

# URINARY TRACT INFECTION (TYPICAL) IDENTIFICATION AND MANAGEMENT

## PRACTICE GUIDELINE<sup>®</sup>

### DOCUMENT SUMMARY/KEY POINTS

- This document outlines:
  - Identification and Management of children with a **Typical UTI**
  - The management in relatively well children with a UTI
  - Management of children with UTI via Hospital in the Home and Ambulatory Care
- Typical UTI management – [FLOWCHART](#)
- Specialist assessment and management is required for children who are considered at high risk of serious illness (underlying structural urinary tract abnormalities, neurogenic bladder or kidney transplant recipients). These children are beyond the scope of these guidelines and are excluded from the recommendations below.

**NOTE:** This guideline **does not** specifically address the child who presents with **Atypical/Complicated Urinary Tract Infections (UTI) or Serious illness/Septicaemia/Shock.**

**Atypical/Complicated UTI patients may have one or more of the following:**

- Seriously ill
- Urinary catheter in situ
- Poor urine flow
- Pre-existing uropathy or grade IV-V vesicoureteric reflux with renal dysplasia
- Reduced renal function
- Abdominal or bladder mass
- Spinal cord lesion
- High blood pressure
- Immunosuppression
- Raised creatinine
- Failure to respond to suitable antibiotics within 48hours

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> May 2018	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Staff Specialist	<b>Area/Dept:</b> Gen Med

- Infection with non-Ecoli organisms

**Discussion with a senior medical clinician should occur regarding admission and planned management for the above patients.**

Patients with Recurrent UTIs should be discussed with a senior doctor regarding management and follow-up.

## CHANGE SUMMARY

- NICE guideline cg54 was updated in 2016
- Changes to this document have been made in line with the current NICE guideline and current evidence
- Management of Urinary Tract Infection Flow Chart has had updates as well as all the tables in the document, and guidance around suprapubic aspiration which is used less frequently in clinical practice over other preferred methods for urine collection.
- Models for ambulatory care include ARC (Acute Review Clinic at CHW), MDU (Medical Day Unit at SCH) and HITH (Hospital in The Home across both sites)

