

# 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  $\geq 48$  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
<b>Leukocyte esterase positive</b>	UTI	Treatment should not be started unless there is good clinical evidence of UTI
<b>Leukocyte esterase Negative</b>	Start treatment if sample was fresh	Not UTI
	Pyuria positive	Pyuria negative
<b>Bacteriuria positive</b>	Definite UTI	Regarded as having UTI
<b>Bacteriuria negative</b>	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***

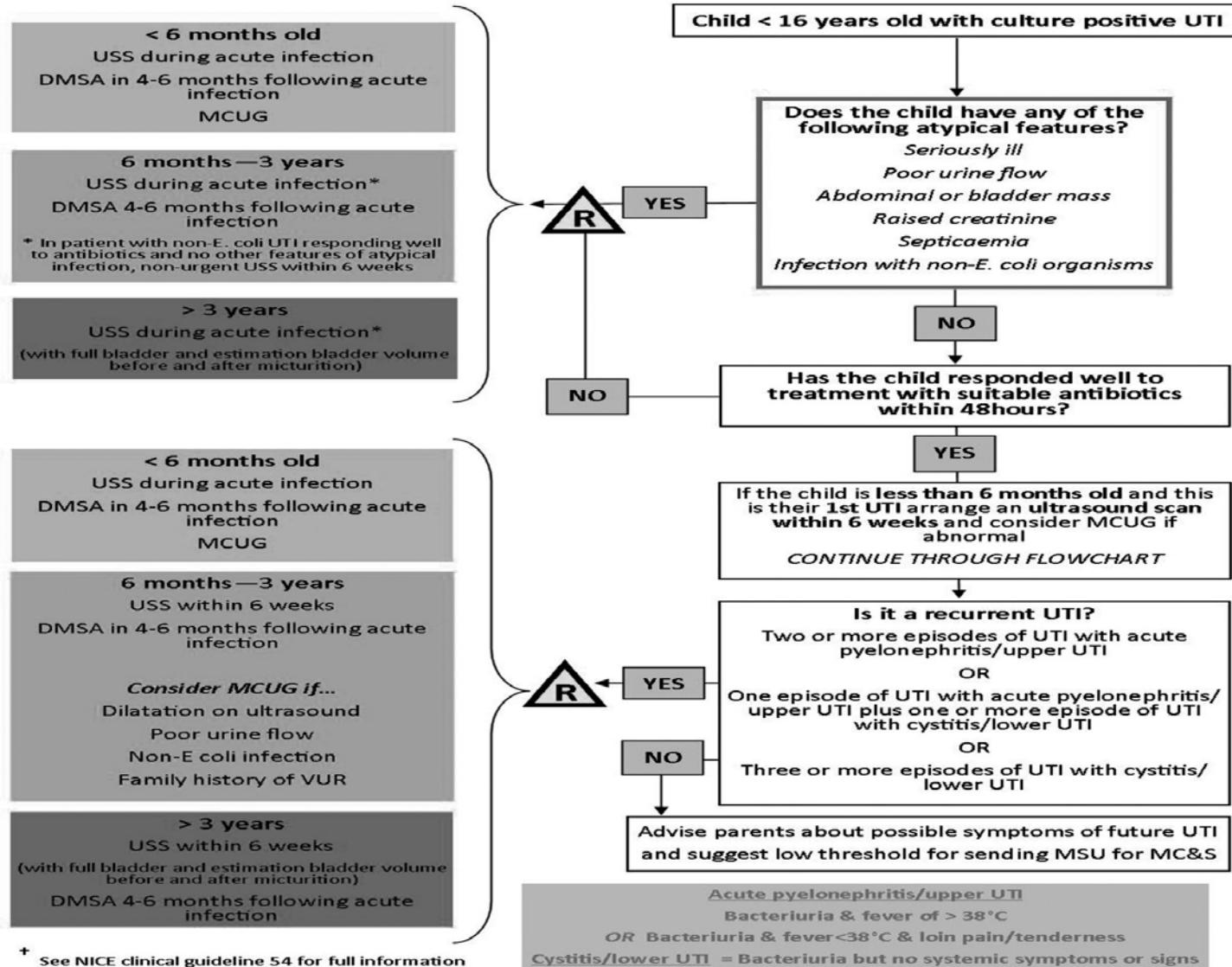
- NICE clinical guideline 54 is not easy to follow in a time pressured environment.
- This is evident across all grades of clinicians.
- Patients presenting to out-of-hours often do not have a urine sample sent for culture.

# Investigation of Children With Urinary Tract Infection

Based on NICE Clinical Guideline 54<sup>†</sup>

Dr N Tomlinson

**R** = GP refer to Paediatrics having arranged USS if possible



<sup>†</sup> See NICE clinical guideline 54 for full information

**Acute pyelonephritis/upper UTI**  
Bacteriuria & fever of > 38°C  
**OR** Bacteriuria & fever < 38°C & loin pain/tenderness  
**Cystitis/lower UTI** = Bacteriuria but no systemic symptoms or signs

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 +  $\geq 1$  episode of cystitis  
or
- $\geq 3$  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.

