



**Royal Hospital for Sick Children**

**Guideline for the management of acute urinary tract infection  
in childhood**

	<b>Version: 1.1</b>	<b>Pages: 1-12</b>
<b>Authors:</b> Karen Leitch	<b>Authorised by:</b> Paediatric Clinical Effectiveness & Risk Committee	<b>Issue Date:</b> July 2014
<b>Revision date:</b> July 2016	<b>Q-Pulse ref:</b> YOR-REN-007	

# **Guideline for the management of acute urinary tract infection in childhood**

## **Symptoms**

The aim of this guideline is to lead to more consistent clinical practice by considering the effectiveness of investigations and treatment. The guideline is based on the NICE guidelines, however adapted for use locally.

Early diagnosis and prompt treatment of UTI are especially important during the first year of life. Any infant or child with a temperature of  $> 38^{\circ}\text{C}$  with no definite cause should have a urine sample examined.

Other indications for examining the urine are as follows:

- Unexplained vomiting or abdominal pain
- Frequency of micturition, dysuria or enuresis
- Failure to thrive
- Prolonged jaundice in the new-born
- Non specific illness
- Suspected sexual abuse
- Haematuria or hypertension
- *Abdominal mass or palpable bladder*

## **Useful Definitions**

When considering further management of infants and children with UTI (see below), it is useful to distinguish those symptoms which are consistent with acute pyelonephritis/upper tract infection from those consistent with lower urinary tract infection viz.

### **Upper Tract**

- Fever
- Non specific abdominal pain
- Lethargy
- Urgency
- General malaise

### **Lower Tract**

- Frequency
- Vomiting
- Wetting
- Loin pain
- Frank haematuria

### **Atypical UTI:**

- seriously ill infant or child
- poor urine flow
- abdominal or bladder mass
- raised plasma 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 within 12 months or,
- one episode of UTI with acute pyelonephritis/upper UTI plus one or more episode of UTI with cystitis/lower tract UTI within 12 months, or
- three or more episodes of UTI with cystitis/lower UTI within 12 months.

### **Specimen type:**

Depending on clinical urgency, a clean catch (CCU) or suprapubic aspiration (SPA) urine in an infant or a mid stream (MSSU) urine specimen in older children should be obtained. Only social cleanliness and dryness are required. If a bag specimen of urine is taken and shows a positive result (see below), confirmation in infants by SPA, CCU or less commonly by catheter specimen (CSU) should be undertaken.

### **Criteria for diagnosis**

The traditional criteria of a pure growth of  $> 10^5$  bacterial colony forming units (CFU) per ml is based on the finding that 95% of pregnant and non-pregnant women with a clinical diagnosis of acute pyelonephritis or acute cystitis had bacterial colony counts of this level in a clean voided specimen. In infants and children the probability of infection using these criteria is of the order of 80% if demonstrated on one voided or urethral catheter specimen and 95% if demonstrated on three specimens. Lower colony counts may be found persistently in UTI, particularly in boys but this should be an indication for repeating the culture or obtaining a SPA. Any growth of gram negative or  $> 500-1000$  gram positive bacteria on a SPA sample is significant.

Significant pyuria is defined as  $> 10$  WBC per c.mm. Pyuria however, is not diagnostic of UTI; UTI can only be diagnosed by a positive urine culture prior to treatment. In addition, the absence of pyuria, particularly in children with recurrent UTI does not exclude significant bacteriuria.

### **Combination dipstick analysis**

Combination dipstick which allow the measurement of leucocyte esterase activity and urinary nitrite in addition to standard urinalysis, are now available. However, despite encouraging data in adult practice, the sensitivity of these combination dipstick, particularly in 0-3 year age group is not sufficiently high for these to replace a urine culture in patients suspected of having a UTI.

In children 3 years and older, combination dipstick testing can be used to inform management viz.

<b>Result</b>	<b>Action</b>
<b>Leucocyte esterase positive and nitrite positive</b>	If clinical diagnosis consistent with UTI and/or a past history of UTI send urine culture and start antibiotic therapy (see table below).
<b>Leucocyte esterase negative and nitrite positive</b>	If clinical diagnosis consistent with UTI and if a fresh urine sample was tested, send urine culture and start antibiotic therapy (see table below).
<b>Leucocyte esterase positive and nitrite negative</b>	Send urine culture but only start antibiotic therapy if there is good clinical evidence of UTI as this result may indicate infection elsewhere. Treat on the basis of the culture result.
<b>Leucocyte esterase and nitrite negative</b>	No indication for urine culture or therapy. Explore other causes of illness.