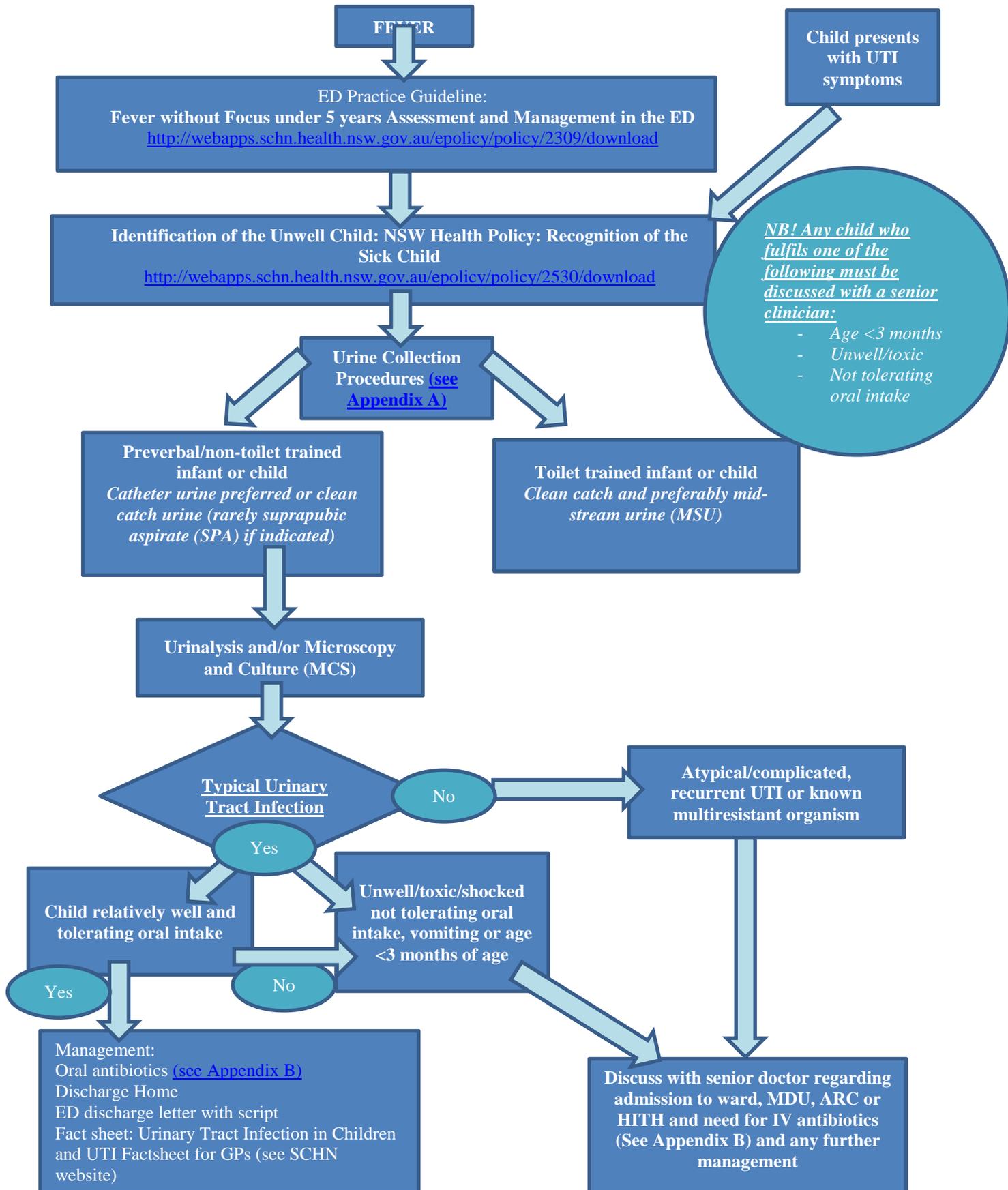
## READ ACKNOWLEDGEMENT

- General Medicine clinicians
- Nephrology clinicians
- Emergency department clinicians
- Ambulatory care staff in Acute Review Clinic and HITH

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## Management of Urinary Tract Infection Flow Chart



## Preamble

Urinary Tract Infection (UTI) is a frequently occurring paediatric illness. This guideline is largely based on the National Institute for Health and Clinical Excellence (NICE) Guideline <sup>(1)</sup> from the United Kingdom and aims to assist with identification, assessment and management of Typical UTIs in infants and children. The [Management of UTI Flowchart](#) outlines the recommended approach to Typical UTIs throughout the Sydney Children's Hospital Network (SCHN).

This guideline was developed considering the resources and expertise available to SCHN.

**Note:** The guideline can be used by accredited **SCHN Nurse Practitioners**.

## Identification of a Urinary Tract infection

Many infants may present with fever alone and only later a UTI may be confirmed with urine culture. Alternatively a child may present with symptoms consistent with a suspected UTI, which again will be confirmed on urine culture <sup>(2)</sup>.

### UTI Symptoms

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
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## Assessment of seriousness of illness

- The level of illness in children or infants should be assessed in line with the NSW Health Policy 'Children and Infants – Recognition of a Sick Baby or Child in the Emergency Department' at [http://www0.health.nsw.gov.au/policies/pd/2011/pdf/PD2011\\_038.pdf](http://www0.health.nsw.gov.au/policies/pd/2011/pdf/PD2011_038.pdf)

### Children who are verbal

- A child who is verbal and relatively well, may provide a verbal account of their symptoms<sup>(2)</sup>. (See [UTI Symptoms](#))

Should the child experience any symptoms consistent with a UTI then collection of a urine specimen is required.

In order to confirm the diagnosis of a UTI a suitable urine specimen must be obtained for culture (See Appendix A: [Urine Collection Procedures](#)).

Following assessment of the child, the suspected UTI may be considered to be *typical* when the child is relatively well. If a child fulfils at least one of the criteria for variation from a typical UTI (see below) the illness may be considered an atypical/complicated UTI.

