

## **Appendix 1: Assessment of NICE guideline CG54, childhood UTI, by British Association of Paediatric Nephrology (BAPN)**

This questionnaire has been designed to analyse the response of the BAPN to the guideline UTI in children. It assumes that each department holds a common view. If within a department there is a diversity of view please make this clear in your return and supply an additional set of responses.

The statements from the guidance (<http://www.nice.org.uk/nicemedia/pdf/CG54NICEguideline.pdf>) that require a response are detailed below. The tables used in the guidance can be found at the end of this document, or inserted in the text where appropriate. The full guideline ([www.nice.org.uk/CG054fullguideline](http://www.nice.org.uk/CG054fullguideline)) gives details of the methods and the evidence used to develop the guidance. **Please underline yes if you agree with the statement, no if you do not, N/A if you feel a response is not appropriate or I/E if you feel that there is insufficient evidence to decide.**

### **1.1 Diagnosis**

#### **1.1.1 Symptoms and signs**

1.1.1.1 Infants and children presenting with unexplained fever of 38°C or higher should have a urine sample tested after 24 hours at the latest.

YES	NO	N/A	I/E
20			

1.1.1.2 Infants and children with an alternative site of infection should not have a urine sample tested. When infants and children with an alternative site of infection remain unwell, urine testing should be considered after 24 hours at the latest.

YES	NO	N/A	I/E
17	2		1

1.1.1.3 Infants and children with symptoms and signs suggestive of urinary tract infection (UTI) should have a urine sample tested for infection. Table 1 is a guide to the symptoms and signs that infants and children present with.

YES	NO	N/A	I/E
20			

#### **Comments on Symptoms and signs:**

#### **1.1.2 Assessment of risk of serious illness**

1.1.2.1 The illness level in infants and children should be assessed in accordance with recommendations in 'Feverish illness in children' (NICE clinical guideline 47).

YES	NO	N/A	I/E
19			1

#### **Comments on Assessment of risk of serious illness:**

## 1.1.3 Urine collection

1.1.3.1 A clean catch urine sample is the recommended method for urine collection. If a clean catch urine sample is unobtainable:

YES	NO	N/A	I/E
20			

- Other non-invasive methods such as urine collection pads should be used. It is important to follow the manufacturer's instructions when using urine collection pads. Cotton wool balls, gauze and sanitary towels should not be used to collect urine in infants and children.

YES	NO	N/A	I/E
16	4		

- When it is not possible or practical to collect urine by non-invasive methods, catheter samples or suprapubic aspiration (SPA) should be used.

YES	NO	N/A	I/E
20			

- Before SPA is attempted, ultrasound guidance should be used to demonstrate the presence of urine in the bladder.

YES	NO	N/A	I/E
19			1

1.1.3.2 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 if a urine sample is unobtainable.

YES	NO	N/A	I/E
18	1	1	

### Comments on Urine collection:

## 1.1.5 Urine testing

1.1.5.1 The urine-testing strategies as shown are recommended:

### Urine-testing strategy for infants younger than 3 months:

- All infants younger than 3 months with suspected UTI (see table 1) should be referred to paediatric specialist care and a urine sample should be sent for urgent microscopy and culture. These infants should be managed in accordance with the recommendations for this age group in 'Feverish illness in children' (NICE clinical guideline 47).

YES	NO	N/A	I/E
19			1

## Urine-testing strategies for infants and children 3 months or older but younger than 3 years:

- Urgent microscopy and culture is the preferred method for diagnosing UTI in this age group; this should be used where possible
- **If the infant or child has specific urinary symptoms:**
  - Urgent microscopy and culture should be arranged and antibiotic treatment should be started.
  - When urgent microscopy is not available, a urine sample should be sent for microscopy and culture, and antibiotic treatment should be started.
- **If the symptoms are non-specific to UTI**
  - For an infant or child with a high risk of serious illness: the infant or child should be urgently referred to a paediatric specialist where a urine sample should be sent for urgent microscopy and culture. Such infants and children should be managed in line with 'Feverish illness in children' (NICE clinical guideline 47).
  - For an infant or child with an intermediate risk of serious illness: if the situation demands, the infant or child may be referred urgently to a paediatric specialist. For infants and children who do not require paediatric specialist referral, urgent microscopy and culture should be arranged. Antibiotic treatment should be started if microscopy is positive (see table 5). When urgent microscopy is not available, dipstick testing may act as a substitute. The presence of nitrites suggests the possibility of infection and antibiotic treatment should be started (see table 4). In all cases, a urine sample should be sent for microscopy and culture.
  - For an infant or child with a low risk of serious illness: microscopy and culture should be arranged. Antibiotic treatment should only be started if microscopy or culture is positive.

