

UTI IN CHILDREN

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Learning Objectives

- Incidence, signs & symptoms, management of febrile UTI's in children
- Imaging options and guidelines
- Referral to secondary care
- Follow up
- Case studies

Case 1

- 9 month old girl
- 2 day history of fever and a one day history of vomiting.
- No diarrhoea or URTI symptoms but has significantly decreased intake of both solids and liquids.
- Vitals: temperature of 39, HR- 145, RR- 28, oxygen saturation 99%.
- Her examination is unremarkable, and no clear source for fever

Is it UTI

- Suspect UTI if no other cause of infection is found
- Temperature $> 38^{\circ}\text{C}$.
- In verbal children, dysuria, frequency, urgency, incontinence, abdominal pain, supra-pubic discomfort, and back pain are suggestive of UTI.
- ***Temperature $>39^{\circ}\text{C}$ for ≥ 48 hours in absence of another source for fever (LR 4.0)***
- ***Temperature $<39^{\circ}\text{C}$ and presence of another source for fever (LR 0.37)***

Risk factors for urinary tract infection in children

- Poor urine flow, dysfunctional voiding and/or constipation
- Previous urinary tract infection
- Antenatally diagnosed renal abnormality
- Underlying spinal lesion
- Family history of vesicoureteric reflux or renal disease
- Enlarged bladder and/or abdominal mass
- Poor growth
- High blood pressure

Incidence of UTI

- < 1 yr – UTI more common in boys than girls, ratio is approximately 3.5:1 UTIs are much more common in uncircumcised boys
- During school age, UTIs are about 3 times more common in girls than in boys
- In adolescence UTIs are far more common in girls than boys.

Case 1

- Urine dip- positive for leucocytes, negative for nitrites.

Diagnosis

- Confirmed UTI-
 - significant bacteriuria and pyuria,
 - positive culture.

Up to 20% of children with a UTI can have a normal urinalysis

Urine Dip

	Nitrites positive	Nitrites negative
Leukocyte esterase positive	UTI	Treatment should not be started unless there is good clinical evidence of UTI
Leukocyte esterase Negative	Start treatment if sample was fresh	Not UTI
	Pyuria positive	Pyuria negative
Bacteriuria positive	Definite UTI	Regarded as having UTI
Bacteriuria negative	Antibiotic treatment should be started if clinically UTI	No UTI

Asymptomatic Bacteriuria

- Common in boys in early infancy
 - 1.6% boys < 2 months
 - Affects 0.2% in school age boys

Girls

- have lower rates until 8-14 months
- 1.5 - 2% in school age girls;
- peak prevalence 7-11 years of age

Asymptomatic bacteriuria resolves spontaneously without causing renal scarring, decreased filtration rate, or interfering with renal growth [2]

Case 1

- Can she be treated with oral antibiotics?
- Does she need referral to secondary care?

Indications for Hospitalisation

- Less than 3-6 months of age .
- With a clinical concern for bacteraemia/urosepsis
- Who are immunocompromised.
- Who cannot tolerate the oral medication.
- With any degree of renal insufficiency.
- With any urologic abnormality
- Recurrent UTI

In Hospital

- Urine dip positive for nitrites and leucocytes
- Started on iv antibiotics

Management

- Infants < 3 months with a possible UTI should be referred to secondary care.
- Children 3 months and above with acute pyelonephritis/upper urinary tract infection
 - consider referral to secondary care
 - treat with oral antibiotics for 7–10 days.
 - DOC- co-amoxiclav, Cefixime(> 6 months), Cefalexin

Management

- Children 3 months or older with cystitis/lower urinary tract infection:
 - treat with oral antibiotics for 3 days.
 - DOC -Trimethoprim, nitrofurantoin, cephalosporin or amoxicillin
- Asymptomatic bacteriuria in infants and children should not be treated with antibiotics

Case 1

- Continues to spike temperature on D3
- Cultures positive for Ecoli, resistant to Amox, Augmentin.

Atypical UTI

- Seriously ill
- Poor urine flow
- Abdominal or bladder mass
- Raised creatinine
- Septicemia
- Failure to respond to treatment within 48 hrs
- Infection with non- *E. coli* organisms

Case 1

- What imaging should this child have

Less than 6 months of age

Test	Responds well within 48 hours	Atypical UTI	Recurrent UTI
USG during acute infection	No	Yes	Yes
USG within 6 weeks	Yes	No	No
DMSA	No	Yes	Yes
MCUG	No	Yes	Yes

6 months to 3 years

Test	Responds well within 48 hours	Atypical UTI	Recurrent UTI
USG during acute infection	No	Yes	No
USG within 6 weeks	No	No	Yes
DMSA	No	Yes	Yes
MCUG	No	No	No

More than 3 years of age

Test	Responds well within 48 hours	Atypical UTI	Recurrent UTI
USG during acute infection	No	Yes	No
USG within 6 weeks	No	No	Yes
DMSA	No	No	Yes
MCUG	No	No	No

Case 1

- Should she be started on prophylaxis

Antibiotic prophylaxis

High grade VUR can cause renal damage with recurrent UTI.