### Atypical Urinary Tract Infection includes

Children should be considered to vary from the management of a *typical* UTI if they present with any of the following features: (See [Urinary Tract Infection Flow Chart](#))

**1. Aged less than 3 months:**

Febrile infants aged less than 3 months who present with fever generally require a septic work up and intravenous antibiotics regardless of whether a UTI is suspected.

**2. Any seriously ill child**

**3. History of poor urine flow**

**4. Abdominal or bladder mass palpable**

**5. Raised creatinine**

**6. Septicaemia**

**7. Toxic/vomiting**

**8. Failure to respond to suitable antibiotics within 48 hours**

**9. Infection with non-*E. coli* organisms**

**Note:** Patients presenting with atypical/complicated UTIs should be discussed with a senior doctor in ED regarding possible admission to the ward, Medical Day Unit (MDU), Acute Review Clinic (ARC) or [Hospital in the Home \(HITH\)](#) and IV antibiotics. Ongoing management of these patients is beyond the scope of this document.

### Recurrent UTIs

Recurrent UTI <sup>(1)</sup> is defined as children who have:

- i. Two or more UTIs with acute pyelonephritis/upper UTI
- ii. A UTI with acute pyelonephritis/upper UTI and 1 or more UTI with cystitis/lower UTI
- iii. Three or more UTIs with cystitis/lower UTI

**Note:** Patients with recurrent UTIs may still be considered to have typical UTIs with each presentation and be treated accordingly, however they should be discussed with a senior doctor regarding ongoing management and suitable medical follow-up.

## Urine Specimen

### Patient criteria determining urine collection procedure

(See [Urine Collection Procedures](#), Appendix A)

- If the child is preverbal (often aged less than 3 years), not toilet-trained or unable to provide a specimen on demand then collection of an in/out catheter specimen is preferred.
- Alternatively a clean-catch specimen, or supra-pubic specimen in infants younger than 12 months, may be necessary if a catheter specimen is unable to be obtained. A suprapubic aspirate should occur after there is confirmation via ultrasound of urine present in the bladder.
- If the child is able to verbally communicate, toilet-trained or able to provide a urine specimen on demand, a clean-catch urine specimen should be collected.
- If the child is a male and circumcised, a clean-catch urine specimen would be a suitable specimen for examination <sup>(5)</sup>.

## Urinalysis, Microscopy and Culture

### Urinalysis

- Following collection of an appropriate urine specimen, the sample will need to be tested with an appropriate urine dipstick to test for the presence of leucocytes and nitrites. <sup>(6,7,8)</sup>. See the table below for recommended management.
- In a low-risk child, older than 3 months, dipstick screening will miss 4-12% of UTIs.<sup>(6)</sup>
- The presence of bacteriuria (by microscopy with gram stain) on an appropriately collected urine specimen can be used as the basis for a presumptive diagnosis of UTI. <sup>(7)</sup>

Urinalysis result	Implications	Management	Further Testing
Leucocyte esterase positive Nitrite positive	Consistent with UTI	Commence antibiotics	Send urine for MCS
Leucocyte esterase positive Nitrite negative	Treat as UTI if clinically indicated	Consider antibiotics	Send urine for MCS and consider

			infection outside the urinary tract
Leucocyte esterase negative Nitrite positive	Treat as UTI if clinically indicated	Consider antibiotics	Send for MCS
Leucocyte esterase negative Nitrite negative	Do not treat as UTI	Antibiotics for UTI should not be started	Unlikely to be a UTI, consider other causes of illness unless child is <3 yrs. An MCS is usually still sent.

### Microscopy and Culture

- All urine specimens collected from children aged less than 3 years are to be sent for culture.
- The result of microscopy alone is not required to suspect a UTI. Microscopy showing leucocytes (i.e. pyuria) should be considered as a possible UTI <sup>(7, 8)</sup>. See the below table.

