Pediatric Urinary Tract Infections

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Pediatric UTI Epidemiology

• What are the chances that this baby has a UTI?
  – UTIs account for 7.5% of febrile episodes in infants < 2 mo vs 1.7% of children < 5 y/o: likelihood decreases with age; high in infants
  – Prevalence preterm infants > term
  – Boys are 5-8 X more likely than girls to be infected; persists for first 3 months of life.
  – In 1st year of life, uncirc’d males >10X incidence of URI than females or circumised males; lifelong
  – Female uti prevalence > males after 3 mo of age.

Arch Dis Child 1969;44,617
BrMJ 1972;1:267
Pediatrics 1982; 69;409
Pediatric UTI Diagnosis

- U/a should be processed immediately; if not, keep refrigerated at 4°C; incubation at room temp for even 1 hour decreases sens/spec.
- U/a can suggest dx; ONLY a positive quantitative culture of properly collected urine is diagnostic.
- Urinalysis: leukocyte esterase, nitrites, microscopic examination of WBC and bacteria (stained, unstained, spun, unspun); often used.
  - LE test 76-85% sensitivity; nitrite (29-70% sensitivity)
  - WBC > 5 hpf on spun urine
  - Any bacteria in spun urinary sediment
  - LE and microscopic WBC highly correlated; not neces to do both
  - Negative microscopy for bacteria or negative Gram stain plus negative dipstick LE : high negative predictive value

Peds 1999;104;79-86
# Pediatric UTI: Diagnosis

<table>
<thead>
<tr>
<th>Collection Mode</th>
<th>Colony Counts</th>
<th>Prob of Infection (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suprapubic</td>
<td>Gram neg bacilli: ANY</td>
<td>&gt; 99</td>
</tr>
<tr>
<td></td>
<td>Gram pos cocci: &gt;10^3</td>
<td></td>
</tr>
<tr>
<td>Catheterization</td>
<td>➢10^5</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>➢10^4 to 10^5</td>
<td>Infection likely</td>
</tr>
<tr>
<td>Clean voided</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>&gt; 10^4</td>
<td>Infection likely</td>
</tr>
<tr>
<td>Girls</td>
<td>3 specimens &gt; 10^5</td>
<td>Infection likely</td>
</tr>
<tr>
<td></td>
<td>1 specimen &gt; 10^5</td>
<td>80%</td>
</tr>
</tbody>
</table>

First voided is best; CFU/ml affected by hydration, recent antibx use
AAP recommends cath or spa; bagged specimen high rate > 70% false +

PIDJ 1982; 1:271
Peds 103 1999;4 843
Pediatric UTI: Diagnosis

• Other tests: WBC, CRP, ESR low predictive value
• New markers: Procalcitonin: marker of biologic inflammation: increases with endotoxin release; short half life (2-6h); remains high as long as inflammatory stimulus present
• Correlation with pyelonephritis
Does this baby have an UTI?

- Febrile infant 2 mo old with + nitrites and LE: *very likely* has an UTI
- *Assumed* to have acute pyelonephritis: immune system, risk of underlying bacteremia, T > 39; infants < 2 mo can quickly change clinical status
- Hoberman study 76% of + BC with UTI in infants < 6 mo

Pediatric clinics of na 53 2006;379-400
Peds 1999;104;79-86
Treatment Issues

• Evaluation for invasive infection if toxic appearing: recommended for neonates, infants < 2 mo of age

• Rx: parenteral vs oral: oral rx as effective as IV for pyelo; decision based on risk of urosepsis, clinical appearance, hydration status, compliance, risk of complications.

• Medications:
  – Parenteral: Amp/gent or third generation cephalosporin good first choice; tailor with culture results; transition to oral meds
  – Oral: T/S consistently higher cure rates than amox
  – Complete 7-14 d course of therapy
Evaluation of UTI

• Routine reculture of sensitive organism not usually necessary, unless: not expected clinical response, sensitivities not available

• Children 2 mo -2 y/o: Imaging: Urinary tract sonography to detect dilatation (obstruction) and a study to detect reflux.
  – Renal USG and either VCUG or RNC (radionuclide cystography)

• Imaging of infants with first UTI recommended to identify renal abnormalities that lead to renal damage.

Peds 103 1999;4 843
Pediatric UTI: Antimicrobial Prophylaxis

- High urinary concentrations; low bowel concentrations to reduce effect on bacterial resistance in bowel
- Use in children with frequent recurrences (>3/yr), esp with uropathy
- Risk for recurrent UTI: recurrent uti, uropathy, some VUR, immunosuppression, dysfunctional voiding/bowel

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
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<tbody>
<tr>
<td>Tmp/Smx</td>
<td>2 mg/kg tmp single bedtime dose or 5 mg/kg tmp 2 x/wk</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>1-2 mg/kg single daily dose</td>
</tr>
<tr>
<td>Sulfisoxazole</td>
<td>10-20 mg/kg div q 12h</td>
</tr>
<tr>
<td>Methenamine mandelate</td>
<td>75 mg/kg divided q 12h</td>
</tr>
<tr>
<td>Nalidix acid</td>
<td>30 mg/kg divided q 12h</td>
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</tbody>
</table>

Peds 103 1999;4 843
Long 2003 Principles and Practice of Peds ID
References

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