GUIDELINE EXCLUSION CRITERIA
- Known genitourinary anatomical abnormality
- Known immunodeficiency and/or on immunosuppressants
- Known uncorrected, hemodynamically unstable complex heart disease
- Prior febrile UTI with pathogen other than E. coli
- Prior febrile UTI with E.coli pathogen known to be resistance to empiric antibiotics therapy
- Clinically unstable (Septic Shock)

GUIDELINE INCLUSION CRITERIA
- 2 months to 18 years of age with symptoms: fussiness, foul smelling urine, blood in urine, new incontinence, dysuria, or urethral discharge
- Febrile > 38°C with no apparent source

Inpatient Criteria
- Ill-appearing (SIRS/SEPSIS)
- Dehydration requiring IV or NG fluids
- Persistent vomiting or inability to tolerate PO ABX
- Social indicators that make treatment compliance and/or PCP follow-up difficult
- Failure of outpatient treatment with need for IV therapy

Emergency Department Pathway

Inpatient Pathway

First Febrile Urinary Tract Infection
Risk Factors and Screening Recommendations
Evidence Based Outcome Center

GUIDELINE EXCLUSION CRITERIA

GUIDELINE INCLUSION CRITERIA

> 2 months – Not Toilet Trained

Probability of UTI > 1%:
2 or more risk factors

Female Risk Factors*
Non-black
T ≥ 39°C
Fever ≥ 2 days
No apparent source of fever
Age < 12 months

Probability of UTI > 1%:
Uncircumcised OR Circumcised with 3 or more Risk Factors

Male Risk Factors*
Non-black
T ≥ 39°C
Fever ≥ 2 days
No apparent source of fever
Age < 6 months

All Patients
- Symptoms referable to urinary tract
- Prior history of UTI, fever ≥ 2 days
- Prolonged fever (≥ 5 days)
- Recommend screening for any of the above factors

Toilet Trained – 18 years

DCMC UTI Definition: The presence of pyuria and/or bacteruria on urinalysis AND a positive urine culture.

- Pyuria should be considered present if there are ≥5 WBCs/hpf in a centrifuged specimen and ≥10 WBCs/hpf in a counting chamber. DCMC uses centrifuged specimens.

- Urine culture is considered positive if there are ≥50,000 cfu/mL in a specimen obtained by catheterization or suprapubic aspiration. If the specimen was obtained by the clean-catch method, ≥100,000 cfu/mL is considered optimal for diagnosis but 50,000-100,000 can also be accepted with the understanding that the sensitivity and specificity are decreased in this setting.

Dell Children’s Medical Center of Texas
A member of the Samsung Family of Hospitals

For questions concerning this pathway, Click Here
Last Updated May 31, 2017
For questions concerning this pathway, Click Here
Last Updated May 31, 2017
For questions concerning this pathway, Click Here
Last Updated May 31, 2017

First Febrile Urinary Tract Infection
Inpatient Management Pathway
Evidence Based Outcome Center

Primary care provider or outside hospital admission

Inclusion criteria met?

Manage OFF-Pathway
Close clinical follow-up

> 24 months

Toilet trained?

NO

Likelihood of UTI ≤ 1%

YES

Order Urine Analysis (UA)
Bag specimen is preferred if possible
Alternative
Catheter OR Suprapubic Aspirate

UA positive?

NO

Order Urine Culture
MUST be obtained from clean catch, catheter, or Suprapubic Aspirate. If bag sample previously tested, another specimen should be obtained to send for culture

Antibiotic Management: Continue or start
Cefazolin: 50 mg/kg/Day divided Q8hrs | Max dose: 2g per dose

Consider stopping antibiotics

Imaging Recommendations

YES

Urine Culture Positive?

Transition:
24 – 48 hours of IV therapy with clinical improvement.
Assess antibiotic susceptibility and adjust to most narrow spectrum agent
Total duration of antibiotics: IV + PO = 7 Days

DISCHARGE CRITERIA
- Non-toxic appearing
- Well-hydrated
- Can tolerate oral antibiotics and fluids
- Normal genitourinary anatomy
- Renal Bladder Ultrasound reviewed if performed
- Quality follow-up within 24 to 48 hours
- Clinically assessed as stable for home disposition

Outside record documents appropriate urine collection and UA is positive

2 - 24 months

Order Urine Analysis (UA) with Micro
Include additional tests if STI considered

DCMC Emergency Department Admission

Non-toxic appearing
Well-hydrated
Can tolerate oral antibiotics and fluids
Normal genitourinary anatomy
Renal Bladder Ultrasound reviewed if performed
Quality follow-up within 24 to 48 hours
Clinically assessed as stable for home disposition
First Febrile Urinary Tract Infection
Imaging Recommendations
Evidence Based Outcome Center

For questions concerning this pathway, Click Here
Last Updated May 31, 2017

Renal Bladder Ultrasound (RBUS) Criteria

<table>
<thead>
<tr>
<th>Age 2 to 24 months</th>
<th>First febrile UTI or no prior RBUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children older than 24 months with any of the following</td>
<td>Pathogen other than E. coli</td>
</tr>
<tr>
<td></td>
<td>Family history of renal or urologic disease</td>
</tr>
<tr>
<td></td>
<td>Hypertension</td>
</tr>
<tr>
<td></td>
<td>Poor growth (PCP input recommended)</td>
</tr>
<tr>
<td></td>
<td>No clinical improvement with empiric antimicrobial therapy after 48 hours</td>
</tr>
</tbody>
</table>