YES	NO	N/A	I/E
19			1

YES	NO	N/A	I/E
19	1		

YES	NO	N/A	I/E
20			

YES	NO	N/A	I/E
19			1

YES	NO	N/A	I/E
18	1		1

YES	NO	N/A	I/E
20			

## Urine-testing strategies for children 3 years or older

- Dipstick testing for leukocyte esterase and nitrite is diagnostically as useful as microscopy and culture, and can safely be used.
  - **If both leukocyte esterase and nitrite are positive:** The child should be regarded as having UTI and antibiotic treatment should be started. If a child has a high or intermediate risk of serious illness and/or a past history of previous UTI, a urine sample should be sent for culture.

YES	NO	N/A	I/E
10	9		1

YES	NO	N/A	I/E
18	2		

- **If leukocyte esterase is negative and nitrite is positive** Antibiotic treatment should be started if the urine test was carried out on a fresh sample of urine. A urine sample should be sent for culture. Subsequent management will depend upon the result of urine culture.

YES	NO	N/A	I/E
17	2	1	

- **If leukocyte esterase is positive and nitrite is negative** A urine sample should be sent for microscopy and culture. Antibiotic treatment for UTI should not be started unless there is good clinical evidence of UTI (for example, obvious urinary symptoms). Leukocyte esterase may be indicative of an infection outside the urinary tract which may need to be managed differently.

YES	NO	N/A	I/E
17	2		1

- **If both leukocyte esterase and nitrite are negative** The child should not be regarded as having UTI. Antibiotic treatment for UTI should not be started, and a urine sample should not be sent for culture. Other causes of illness should be explored.

YES	NO	N/A	I/E
12	4	1	3

## Comments on urine-testing strategies:

### 1.1.6 Indication for culture

#### 1.1.6.1 Urine samples should be sent for culture:

- in infants and children who have a diagnosis of acute pyelonephritis/upper urinary tract infection (see 1.1.8.1)
- in infants and children with a high to intermediate risk of serious illness
- in infants and children under 3 years
- in infants and children with a single 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.

YES	NO	N/A	I/E
20			

YES	NO	N/A	I/E
20			

YES	NO	N/A	I/E
15	1	3	1

YES	NO	N/A	I/E
19			1

YES	NO	N/A	I/E
18		2	

YES	NO	N/A	I/E
20			

YES	NO	N/A	I/E
20			

**Comments on Indication for culture:**

**1.1.8 Clinical differentiation between acute pyelonephritis/upper urinary tract infection and cystitis/lower urinary tract infection**

1.1.8.1 Infants and children who have bacteriuria and fever of 38°C or higher should be considered to have acute pyelonephritis/upper urinary tract infection. Infants and children presenting with fever lower than 38°C with loin pain/tenderness and bacteriuria should also be considered to have acute pyelonephritis/upper urinary tract infection. All other infants and children who have bacteriuria but no systemic symptoms or signs should be considered to have cystitis/lower urinary tract infection.

YES	NO	N/A	I/E
11	1	1	7

**Comments on Clinical differentiation between acute pyelonephritis/upper urinary tract infection and cystitis/lower urinary tract infection:**

**1.2 Acute management**

1.2.1.1 Infants and children with a high risk of serious illness should be referred urgently to the care of a paediatric specialist.

YES	NO	N/A	I/E
20			

1.2.1.2 Infants younger than 3 months with a possible UTI should be referred immediately to the care of a paediatric specialist. Treatment should be with parenteral antibiotics in line with 'Feverish illness in children' (NICE clinical guideline 47).

YES	NO	N/A	I/E
20			

1.2.1.3 For infants and children 3 months or older with acute pyelonephritis/upper urinary tract infection:

- consider referral to a paediatric specialist

YES	NO	N/A	I/E
16	3		1

- treat with oral antibiotics for 7–10 days. The use of an oral antibiotic with low resistance patterns is recommended, for example cephalosporin or co-amoxiclav

YES	NO	N/A	I/E
17	2		1

- if oral antibiotics cannot be used, treat with an intravenous (IV) antibiotic agent such as cefotaxime or ceftriaxone for 2–4 days followed by oral antibiotics for a total duration of 10 days.

