Which UTIs Need a VCUG? Applying AAP Guidelines

Nicolette Janzen, MD
Texas Children’s Hospital

Goals

1. Review the guidelines
2. Present clinical scenarios
3. Discuss VCUG and nuclear cystogram
4. Discuss the application of the guidelines for patients NOT in the 2-24 month age group
5. The RIVUR trial results
Clinical Scenario

A 22-month-old boy is referred for dysuria and two UTIs. At the time of his diagnosis, he had no or low grade fever. He is uncircumcised and is not toilet trained. According to his mother, a bag was used to collect the urine, the most recent was E. Coli >100K cfu/ml. A renal US was recently performed demonstrating normal appearing kidney parenchyma with left pelviectasis, no hydroureter and a normal bladder.

Your next step is to:

Clinical Scenario

• 22-month-old boy is referred for dysuria and two UTIs
• No or low grade fever at time of diagnosis
• Uncircumcised
• Not toilet trained
• A bag was used to collect the urine, the most recent was E. Coli >100K cfu/ml, per his mother
• A renal US was recently performed demonstrating normal appearing kidney parenchyma with left pelviectasis, no hydroureter and a normal bladder

Your next step is to:
AUDIENCE RESPONSE

A. Obtain VCUG
B. Repeat renal us in 6 months
C. Recommend circumcision
D. Observe

Do the Guidelines Apply?

Patient is between 2-24 months
> 50,000 cfu of a uropathogen

Not febrile
Inappropriate collection of urine specimen
No urinalysis available to confirm pyuria
AAP Guidelines for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2-24 Months

Seven Action Statements

Diagnosis (3)
Treatment (1)
Work-up (2)
Follow-up (1)

Diagnosis – Is It a UTI?

MUSTS

• Pyuria on urinalysis
• At least 50,000 cfu/ml
• Uropathogenic organism
• Appropriately collected urine specimen
**Pyuria**

- Urinalysis > 5 wbc per HPF
- Leukocyte esterase – a surrogate marker for pyuria
  - High sensitivity, low specificity
  - False positives common

**Urinalysis**

Indirect tests may support diagnosis of UTI

- Microscopic WBC > 5 pHPF
- Any number of bacteria pHPF
- Urinary leukocyte esterase positive
  (high sensitivity, low specificity)
- Urinary nitrite (low sensitivity, high specificity)
  - Gram positive bacteria do not reduce urinary nitrates

If last 3 present, sensitivity for UTI almost 100%
Urine Culture

• 50,000 cfu/ml
• Uropathogen
  – Not clinically relevant:
    • Lactobacillus
    • Coag negative Staph
    • Corynebacterium

Specimen

• In children (age 2-24 months) in whom a UTI is suspected, the specimen needs to be obtained via catheterization or suprapubic aspirate

• Bagged specimens have an unacceptably high false-positive rate
Clinical Scenario

- 8-month-old female patient presents for workup of fever to 102 for one day
- No obvious GI, ENT, URI or other source
- A cathed urine specimen is nitrite and leuk esterase positive
- UTI suspected and culture sent
- Clinically stable, able to tolerate PO and is started on empiric antibiotics
- Her urine culture results in 48 hours, it is sensitive to the antibiotics you started

Your next step:

AUDIENCE RESPONSE

A. Recommend renal ultrasound ASAP
B. Recommend renal ultrasound and VCUG
C. Recommend renal US in 2-3 weeks
D. Observe
Work-up

• Renal ultrasound
  – Obtain early if very ill or not improving
  – If clinically stable and improving, wait and obtain after UTI has been treated

• Obtain cystogram only if an anatomic abnormality is present
  – Or, if second febrile UTI occurs (renal US normal after the first)

Which Cystogram?

• Contrast voiding cystourethrogram
  – Gold standard
  – Precise anatomic detail and grade

• Nuclear cystogram
  – Lower radiation exposure
  – Inferior anatomic detail of bladder and urethra
  – Longer cycling time
### What If My Patient Is Not 2-24 Months?

<table>
<thead>
<tr>
<th>Infants Younger Than 2 Months</th>
<th>Non Toilet Trained Children Older Than 24 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal US and VCUG</td>
<td>Apply the guidelines</td>
</tr>
</tbody>
</table>

### Toilet Trained Children
- Obtain detailed voiding and elimination history
- Discuss behavior modification to reduce UTI risk
- Obtain renal US
- Consider DMSA to rule out scarring
- Offer sedation with VCUG

### Circumcision Status
- 92% of boys < 6 months with UTI are uncircumcised
- Relative risk of UTI in uncircumcised male infants is 3 to 12 compared to circumcised males
RIVUR Trial
*Randomized Intervention for children with VesicoUreteral Reflux*

- Multi-center, randomized, double-blind, placebo controlled trial
- Effectiveness of daily prophylaxis (Bactrim) in children found to have VUR after initial UTI
- Inclusion criteria: VUR grades 1-4
- Study period 2 years

**RIVUR Trial Conclusions**

- Less febrile UTIs on prophylaxis
  - 39/302 prophylaxis group
  - 72/305 placebo group

- No difference in preventing renal scar formation
  - 11.9% prophylaxis group
  - 10.2% placebo group
Key Take Aways

1. For infants and children >2 months of age and not toilet trained, a VCUG is recommended after a second febrile UTI occurs or if a abnormality is detected on renal US after the first febrile UTI.

2. For infants ≤ 2 months of age, obtain a renal US and VCUG after a first febrile UTI.

3. The proper diagnosis of a UTI depends on proper specimen collection and interpretation of the urinalysis and urine culture results.

4. Improper diagnosis of a UTI may lead to unnecessary testing.