Voiding Cystourethrogram (VCUG) Criteria

<table>
<thead>
<tr>
<th>Criteria for obtaining a VCUG</th>
<th>Abnormal findings:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hydronephrosis</td>
</tr>
<tr>
<td></td>
<td>Scarring</td>
</tr>
<tr>
<td></td>
<td>Dilated pelvis</td>
</tr>
<tr>
<td></td>
<td>Dilated ureter</td>
</tr>
<tr>
<td></td>
<td>Recommended by reviewing Pediatric Radiologist</td>
</tr>
<tr>
<td></td>
<td>Chronic hypertension +/- poor growth</td>
</tr>
<tr>
<td></td>
<td>Urinary pathogen other than E. coli</td>
</tr>
<tr>
<td></td>
<td>Extended spectrum beta-lactamase producing E. coli</td>
</tr>
</tbody>
</table>
DCMC Positive Urinalysis (UA) Definition: The presence of Leukocyte Esterase OR Nitrites OR microscopic analysis results positive for leukocytes or bacteria is suggestive of an active UTI. When more than one of these findings is present at the same time, the sensitivity and specificity increase significantly.

- Urine dipstick alone is unable to report WBC count and presence of bacteria and should be used with caution for detecting a UTI.
- Within the guideline, there exists the option to perform a bag specimen if the clinician feels it to be more convenient. If the results of the UA are positive, it is strongly advised to obtain a catheterized specimen for the urine culture to avoid contamination.

DCMC UTI Definition: The presence of pyuria and/or bacteruria on urinalysis AND a positive urine culture.

- Pyuria should be considered present if there are $\geq 5$ WBCs/hpf in a centrifuged specimen and $\geq 10$ WBCs/hpf in a counting chamber. DCMC uses centrifuged specimens.
- Urine culture is considered positive if there are $\geq 50,000$ cfu/mL in a specimen obtained by catheterization or suprapubic aspiration. If the specimen was obtained by the clean-catch method, $\geq 100,000$ cfu/mL is considered optimal for diagnosis but 50,000-100,000 can also be accepted with the understanding that the sensitivity and specificity are decreased in this setting.
### EMERGENCY DEPARTMENT/OUTPATIENT

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Empiric First Line</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cephalexin</td>
<td>50-100 mg/kg/day divided TID-QID</td>
<td>Maximum 1000 mg/dose</td>
</tr>
<tr>
<td><strong>Empiric Alternative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin/clavulanate</td>
<td>20-40 mg/kg/day divided BID</td>
<td>Maximum 875 mg/dose</td>
</tr>
<tr>
<td><strong>If IgE-mediated allergy to penicillins AND cephalosporins</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>20 mg/kg/day divided BID</td>
<td>Maximum 750 mg/dose (oral)</td>
</tr>
<tr>
<td>Trimethoprim/sulfamethoxazole should be used with caution as empiric therapy due to decreased susceptibility among <em>E. coli</em> isolates, only 71% susceptible.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### INPATIENT

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Empiric First Line</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefazolin</td>
<td>50 mg/kg/day divided q8H</td>
<td>Maximum 2000 mg/dose</td>
</tr>
<tr>
<td><strong>If IgE-mediated allergy to penicillins AND cephalosporins</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aztreonam</td>
<td>90 mg/kg/day divided q8H</td>
<td>Maximum 2000 mg/dose</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>5-7 mg/kg/day q24H</td>
<td>No maximum dose</td>
</tr>
<tr>
<td><strong>If concern for CNS involvement (first line)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>100 mg/kg/day divided q12H</td>
<td>Maximum dose 2000 mg/dose</td>
</tr>
<tr>
<td><strong>If concern for CNS involvement and IgE-mediated allergy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aztreonam</td>
<td>90 mg/kg/day divided q8H</td>
<td>Maximum 2000 mg/dose</td>
</tr>
</tbody>
</table>
First Febrile Urinary Tract Infection
Evidence Based Outcome Center

EBOC Project Owner: George Miner, MD

Approved by the Evidence-Based Outcomes Center

Revision History
Date Approved: 5/31/2017
Next Review Date: 6/01/2019

EBOC Team:
George Miner, MD
Claire Hebner, MD
Sujit Iyer, MD
Sarmistha Hauger, MD
Marisol Fernandez, MD
Allen Coburn, MD
Michael Gardiner, MD
Jose Cortez, MD
Kathryn Merkel, PharmD
Patrick Boswell

EBOC Committee:
Sarmistha Hauger, MD
Terry Stanley, DNP, RN, NE-BC
Mark Shen, MD
Deb Brown, RN
Robert Schlechter, MD
Levy Moise, MD
Sujit Iyer, MD
Tory Meyer, MD
Nilda Garcia, MD
Meena Iyer, MD
Michael Auth, DO

LEGAL DISCLAIMER: The information provided by Dell Children’s Medical Center of Texas (DCMCT), including but not limited to Clinical Pathways and Guidelines, protocols and outcome data, (collectively the “Information”) is presented for the purpose of educating patients and providers on various medical treatment and management. The Information should not be relied upon as complete or accurate; nor should it be relied on to suggest a course of treatment for a particular patient. The Clinical Pathways and Guidelines are intended to assist physicians and other health care providers in clinical decision-making by describing a range of generally acceptable approaches for the diagnosis, management, or prevention of specific diseases or conditions. These guidelines should not be considered inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the same results. The ultimate judgment regarding care of a particular patient must be made by the physician in light of the individual circumstances presented by the patient. DCMCT shall not be liable for direct, indirect, special, incidental or consequential damages related to the user’s decision to use this information contained herein.