YES	NO	N/A	I/E
18	1		1

1.2.1.4 For infants and children 3 months or older with cystitis/lower urinary tract infection:

- treat with oral antibiotics for 3 days. The choice of antibiotics should be directed by locally developed multidisciplinary guidance. Trimethoprim, nitrofurantoin, cephalosporin or amoxicillin may be suitable.

YES	NO	N/A	I/E
10	4		6

- the parents or carers should be advised to bring the infant or child for reassessment if the infant or child is still unwell after 24–48 hours. If an alternative diagnosis is not made, a urine sample should be sent for culture to identify the presence of bacteria and determine antibiotic sensitivity if urine culture has not already been carried out.

YES	NO	N/A	I/E
17	3		

1.2.1.5 For infants and children who receive aminoglycosides (gentamicin or amikacin), once daily dosing is recommended.

YES	NO	N/A	I/E
16	2		2

1.2.1.6 If parenteral treatment is required and IV treatment is not possible, intramuscular treatment should be considered.

YES	NO	N/A	I/E
19	1		

1.2.1.7 If an infant or child is receiving prophylactic medication and develops an infection, treatment should be with a different antibiotic, not a higher dose of the same antibiotic.

YES	NO	N/A	I/E
20			

1.2.1.8 Asymptomatic bacteriuria in infants and children should not be treated with antibiotics.

YES	NO	N/A	I/E
12	3	3	2

1.2.1.9 Laboratories should monitor resistance patterns of urinary pathogens and make this information routinely available to prescribers.

YES	NO	N/A	I/E
20			

**Comments on above management:**

## 1.2.2 Prevention of recurrence

1.2.2.1 Dysfunctional elimination syndromes and constipation should be addressed in infants and children who have had a UTI.

YES	NO	N/A	I/E
20			

1.2.2.2 Children who have had a UTI should be encouraged to drink an adequate amount.

YES	NO	N/A	I/E
20			

1.2.2.3 Children who have had a UTI should have ready access to clean toilets when required and should not be expected to delay voiding.

YES	NO	N/A	I/E
19		1	

**Comments on prevention of recurrence:**

## 1.2.3 Antibiotic prophylaxis

1.2.3.1 Antibiotic prophylaxis should not be routinely recommended in infants and children following first-time UTI.

YES	NO	N/A	I/E
11	4		5

1.2.3.2 Antibiotic prophylaxis may be considered in infants and children with recurrent UTI.

YES	NO	N/A	I/E
19			1

1.2.3.3 Asymptomatic bacteriuria in infants and children should not be treated with prophylactic antibiotics

YES	NO	N/A	I/E
18	1		1

**Comments on antibiotic prophylaxis:**

## 1.3 Imaging tests

- 1.3.1.1 Infants and children with atypical UTI (see box 1) should have ultrasound of the urinary tract during the acute infection to identify structural abnormalities of the urinary tract such as obstruction, as outlined in tables 6, 7 and 8. This is to ensure prompt management.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 20  |    |     |     |
- 1.3.1.2 For infants younger than 6 months with first-time UTI that responds to treatment, ultrasound should be carried out within 6 weeks of the UTI, as outlined in table 6.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 20  |    |     |     |
- 1.3.1.3 For infants and children aged 6 months and older with first-time UTI that responds to treatment, routine ultrasound is not recommended unless the infant or child has atypical UTI, as outlined in tables 7 and 8.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 6   | 10 | 1   | 3   |
- 1.3.1.4 Infants and children who have had a lower urinary tract infection should undergo ultrasound (within 6 weeks) only if they are younger than 6 months or have had recurrent infections.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 9   | 8  |     | 3   |
- 1.3.1.5 A DMSA scan 4–6 months following the acute infection should be used to detect renal parenchymal defects, as outlined in tables 6, 7 and 8.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 13  | 5  | 2   |     |
- 1.3.1.6 If the infant or child has a subsequent UTI while awaiting DMSA, the timing of the DMSA should be reviewed and consideration given to doing it sooner.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 12  | 8  |     |     |
- 1.3.1.7 Routine imaging to identify VUR is not recommended for infants and children who have had a UTI, except in specific circumstances, as outlined in tables 6, 7 and 8.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 14  | 4  | 2   |     |
- 1.3.1.8 When a micturating cystourethrogram (MCUG) is performed, prophylactic antibiotics should be given orally for 3 days with MCUG taking place on the second day.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 17  | 3  |     |     |
- 1.3.1.9 Infants and children who have had a UTI should be imaged as outlined in tables 6, 7 and 8.
- | YES | NO | N/A | I/E |
|-----|----|-----|-----|
| 10  | 7  |     | 3   |

