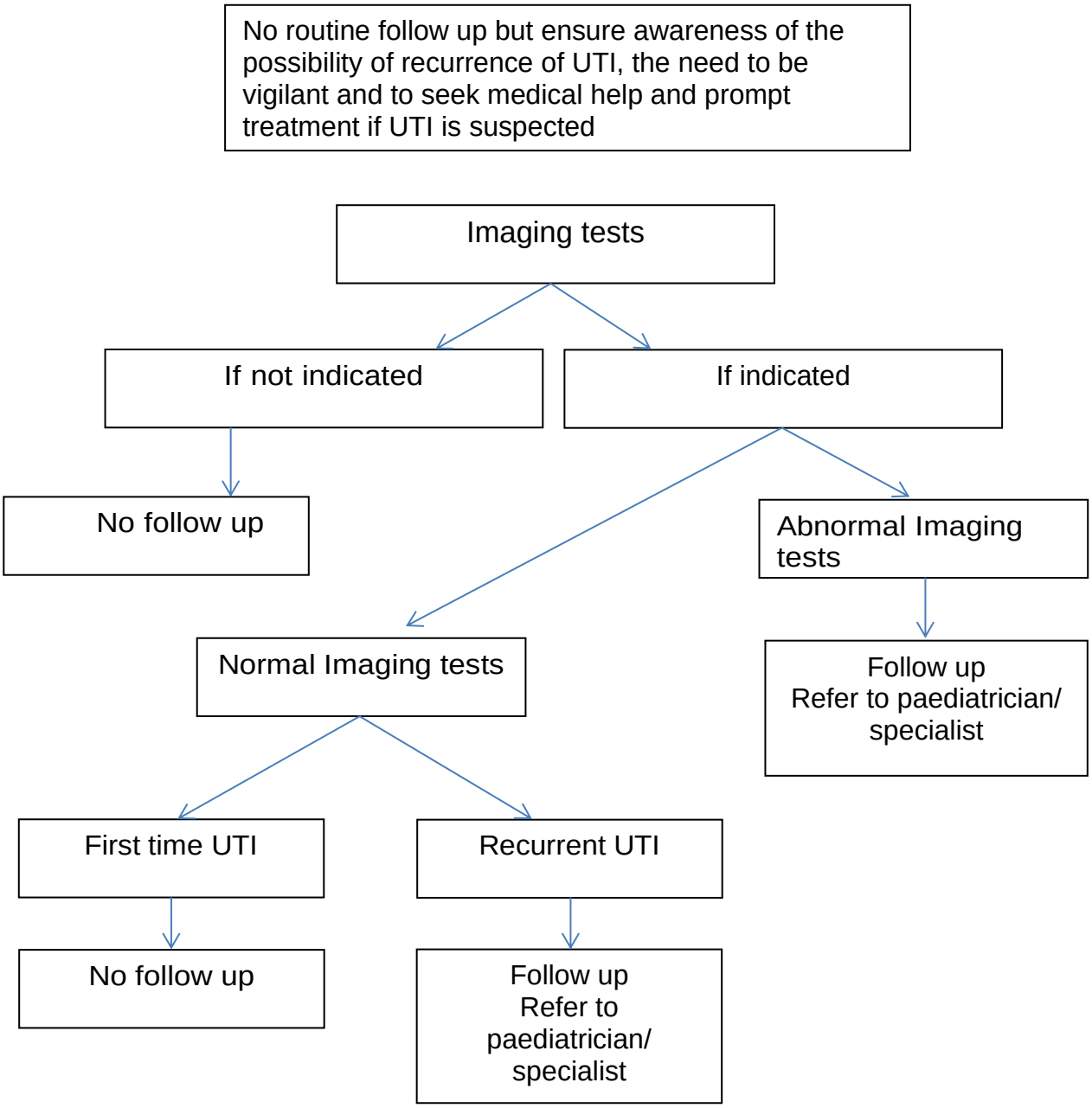
Atypical UTI

- Seriously ill
- Poor urinary flow
- Abdominal or bladder mass
- Raised serum 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 UTI or
- One episode of UTI with acute pyelonephritis/ upper UTI plus one or more episode of UTI with cystitis/ lower UTI, or
- Three or more episodes of UTI with cystitis/lower UTI

Appendix 2: Follow up in UTI



Referral to Paediatric Nephrology/Urology

- Significant hydronephrosis on ultrasound in the absence of reflux on MCUG
- Bilateral reflux nephropathy
- Children with dysfunctional voiding patterns in association with recurrent urinary tract infection
- Recurrent urinary tract infections despite antibiotic prophylaxis
- Severe vesicoureteric reflux (Grade 3 or above)

Appendix 3: Micturating Cystogram (MCUG)

The MCUG scan involves the insertion of a catheter into a child's bladder via the urethra. The bladder is then filled with contrast to assess the presence of vesicoureteric reflux or outflow obstruction. In the presence of existing reflux there is a risk of a UTI developing. For this reason antibiotic cover should be prescribed for patients undergoing the scan. (NICE CG54)

Antibiotic choice: Cefalexin*

Duration: 3 day course, starting one day before the scan

Dose: Treatment dose (please refer to BNFc)

An outpatient prescription for antibiotic prophylaxis should be provided when the patient is seen at the time the scan is requested. The prescription should be given to the patient/carer in clinic and they should be advised to take this to the outpatient pharmacy on the same day. A dry bottle of antibiotics will be provided to the patient/carer that will have to be reconstituted on the day of the first dose. (Instructions will be provided by the pharmacy to parents/carers)
* if there is a recent urine culture result which is cefelexin resistant or allergy/intolerance to cefelexin, choose an antibiotic option that is sensitive and patient able to tolerate.