### **Urine transport**

**Accurate interpretation of microbiological culture findings on urine samples is highly dependent on the quality of the sample and the manner in which it is transported to the laboratory. Samples are rendered useless if they are contaminated by faecal flora at the time of collection OR if there is a delay of 4 hours or more between collection and arrival in the laboratory.**

A boric acid container should be used. The correct volume of urine must be added to the container to ensure the correct concentration of boric acid.

### **Management**

Management is greatly helped by detailed discussion with the parents and the older child, preferably supplemented by written information.

After an appropriate specimen of urine has been obtained, treatment should be started immediately, especially in infants and children under the age of 3 years. The choice of antibiotic should be based on a "best guess" policy until the sensitivity of the organism is available. However, if there is no

clinical response within 24-48 hours, the agent should be changed. The following drugs are suitable for oral administration for short full dose courses.

**Please check updated version of BNF for children for treatment and doses.**

### **Acute Management**

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 (see above under definitions) should have early imaging.

<b>Type</b>	<b>Management</b>
<b>Children with a high risk of serious illness and/or children younger than 6 months with suspicion of UTI</b>	Urine microscopy and ccu Treat with antibiotics following current hospital guidelines
<b>Acute pyelonephritis/upper UTI.</b>	
Children who have bacteriuria and fever 38 °C or higher.	Urine culture if not already done. Treat with 7 days oral antibiotics (if oral route not possible, use IV)
Children presenting with fever lower than 38 °C with loin pain/tenderness and bacteriuria.	
<b>Cystitis/lower UTI</b>	
All other infants and children with symptoms of signs of UTI who have bacteriuria but no systemic symptoms or signs	Treat with 3 days oral antibiotics. Review if still unwell at 24-48 hours.