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

**Note:** Pathology at some sites do not comment on the presence of organisms in urine specimens. The availability of microscopy results should not determine the need to commence antibiotics. This remains a clinical decision.

- Confirmation of a UTI will be available with the urine culture results. The culture results will identify the type of organism and the antibiotic sensitivities of that organism. These results however will not be available for the initial commencement of antibiotics. Antibiotics should not be withheld until the microscopy or culture is available.
- It is recommended the following minimum counts of colony forming units (CFU) grown on urine culture can be considered as diagnostic of UTI
  - SPA: Any growth
  - Catheter urine:  $>10^8$  CFU/L ( $10^6$ - $10^8$  CFU/L: possible UTI)
  - MSU/Clean catch:  $>10^8$  CFU/L ( $10^7$ - $10^8$  CFU/L: possible UTI)
  - Bag/pad/cotton ball: not recommended for definitive culture

## Treatment of a Typical UTI

Oral antibiotic treatment should be commenced following identification of a suspected typical UTI in a child who is relatively well and tolerating oral intake<sup>(9)</sup>. The child's suspected diagnosis and management should be discussed with the family.

## Oral antibiotic treatment recommendations

See Appendix B: [Antibiotic Treatment for UTI](#)

### Child not tolerating oral intake or vomiting

- The child with a suspected typical UTI who is unwell or unable to tolerate oral intake and hence oral antibiotics, should be commenced on intravenous fluids and IV antibiotic treatment. See Appendix B [Antibiotic Treatment for typical UTI](#) for management options.
- Vomiting patients will need to be admitted for ongoing care. Admitted patients may require IV fluids and will require IV antibiotic treatment. The patient's clinical progress will need to be reviewed within 24 hours and if tolerating oral intake changed to oral antibiotics. (See Appendix B: [Antibiotic Treatment for typical UTI](#)). Those patients tolerating oral antibiotics can be discharged on the full course.
- For admitted patients still requiring IV antibiotics after 24 hours consider the Medical Day Unit (MDU), ARC (Acute Review Clinic) or Hospital in the Home (HITH) for ongoing administration of IV antibiotics. These patients will require a General Paediatrician to supervise their care and arrange for appropriate review and renal imaging. An Appendix item covers antibiotics and administration of IV antibiotics for children with UTI through ambulatory care.

### Discharge and Follow-up

- The relatively well child with a suspected or confirmed UTI is suitable for discharge on oral antibiotics, with a plan for medical or GP follow-up within 48 hours.
- Oral antibiotic treatment duration consists of 4 days treatment, if afebrile and 7 days treatment, if febrile patients<sup>(10)</sup>. (See Appendix B: [Antibiotic Treatment for typical UTI](#))
- The child's carers should be provided with
  - An ED or ward Discharge letter
  - A Fact sheet – **Urinary tract infection in children**, explaining the diagnosis and management of a typical urinary tract infection:  
<http://www.schn.health.nsw.gov.au/parents-and-carers/fact-sheets/urinary-tract-infection-in-children>
  - A UTI fact sheet for GPs ([UTI Fact Sheet for GPs](#)) is located on the SCHN internet site outlining the availability of culture sensitivities and imaging management.  
[https://www.schn.health.nsw.gov.au/files/attachments/uti\\_gp\\_fact\\_sheet.pdf](https://www.schn.health.nsw.gov.au/files/attachments/uti_gp_fact_sheet.pdf)
  - Medical follow-up should include reviewing the child's clinical state, ensuring oral antibiotic compliance, checking the blood culture result, confirming the urine culture and antibiotic sensitivities and altering the antibiotic accordingly if required.

- The medical review will then need to include arrangement of any appropriate renal imaging as outlined in the following section (See Appendix C: [Renal Imaging for typical UTI and recurrent UTI](#)). If the child had required admission, paediatrician follow-up for review and planned appropriate investigation is recommended.