### Comments on imaging tests:

**Table 6 Recommended imaging schedule for infants younger than 6 months**

Test	Responds well to treatment within 48 hours	Atypical UTI <sup>a</sup>	Recurrent UTI <sup>a</sup>
Ultrasound during the acute infection	No	Yes <sup>c</sup>	Yes
Ultrasound within 6 weeks	Yes <sup>b</sup>	No	No
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	Yes	Yes

<sup>a</sup> See box 1 for definition

<sup>b</sup> If abnormal consider MCUG

<sup>c</sup> In an infant or child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks

**Table 7 Recommended imaging schedule for infants and children 6 months or older but younger than 3 years**

Test	Responds well to treatment within 48 hours	Atypical UTI <sup>a</sup>	Recurrent UTI <sup>a</sup>
Ultrasound during the acute infection	No	Yes <sup>c</sup>	No
Ultrasound within 6 weeks	No	No	Yes
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	No <sup>b</sup>	No <sup>b</sup>

<sup>a</sup> See box 1 for definition

<sup>b</sup> 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 VUR. <sup>c</sup> In an infant or child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks

**Table 8 Recommended imaging schedule for children 3 years or older**

Test	Responds well to treatment within 48 hours	Atypical UTI <sup>a</sup>	Recurrent UTI <sup>a</sup>
Ultrasound during the acute infection	No	Yes <sup>b,c</sup>	No
Ultrasound within 6 weeks	No	No	Yes <sup>b</sup>
DMSA 4–6 months following the acute infection	No	No	Yes
MCUG	No	No	No

<sup>a</sup> See box 1 for definition

<sup>b</sup> Ultrasound in toilet-trained children should be performed with a full bladder with an estimate of bladder volume before and after micturition.

<sup>c</sup> In a child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks

## **Box 1 Definitions of atypical and recurrent UTI**

### **Atypical UTI includes:**

- seriously ill (for more information refer to 'Feverish illness in children' [NICE clinical guideline 47])
- poor urine flow
- abdominal or bladder mass
- raised 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 urinary tract infection, or
- one episode of UTI with acute pyelonephritis/upper urinary tract infection plus one or more episode of UTI with cystitis/lower urinary tract infection, or
- three or more episodes of UTI with cystitis/lower urinary tract infection.

## 1.4 Surgical intervention

1.4.1.1 Surgical management of VUR is not routinely recommended.

YES	NO	N/A	I/E
19			

**Comments on Surgical intervention:**

## 1.5 Follow-up

1.5.1.1 Infants and children who do not undergo imaging investigations should not routinely be followed up.

YES	NO	N/A	I/E
16	1		2

1.5.1.2 The way in which the results of imaging will be communicated should be agreed with the parents or carers or the young person as appropriate.

YES	NO	N/A	I/E
18			1

1.5.1.3 When results are normal, a follow-up outpatient appointment is not routinely required. Parents or carers should be informed of the results of all the investigations in writing.

YES	NO	N/A	I/E
17		1	1

1.5.1.4 Infants and children who have recurrent UTI or abnormal imaging results should be assessed by a paediatric specialist.

YES	NO	N/A	I/E
18			1

1.5.1.5 Assessment of infants and children with renal parenchymal defects should include height, weight, blood pressure and routine testing for proteinuria.

YES	NO	N/A	I/E
19			

1.5.1.6 Infants and children with a minor, unilateral renal parenchymal defect do not need long-term follow-up unless they have recurrent UTI or family history or lifestyle risk factors for hypertension.

YES	NO	N/A	I/E
8	6		5

1.5.1.7 Infants and children who have bilateral renal abnormalities, impaired kidney function, raised blood pressure and/or proteinuria should receive monitoring and appropriate management by a paediatric nephrologist to slow the progression of chronic kidney disease.

YES	NO	N/A	I/E
19			

1.5.1.8 Infants and children who are asymptomatic following an episode of UTI should not routinely have their urine re-tested for infection.

YES	NO	N/A	I/E
17	1		1

1.5.1.9 Asymptomatic bacteriuria is not an indication for follow-up.

YES	NO	N/A	I/E
18			2

Tables not illustrated in text for reference

**Table 1 Presenting symptoms and signs in infants and children with UTI**

Age group		Symptoms and signs Most common → Least common		
Infants younger than 3 months		Fever Vomiting Lethargy Irritability	Poor feeding Failure to thrive	Abdominal pain Jaundice Haematuria Offensive urine
Infants and children, 3 months or older	Preverbal	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

**Table 5 Guidance on the 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