### **Antibiotic Prophylaxis**

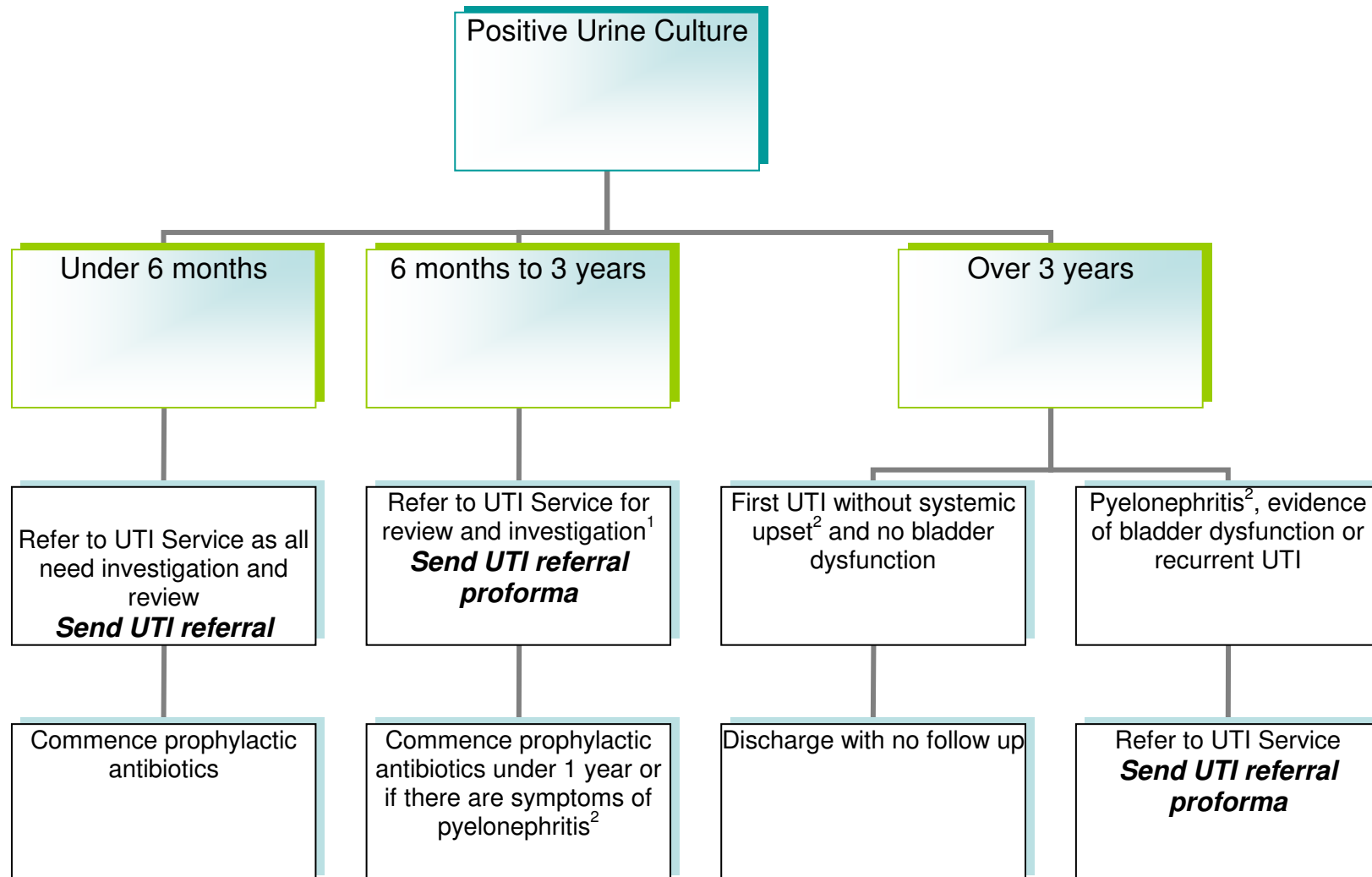
The evidence base for the value of antibiotic prophylaxis is deficient however a prophylactic dose of a suitable antibiotic should be considered until the initial urinary tract imaging has been completed. The drug dosage should be adjusted to the child's age and weight and agents currently suitable for prophylaxis include:

**Please check updated version of BNF for children for treatment and doses.**

To reduce the risk of dental decay, liquid preparations of these drugs should ideally be sugar free and must not be diluted with sugar containing diluents. In children with minor symptoms it is acceptable to wait for the results of the urine culture before starting therapy. If a negative urine culture has been obtained following therapy, further follow up urine cultures may be restricted to times during which the child is either fevered or unwell.

The long term management of infants and children with a history of recurrent UTI, renal scarring or other imaging abnormalities e.g. vesico ureteric reflux should be individualised.

## Referral to UTI Service within RHSC



<sup>1</sup> Children under 3 years of age will be routinely reviewed in the clinic

<sup>2</sup> Systemic upset or pyelonephritis = fever  $>38^{\circ}\text{C}$ , loin pain/tenderness, vomiting (See NICE Guidance UTI in Children)

