SHC Clinical Pathway: Management of Urinary Tract Infections – Adult Patients

I. Background: We have adapted national guidelines to assist in the management of adult with UTIs at SHC. Patients who present with sepsis should be managed with SHC sepsis guidelines.

II. Procedures/Guidelines:
   a. Definitions:
      i. Acute uncomplicated UTI: Per IDSA guidelines, this category includes infections that occur in otherwise healthy, non-pregnant, pre-menopausal women with normal urinary tract anatomy. Some clinicians may also include post-menopausal women and men without urologic abnormalities (e.g. prostatic enlargement)
      ii. Acute complicated UTI: occur in those with risk factors that increase the risk of failing therapy. These risk factors include: pregnancy, urinary tract obstruction, functional or anatomic abnormality of the urinary tract, renal failure, DM, immunosuppression, hospital-acquired infection, renal transplant, immunosuppression.
      iii. Acute complicated pyelonephritis: upper tract infection that is complicated by an abscess, nephrolithiasis, papillary necrosis, or emphysematous pyelonephritis
      iv. Catheter-associated urinary tract infection (CAUTI): infections that occur in patients with indwelling bladder catheters or within 2 days of catheter removal
   b. Symptoms:
      i. cystitis: dysuria, urinary frequency, urinary urgency, suprapubic pain, hematuria
      ii. pyelonephritis: symptoms of cystitis, fever (>38°C), chills, flank pain, costovertebral angle tenderness, and nausea/vomiting
   c. Diagnosis: A positive urine culture may confirm a UTI, but it may also reflect asymptomatic bacteriuria or a urine sample that was contaminated by bacteria during collection. Urine cultures are most useful if they are only obtained for patients with high clinical suspicion of UTI. They should not be obtained for asymptomatic patients with dirty-appearing or smelly urine samples.
      i. In healthy women without risk factors for infections with drug resistant organisms such as recent antibiotic use (e.g. within the last 3 months) a confirmatory urine culture may not be necessary. Clinical evidence indicates that women with >2 symptoms suggestive of a UTI as well as no evidence of vaginitis had a >90% probability of a UTI.
      ii. For all other UTIs, UA with reflex culture should be obtained.
      iii. For patients with an indwelling urinary catheter, samples should be obtained from newly placed catheter (eg within 5 days) or straight catheterization.
      iv. Some causes of sterile pyuria: Specimen contamination; antibiotics taken prior to obtaining urine culture; sexually transmitted infections; recent urinary tract instrumentation (e.g. ureteral stents); renal disease, including interstitial nephritis and nephrolithiasis; intra-abdominal inflammatory process (e.g. appendicitis); pelvic malignancy; medications (e.g. non-steroidal anti-inflammatories, proton pump inhibitors)
   d. Empiric antibiotics:
      i. Empiric antimicrobial choice is directed at E. coli (the most common uropathogen) and should take into consideration local resistance patterns or previous exposure to antibiotics (see select antibiograms on page 2)
         1. Guidelines recommend avoiding empiric use of trimethoprim-sulfamethoxazole if resistance prevalence is >20% or if used by the patient in the previous 3 months
         2. Guidelines recommend avoiding empiric use of fluoroquinolones if resistance prevalence is >10%
      ii. Uncomplicated cystitis in women: nitrofurantoin is first-line
      iii. Cystitis in men: trimethoprim-sulfamethoxazole is first-line, fluoroquinolones are also an acceptable choice (see below.)
iv. Fluoroquinolones should be reserved for situations in which other choices are not options.

**Table 1. 2016 SHC data for E.coli isolated from urine cultures – outpatient setting (all clinics)**

<table>
<thead>
<tr>
<th></th>
<th>Ampicillin</th>
<th>Amoxicillin-clavulanate</th>
<th>Cefazolin</th>
<th>Ceftriaxone</th>
<th>Nitrofurantoin</th>
<th>Trimethoprim-sulfamethoxazole</th>
<th>Ciprofloxacin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E. coli</strong> isolates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1692 isolates</td>
<td>54.4%</td>
<td>81.2%</td>
<td>88.5%</td>
<td>92.7%</td>
<td>97.2%</td>
<td>74.1%</td>
<td>80.5%</td>
</tr>
</tbody>
</table>

**Table 2. 2016 SHC data for E.coli isolated from urine cultures – Express Care (2 clinics)**

<table>
<thead>
<tr>
<th></th>
<th>Ampicillin</th>
<th>Amoxicillin-clavulanate</th>
<th>Cefazolin</th>
<th>Ceftriaxone</th>
<th>Nitrofurantoin</th>
<th>Trimethoprim-sulfamethoxazole</th>
<th>Ciprofloxacin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E. coli</strong> isolates</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>411 isolates</td>
<td>61.3%</td>
<td>82.2%</td>
<td>98.3%</td>
<td>96.1%</td>
<td>98.5%</td>
<td>79.6%</td>
<td>90%</td>
</tr>
</tbody>
</table>

