GUIDELINE	
Urinary Tract Infections: Investigation and Follow up	
Scope (Staff):	Medical
Scope (Area):	PMH (PCH)

This document should be read in conjunction with this DISCLAIMER

Aim

This guideline provides an evidence-based framework for the investigation and follow up of children following a urinary tract infection (UTI), referred to the Department of General Paediatrics (DGP) at Princess Margaret Hospital (PMH/PCH).

Background

Urinary tract infections (UTIs) are common. UTIs can lead to renal scarring and renal dysfunction or hypertension in adulthood. Abnormalities of the renal tract may predispose children to developing UTIs.

The management of UTI has changed in the past decade, with improvement in renal imaging modalities and recognition that past practices have been based on limited evidence.

Risk

Children with urinary tract infections may undergo unnecessary investigations or not receive the appropriate investigations and follow up.

Initial management

- Children aged greater than 3 months presenting to PMH with a UTI should be initially managed in accordance with the Emergency Department UTI guideline
- Febrile infants less than 3 months of age should be managed according to the Emergency Department Fever Without Source guideline
- Antibiotic therapy should be commenced in accordance with the ChAMP antimicrobial guideline – ChAMP Empiric Guidelines: Urinary Tract Infections

INVESTIGATIONS

- Refer to flowchart in **Appendix 1**

Renal Tract Ultrasound (US)

Renal tract ultrasound is used to assess renal anatomy.

For children less than 3 years of age:

- A renal tract US for all children following their first UTI is recommended.

- Children with an atypical UTI or UTI responding poorly to treatment should have a renal tract US performed acutely, ideally during their hospital admission. [1]
- All other children should have a renal tract US performed on a non-urgent schedule.

Children aged 3 years or older:

A renal tract ultrasound is not always necessary for older children with a simple UTI however:

- Children of any age with recurrent UTI's should have a renal tract US (non-urgent).
- Children of any age with an atypical UTI or UTI responding poorly to treatment should have a rental tract US (urgent).[1]

Micturating Cystourethrogram (MCUG)

MCUG provides an assessment of renal tract anatomy during voiding. Its purpose is to detect renal tract obstruction, anatomical anomalies and vesico-ureteric reflux (VUR).

Routine MCUG is no longer recommended after all first UTI. A recent audit performed within our institution found that a renal tract US performed by the PMH radiology service effectively excluded high grade (4 or 5) VUR and posterior urethral valves (n=220).[2] Good quality renal tract US may obviate the need for MCUG.

MCUG should be considered if:

- The renal tract US is abnormal (with features suggestive of VUR / obstruction, scarring or poor growth).
- In atypical UTIs
- If there is a history of poor urine flow
- If there is a family history of VUR[3]

Dimercaptosuccinic Acid Scan (DMSA scan)

- DMSA scans are used to assess renal function. DMSA scans show areas of differential uptake of a radioisotope in the kidney. This differential uptake is presumed to be due to renal injury or scarring. DMSA scans are usually performed 4 to 6 months following acute infection.
- Recent literature suggests that some scarring detected on DMSA may pre-exist the UTI. The long term outcome and prognosis of renal scarring detected on DMSA is unclear. There is no consensus within the literature as to how renal scarring should be monitored.
- DMSA scans have been recommended for children up to the age of 3 years with atypical or recurrent UTI. For children greater than 3 years of age, DMSA scan is only recommended for recurrent infections. [4]
- A recent audit performed within our institution found that a normal renal tract US performed by the PMH radiology service excluded significant abnormalities on DMSA with a negative predictive value of 90% (n = 143). Of those children who

had a normal ultrasound and abnormal DMSA scan, 4/9 had a small single renal scar with normal differential function and 5/9 had no scar but borderline differential function (4/5 were 44% vs 56% and 1/5 was 43% vs 57%). [5]

- Repeat renal tract US may be an acceptable alternative to DMSA for monitoring renal scarring.

Mercaptoacetyltriglycine scan (MAG 3 scan) or Diethylene Triamine Pentacaetic Acid scan (DTPA scan)

- MAG 3 and DTPA studies provide information on differential renal function and drainage. MAG 3 and DTPA scans can be used to make some assessment of cortical abnormality however a DMSA scan is a superior study for this purpose. MAG 3 and DTPA scans can be used to assess for VUR however they are less sensitive than MCUG.
- MAG 3 and DTPA studies are typically used for children in whom obstruction may be suspected. In older children where MCUG is undesirable due to age and discomfort, MAG 3 or DTPA can be used to provide an assessment of VUR.

Investigation Pathways

- Children less than 6 months old should have a renal tract US and be referred to a Paediatrician for follow up and consideration of the need for further investigation.
- Children aged 6 months – 3 years who have a normal renal tract US after their first uncomplicated UTI can be followed up by their GP.
- Children greater than 3 years with their first uncomplicated UTI do not necessarily need further investigation. These children can be followed up by their GP.
- Children who have a history of recurrent UTI, a family history of VUR or known renal abnormalities, may require further imaging such as MCUG or DMSA. These cases should be discussed with their treating Paediatrician.

Related internal policies, procedures and guidelines
Emergency Department Urinary Tract Infection Guideline (kidshealth.wa)
ChAMP Empiric Guidelines: Urinary Tract Infections

References
1. National Institute for Health and Care Excellence (NICE). Urinary tract infection in under 16's: diagnosis and management. Clinical guideline [CG54]. 2007. [Updated September 2017]. Available from: https://www.nice.org.uk/guidance/CG54. Accessed 15 August 2017.