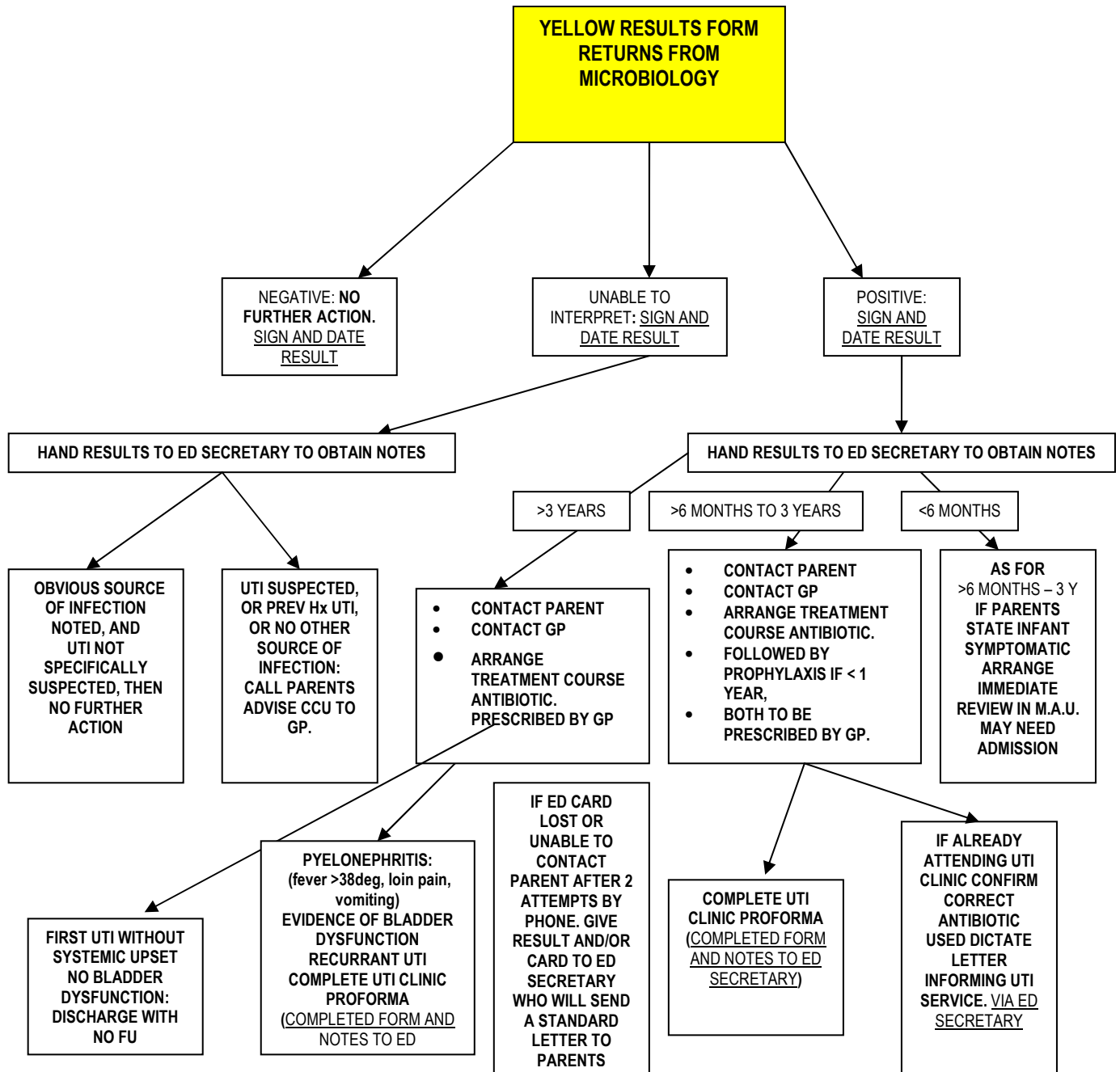
**\* Dealing with urine culture results: Medical Staff**

Large numbers of urine samples are sent for culture from our Medical Assessment unit and Emergency Department. Batches of yellow result forms return daily to the doctors' room in the department and are evaluated and processed by medical staff each morning.

As the implications of missing treatment and follow up in a child with a UTI can be serious we now operate a back up check by the ED secretaries. Algorithms of both these processes are illustrated below.