**Table 3. Preferred agents**

<table>
<thead>
<tr>
<th>Agent</th>
<th>Dose</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Nitrofurantoin         | Macrobid®: 100 mg PO q12h x 5-7 days (uncomplicated) | ▪ Avoid if concern for pyelonephritis  
▪ Avoid if CrCl < 30, pregnant patients at term  
▪ Use with caution in age > 65  
▪ Use with caution in men due to concern for sub-therapeutic prostatic levels  
▪ Activity against enterococcus, VRE  
▪ ADRs: urinary discoloration (brown) |
| Trimethoprim/Sulfamethoxazole | 800/160 mg PO q12h x3 days (uncomplicated) or 10-14 days (complicated or pyelonephritis) | ▪ Good prostatic tissue levels: ok in men with cystitis if concern of prostatitis  
▪ Avoid in pregnancy  
▪ ADRs: rash, hyperkalemia (use caution in elderly concomitantly with ACE inhibitors/ARBs, spironolactone, etc), elevated BUN/SCr, bone marrow suppression |
| Cephalexin             | 500 mg PO q8-12h x7 days (uncomplicated) or 10-14 days (complicated) | ▪ Limited data: lower efficacy with β-lactams: vs comparator ABX  
▪ β-lactams generally not used in men with cystitis if concerned re: prostatitis |
| Cefpodoxime           | Uncomplicated: 100 mg PO q12h x 5-7 days  
Complicated pyelonephritis: 200-400 mg PO q12 x 10-14 days | ▪ Limited data: lower efficacy of β-lactams vs. comparator ABX  
▪ β-lactams generally not used in men with cystitis if concerned of prostatitis  
▪ Frequently requires prior authorization from insurance |
### Table 4. Second-line agents

<table>
<thead>
<tr>
<th>Agent</th>
<th>Dose</th>
<th>Notes</th>
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</thead>
</table>
| **Ciprofloxacin**      | 500 mg PO q12h x3 days (uncomplicated) or 5-7 days (complicated or pyelonephritis) | - Caution with empiric use- increasing resistance to *E.coli* (see SHC antibiogram)  
- Preferred over β-lactams in men with cystitis if concern for prostatitis  
- Avoid in pregnancy  
- Avoid enteral administration with antacids  
- ADRs: QTc prolongation, black box warnings (tendinitis, peripheral neuropathy, CNS effects) |
| **Levofloxacin**       | Uncomplicated cystitis 750 mg PO daily x3 days  
Acute pyelonephritis: 750mg daily x 5 -7 days | - Caution with empiric use- increasing resistance to *E.coli* (see SHC antibiogram)  
- Preferred over β-lactams in men with cystitis if concern for prostatitis  
- Avoid in pregnancy  
- Avoid enteral administration with antacids  
- ADRs: QTc prolongation, black box warnings (tendinitis, peripheral neuropathy, CNS effects)  
- Frequently requires prior authorization |
| **Fosfomycin** (SHC restriction) | Cystitis: 3 grams PO x1  
Complicated/MDR organisms: 3g q48-72h x3 doses | - Not recommended if concern for pyelonephritis or perinephric abscess  
- Useful in MDR infections without oral alternatives  
- OK in men with cystitis if concern for prostatitis  
- Use requires confirming micro susceptibilities  
- Frequently requires prior authorization |
| **Amoxicillin**        | Uncomplicated: 500 mg PO BID  
Complicated or pyelonephritis: 500 mg q8h or 875 mg q12h | - Use if organism susceptible  
- Limited data: lower efficacy with β-lactams: vs comparator ABX  
- β-lactams generally not used in men with cystitis if concerned of prostatitis |
| **Amoxicillin-clavulanate** | Uncomplicated: 500/125 mg PO q12h x5-7 days  
Complicated or pyelonephritis: 500/125 mg q8h or 875/125 mg q12h x 10-14 days | - Use if organism susceptible  
- Limited data: lower efficacy with β-lactams: vs comparator ABX  
- β-lactams generally not used in men with cystitis if concerned of prostatitis |
III. References


IV. Document Information

a. Original Author/Date: Marisa Holubar, MD MS & Lina Meng, PharmD

b. Gatekeeper: Antimicrobial Stewardship Program

c. Review and Renewal Requirement

This document will be reviewed every three years and as required by change of law or practice

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ii. P&T: pending approval 12/2017

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