## Renal Imaging

According to the NICE guidelines<sup>(1)</sup>, children aged less than 6 months, with a first UTI, who respond well to treatment (i.e. within 48 hours) require a renal ultrasound within 6 weeks of presentation and no other investigations. Children aged greater than 6 months, with a first UTI, who respond well to treatment (i.e. within 48 hours) do not require renal ultrasound or more extensive imaging of the renal tract. (See Appendix C: [Renal Imaging for UTI](#))

Renal ultrasound can be considered in children who <sup>(7)</sup>:

- Have concurrent bacteraemia
- Are less than 3 months of age
- Have a urine culture with atypical organisms
- Lack a clinical response to 48 hours of antibiotic if sensitive organism
- Have renal impairment or significant electrolyte derangement
- Have an abdominal mass
- Have a poor urinary stream

## Prophylactic antibiotics

Prophylactic antibiotic treatment following typical urinary tract infections is not recommended.

## Recommendations

Children with a typical urinary tract infection should be considered suitable for discharge if tolerating oral intake and relatively well. The child's carers should be provided with parent information sheets outlining symptoms and signs which would prompt early medical review or hospitalisation and a fact sheet explaining the diagnosis and management of a typical urinary tract infection. The discharge letter should outline the patient's presentation and management and any follow-up that may be required.

## References

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## Appendix A: Urine Collection Procedures

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

- Aseptic catheterisation can be used
- Occasionally a suprapubic aspirate can be used, particularly if clean catch urine and catheter urine are not practical. Before an SPA is attempted, ultrasound guidance should be used to demonstrate the presence of urine in the bladder.

### Aseptic Catheter Urine collection

The technique for collecting a catheter urine specimen is described in the CHW Procedure [Catheters \(Urinary\): Management](#) in the section Intermittent Catheterisation (page 9).

<http://webapps.schn.health.nsw.gov.au/epolicy/policy/3719/download>

**Please note:** The urine specimen to be obtained in this procedure needs to be collected in a sterile specimen container for analysis rather than into cotton balls in a kidney dish as described in the Catheters (Urinary): Management procedure.

### Clean-catch Urine collection

Wash genitalia with water and dry. The specimen is collected in a sterile container on request to void.

### Suprapubic Aspiration Urine collection

Suprapubic aspirate whilst being the most definitive method of urine culture, is more invasive than other methods. The use of a clean catch, mid-stream or in-out catheter urine sample are preferred as alternate methods for urine collection.<sup>(7)</sup>

Please refer to the SCH policy: Suprapubic Aspiration of Urine for indications and details on the procedure.

<http://webapps.schn.health.nsw.gov.au/epolicy/policy/3534>

Best practice states that before an SPA is attempted, ultrasound guidance should be used to demonstrate the presence of urine in the bladder.

## Appendix B: Antibiotic Treatment for typical UTI

Treatment should be commenced for presumed UTI in children who have clinical symptoms suggestive of UTI and who have positive leucocyte esterase or nitrite on urinary dipstick or bacteriuria on microscopy.

### Oral Antibiotics

#### ***Cephalexin (Keflex)***

- Cephalexin 12.5 – 25 mg/kg/dose (maximum 1g/dose) four times a day

#### ***Trimethoprim – sulfamethoxazole (Bactrim/Resprim)***

- Trimethoprim – sulfamethoxazole is a fixed-ratio combination which always contains 1mg trimethoprim for every 5mg sulfamethoxazole.
- The dose is conventionally specified based on the trimethoprim component, but to avoid errors we suggest specifying both components.
- The recommended dose is 20/4 mg/kg/dose twice daily (maximum dose sulfamethoxazole 1600mg / trimethoprim 320 mg / day).
- The usual mixture comes as: Sulfamethoxazole 200mg / Trimethoprim 40mg in 5mL, so the recommended dose of this mixture is 0.5mL/Kg twice daily.

#### ***Amoxicillin- clavulanic acid (Augmentin Duo, Clamoxyl Duo)***

- 22.5 mg/kg/dose (based on amoxicillin component) twice a day

Oral antibiotic treatment duration consists of 4 days treatment, if the patient is afebrile and 7 days treatment, if the patient is febrile.