OF SPECIAL NOTE

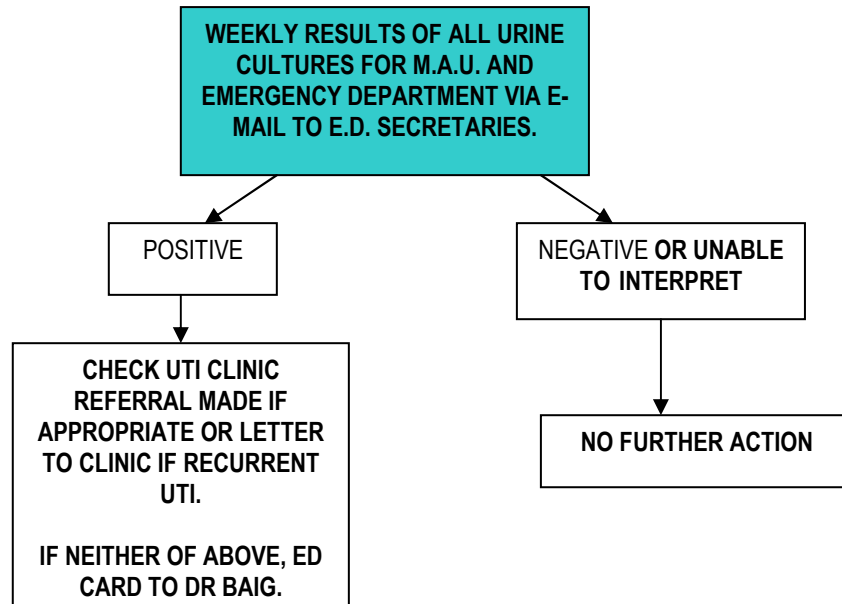
- DO NOT MAKE A NEW UTI CLINIC REFERRAL TILL A POSITIVE CULTURE IS OBTAINED.
- ALL UTI REFERRALS MUST BE PROCESSED THROUGH THE ED SECRETARIES.
- PROPHYLACTIC ANTIBIOTICS ONLY FOR CHILDREN UNDER 1 YEAR.
- GENERALLY NO FOLLOW UP FOR CHILDREN OVER THREE UNLESS EVIDENCE PYLONEPHRITIS/ RECCURANCE OR BLADDER DYSFUNCTION