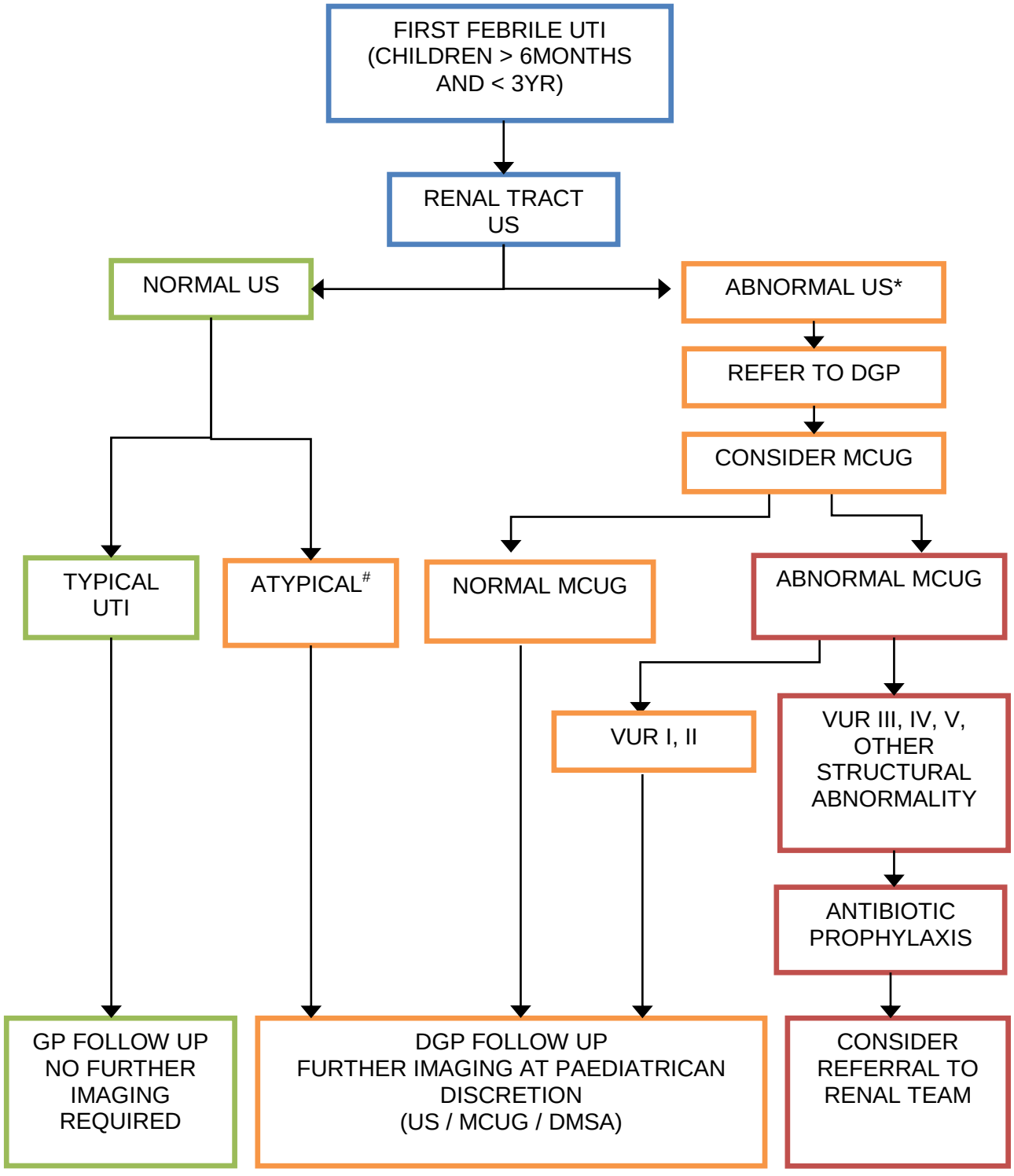
References
2. Leung M, Ozanne R, Smith L, Martin AC. Utility of Screening Ultrasound After First Febrile UTI Among Patients With Clinically Significant Vesico-ureteral Reflux. Urology 2014. 83(3) pp680-681.
3. Tan A, Troedson R, Martin AC. A normal Renal Ultrasound Scan reliably excludes major abnormalities on DMSA in children with UTIs. J Paed Child Health. 2014. 50(12) pp1033-1034.

Useful resources

This document can be made available in alternative formats on request for a person with a disability.

File Path:					
Document Owner:	Head of Department, General Paediatrics (DGP)				
Reviewer / Team:	Dr Ciara Peake, Dr Aggie Judkins, Dr Andrew Martin (DGP)				
Date First Issued:	01/09/2014	Last Reviewed:	November 2017	Review Date:	30 November 2020
Approved by:	Head of Department, General Paediatrics			Date:	28/11/2017
Endorsed by:	Head of Department, General Paediatrics			Date:	28/11/2017
Standards Applicable:	NSQHS Standards:				
Printed or personally saved electronic copies of this document are considered uncontrolled					

Appendix 1: UTI Investigation Flowchart



***Abnormal US** - refers to an US that suggests renal tract obstruction or scarring or discrepancy in size. If the US shows changes suggestive of acute pyelonephritis (such as kidney size > 97th percentile), follow up with a repeat US rather than MCUG is recommended.

 # Atypical UTI – refers to a UTI caused by a non E coli organism, UTI with septicaemia, UTI with poor response to treatment within the first 48 hours, UTI in association with poor urine flow, abdominal mass or raised creatinine.