### IV Antibiotics

***Both ampicillin and gentamicin are used together to treat most typical UTIs\****

#### ***Ampicillin:***

- 25 – 50mg/kg/dose 6 hourly (max 2g/ dose)

#### ***Gentamicin:***

- As per [SCHN Gentamicin dosing guideline](http://webapps.schn.health.nsw.gov.au/meds4kids/browse/G) <http://webapps.schn.health.nsw.gov.au/meds4kids/browse/G> (see under Gentamicin)
- With daily dosing document clearly when the first dose is given in ED and when the next dose is due on the ward.

*\* note children with a history of recurrent UTIs or those with an atypical infection may have had a previous multiresistant organism, in which case the above antibiotics may not be appropriate, and the correct antibiotics are chosen on an individual basis*

## Appendix C: Renal Imaging Recommendations for UTI

### Infants <6 months

Test	Responds well to treatment within 48h	Atypical UTI <sup>a</sup>	Recurrent UTI <sup>a</sup>
Ultrasound during acute infection	No	Yes <sup>c</sup>	Yes
Ultrasound within six 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 above page 7 for features of atypical UTI or recurrent UTI

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

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

### Infants and children > 6 months but younger than 3 years

Test	Responds well to treatment within 48h	Atypical UTI <sup>a</sup>	Recurrent UTI <sup>a</sup>
Ultrasound during acute infection	No	Yes <sup>c</sup>	No
Ultrasound within six 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 above page 7 for features of atypical UTI or recurrent UTI

<sup>b</sup> While MCUG should not be performed routinely, it should be considered if the following 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 non-Ecoli UTI, responding well to antibiotics with no other features of an atypical infection, the ultrasound can be requested on a non-urgent basis, within 6 weeks.

### Children 3 years or older

Test	Responds well to treatment within 48h	Atypical UTI <sup>a</sup>	Recurrent UTI <sup>a</sup>
Ultrasound during acute infection	No	Yes <sup>bc</sup>	No
Ultrasound within six 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 above page 7 for features of atypical UTI or recurrent UTI

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

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

## Appendix D: Children with UTI for IV antibiotics via HITH

Some children with UTI may be suitable to receive intravenous antibiotics via HITH.

### Home with admission to HITH (admitted to HITH)

- Normal or only slightly reduced oral intake, not requiring IV fluids
- Poor response to prior oral antibiotics over the last 24-48 hours
- Unable to tolerate oral medication (refusal, vomiting)

### Eligibility for UTI treatment on Home IV Therapy

Currently the ARC clinic operates with a nurse and registrar:

- CHW - Monday to Friday 08:30am to 4:00pm, excluding public holidays
- SCH – Monday to Friday 11:00am to 18:00pm and Saturday/Sunday 09:00am to 13:00pm
- On weekends HITH nursing staff are able to review patients in ARC
- The patient requires a “HITH referral” through PowerChart and the team will decide on the most appropriate location to review the child, either ARC or in the home.
- CAP in children may be suitable for intravenous antibiotics at home if the child is well and meets the following eligibility criteria:

#### Eligible Patients

- Age over 3 months
- Not requiring intravenous fluids
- Unable to tolerate oral antibiotics
- Would otherwise be admitted for IV antibiotics
- Meets HITH criteria

#### Exclusion Criteria

- Age under 3 months
- Require IV fluids
- Immunosuppressed
- Significant comorbidity/chronic disease (neurological, cardiac, respiratory) \*discuss with ED or Gen Med consultant
- Toxic or unwell requiring observation, or resuscitation

For antibiotics in ambulatory care, **IV gentamicin and oral amoxicillin** are used together first line in lieu of intravenous ampicillin and gentamicin to enable once daily dosing:

### HITH UTI Antibiotics

Gentamicin IV 7.5mg/kg/dose once daily \*monitoring as per drug policy

Oral amoxicillin 25mg/kg/dose three times daily

Once the patient is clinically improved and sensitivities are available, the patient can switch to oral antibiotics as above. (See Appendix B: [Antibiotic Treatment for typical UTI](#))

## Guideline Overview