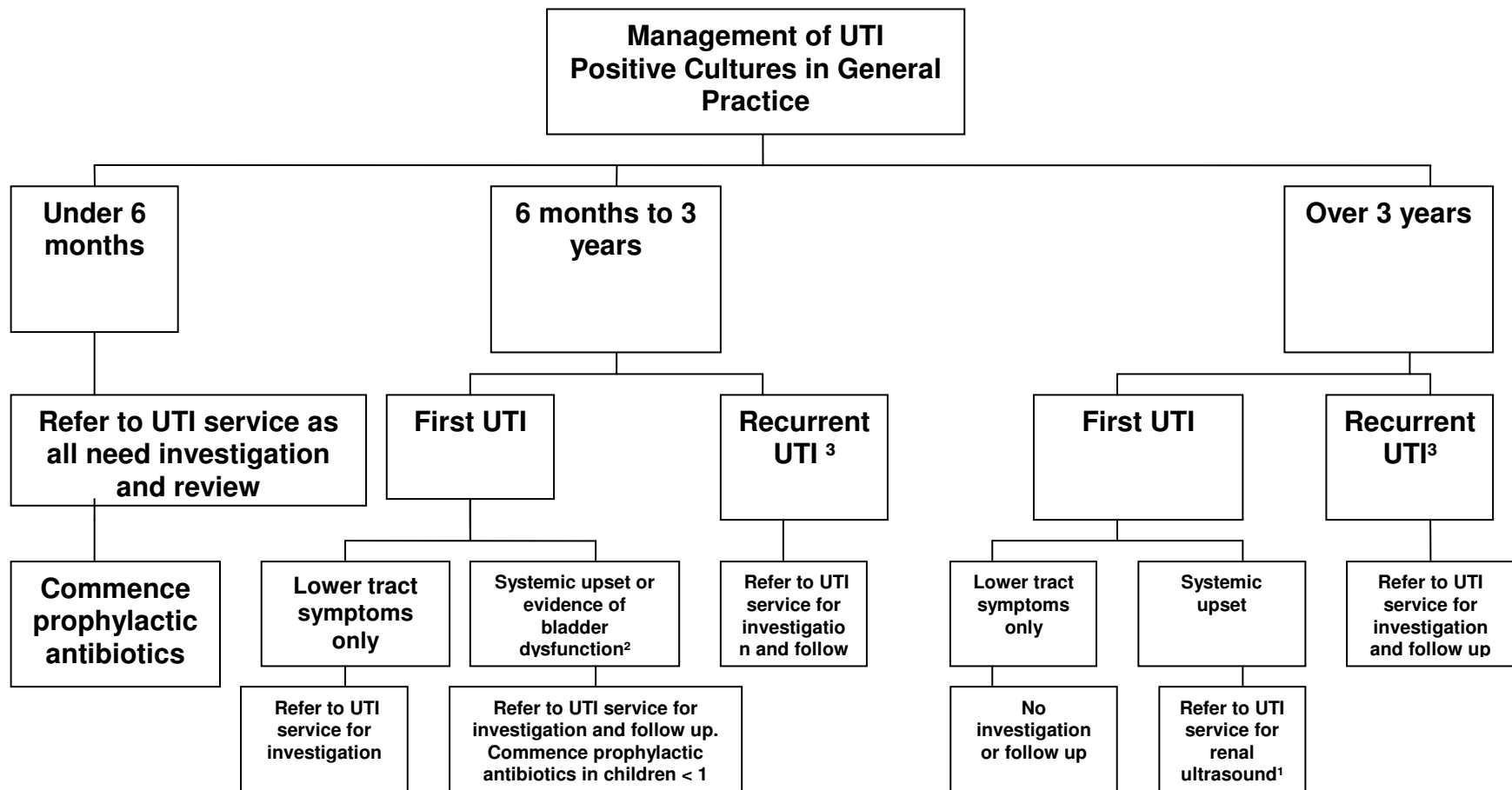


Please use above in conjunction with Referral to UTI Service RHSC document



Dealing with urine culture results: ED Secretary





1. Children with normal imaging after a first UTI will not be routinely reviewed in the UTI clinic.
2. Systemic upset of pyelonephritis – fever >38°, loin pain/tenderness, vomiting (see NICE guidance UTI in children).
3. Recurrent UTI – 3 in a 12 month period.

## Initial Imaging

A number of urinary tract anomalies may be detected in children of both sexes who present with UTI but recent evidence suggests a more tailored approach to urinary tract imaging is appropriate. The following guideline is suggested as initial imaging in the light of the published NICE guideline (August 2007).

<b>Age of Child</b>	<b>Imaging</b>
<b>0 – 6 months</b>	<p><b>Urinary tract ultrasound</b></p> <p>A 99m Tc DMSA scan and MCUG should only be arranged if there is a history of an episode of UTI with “upper tract” symptoms (see above) or recurrent UTI. The DMSA scan should be carried out 6 months after infection.</p> <p><b>MCUG</b> should be carried out when the urine is sterile <b>and is recommended in all boys in this age group. MCUG should be undertaken urgently in both sexes if there is gross dilatation of the collecting system (s) on USS and/or obstructive uropathy is suspected.</b> In girls who have a normal USS but abnormal DMSA, MCUG should be <u>considered</u>.</p>
<b>6 months – 3 years</b>	<p><b>Urinary tract ultrasound</b></p> <p>If there is a history of recurrent UTI or an episode of UTI with “upper tract” symptoms (see above) a 99m Tc DMSA scan should be carried out. If an abnormality on either of these two imaging studies is found, a reflux study will depend on the degree of continence of the child. In the pre-continent child MCUG or a direct radionuclide cystogram (see below) should be carried out. In the child who is continent and co-operative indirect radionuclide cystography using 99m Tc DTPA or MAG3 should be used.</p>

> 3years

**Urinary tract ultrasound if upper tract symptoms.**

If there is a history of recurrent UTI 99m Tc DMSA scan should be carried out. If an abnormality is detected on either of these two imaging studies then a 99M Tc DTPA or MAG3 indirect radionuclide cystogram should be considered.

In the child who has required hospital admission, it is preferable for the **urinary tract ultrasound scan** to be carried out prior to discharge if possible, particularly if there has been a delayed response to treatment.

The use of a **plain abdominal x-ray** is common in urinary tract imaging protocols. However, it is recognised that in the absence of specific indications the diagnostic yield is very low indeed. Specific indications for plain abdominal x-ray should be any patient presenting with **frank/persistent haematuria, UTI secondary to Proteus species or in a child** who has an **abnormal or delayed micturition**.

### **Subsequent studies**

Subsequent imaging should be individualised and will depend on the age of the child, and the presence or absence of abnormalities on initial imaging. A regular meeting is held in the renal unit involving radiologists and clinicians. This meeting serves as a discussion forum and is open to all clinical colleagues who may have problem cases.

### **Follow up**

Patients found to have bilateral renal scarring with or without renal functional impairment require long term medical review. In patients with unilateral renal scarring and affected function will be reviewed annually for BP and urinalysis check at renal clinic until 12years of age. Long term review will then be carried out by General Practitioners.

### **UTI SERVICE RHSC YORKHILL**

July 2014