Long term risk

- Progressive scarring is a risk in children with high grade VUR and recurrent UTI.
- Scarring is associated with severe hypertension, proteinuria, complications in pregnancy and progression to established renal failure.
- These risks are greater in children with bilateral renal parenchymal defects.

Case 1

- Should she be followed up

Follow up

- Infants and children who do not undergo imaging investigations should not routinely be followed up
- When the investigations are normal, Parents or carers should be informed of the results of all the investigations in writing.
- Asymptomatic bacteriuria is not an indication for follow-up

Referral and investigation of paediatric urinary tract infections in a general practice setting – are we getting it right?

N Tomlinson *Arch Dis Child* 2015; **100**:A129-A130 doi:10.1136/archdischild-2015-308599.282

- Retrospective audit looking at management of patients under 16 years old presenting to an inner city general practice from September 2010–14 with suspected UTI.
- Culture positive UTIs were identified and patients who fulfilled the NICE criteria for referral were highlighted
- Referrals were categorized as appropriate, inappropriate or missed.
- Grade of clinician who assessed the patient was also categorized as trainee, GP or locum

Results

- Results: n = 15.
 - Overall 13% referrals were appropriate,
 - 33% inappropriate
 - 53% missed.
- 100% trainee referrals were inappropriate,
- 80% GP referrals were missed and
- 50% locum referrals were inappropriate.
- There was confusion about whether to refer to paediatric urology or paediatrics (40% and 30% respectively).
- 88% missed referrals related to atypical UTIs.

Conclusion

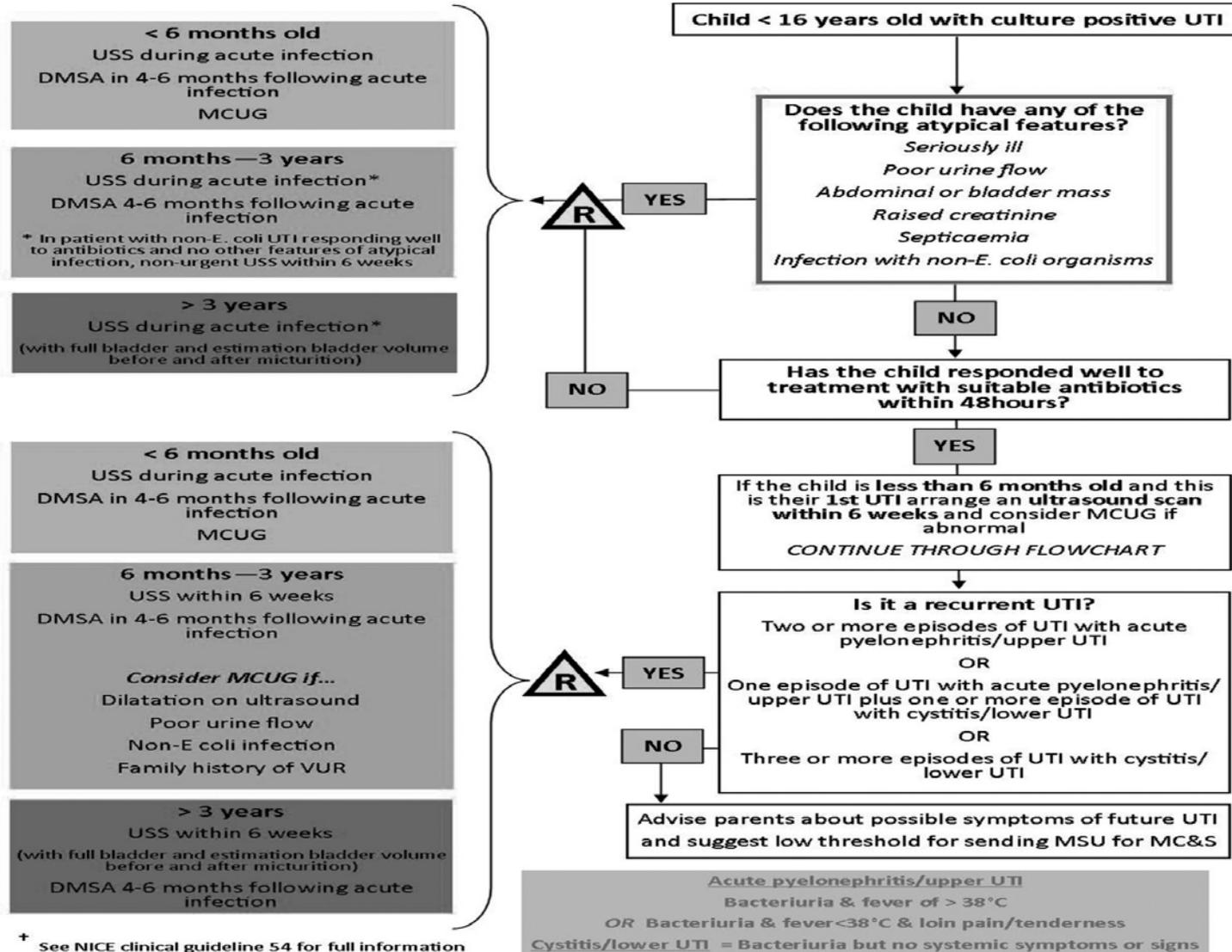
- NICE clinical guideline 54 is not easy to follow in a time pressured environment.
- This is evident across all grades of clinicians.
- Patients presenting to out-of-hours often do not have a urine sample sent for culture.

Investigation of Children With Urinary Tract Infection

Based on NICE Clinical Guideline 54[†]

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R = GP refer to Paediatrics having arranged USS if possible



[†] See NICE clinical guideline 54 for full information

N Tomlinson Arch Dis Child 2015;100:A129-A130



Case 2

- 3 year old presents with 2 day history of fever, burning micturition and vomiting.
- Had 3 previous UTI.
- Haemodynamically stable.
- History of constipation- on Movicol previously
- O/E: mild tenderness in the supra-pubic region, fecal masses in the left iliac fossa.
- Urine dip – positive for nitrites and leucocytes.
- Previous urine culture- E. coli sensitive to Trimethoprim.

Management

- Treat with Trimethoprim
- Restart Movicol
- Dietary advice
- Referral to Secondary care
 - Antibiotic prophylaxis
 - Investigations
 - USG within 4-6 weeks
 - DMSA 4-6 months

Recurrent UTI

- 2 or more episodes of acute pyelonephritis / upper urinary tract infection
or
- 1 episode of acute pyelonephritis + ≥ 1 episode of cystitis
or
- ≥ 3 episodes of cystitis/lower urinary tract infection

Dysfunctional voiding syndrome

Lack of coordination between detrusor function and external sphincter activity.

lazy, high capacity bladders little sensation

overactive bladders that lead to frequency and urgency

- Dysfunctional voiding can lead to secondary VUR ,exacerbated by chronic constipation
- Treatment
 - behavioral modification,
 - bowel regimens,
 - short-term prophylactic antibiotics.

Case 3

- 5 yr old girl with recurrent episodes of dysuria, frequency and urgency.
- Just completed a course of antibiotic for UTI. Had received multiple courses of antibiotics for similar complaints.
- Previous cultures negative
- Currently well, no fever.
- Systemic examination- Normal
- External genital examination- mild hyperemia, no discharge
- Urine dip – leucocytes positive, no nitrites.

Case 3

- Vulvovaginitis
- Treatment
 - No antibiotics.
 - Does not require further imaging
 - Reassurance
 - Cotton underpants
 - Daily warm bathing
 - Rinse genital area well.

Summary

- Do not treat for UTI without testing urine.
- If less than 3 months refer to secondary care
- older children
 - Fever over 38, loin tenderness, -pyelonephritis
 - Fever, dysuria, supra-pubic tenderness- Cystitis

Summary

- **3-6 months-** responds well to treatment – USG within 6 weeks, no further imaging required
- *Will need urgent USG along with DMSA in 4-6 weeks and MCUG if atypical, recurrent UTI*
- **6 months- 3 yrs-** No investigations if respond well to antibiotics, *Will need USG and DMSA if atypical or recurrent*
- **> 3 yrs** -USG if atypical, USG +DMSA if recurrent

References

1) NICE Guidance on management of UTI cg 54

2) Asymptomatic bacteriuria in schoolgirls. VIII. Clinical course during a 3-year follow-up. Lindberg U, Claesson I, Hanson LA, Jodal U J Pediatr. 1978;92(2):194.

