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 catherization.

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)

		Ampicillin	Amoxicillin-clavulanate	Cefazolin	Ceftriaxone	Nitrofurantoin	Trimethoprim-sulfamethoxazole	Ciprofloxacin
E. coli	1692 isolates	54.4%	81.2%	88.5%	92.7%	97.2%	74.1%	80.5%

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

	Number	Ampicillin	Amoxicillin-clavulanate	Cefazolin	Ceftriaxone	Nitrofurantoin	Trimethoprim-sulfamethoxazole	Ciprofloxacin
E. coli	411 isolates	61.3%	82.2%	98.3%	96.1%	98.5%	79.6%	90%

Table 3. Preferred agents

Agent	Dose	Notes
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 or 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

Agent	Dose	Notes
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: 875 mg q12-8h	▪ 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 q12-8h x5-7 days x 10-14 days Complicated or pyelonephritis: 875/125 mg q12-8h 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

a. Gupta, et al. International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases Clinical Infectious Diseases 2011;52(5):e103–e120
b. Grigoryan L, Trautner BW, Gupta K. Diagnosis and management of urinary tract infections in the outpatient setting: a review. JAMA. 2014 Oct 22-29;312(16):1677-84. doi: 10.1001/jama.2014.12842. Review. PubMed PMID: 25335150.
c. Metlay JP, Strom BL, Asch DA. Prior antimicrobial drug exposure:a risk factor for trimethoprim-sulfamethoxazole-resistant urinary tract infections. J Antimicrob Chemother 2003; 51:963–70.
d. Pallin DJ, et al. 2014. Urinalysis in Acute Care of Adults: Pitfalls in Testing and Interpreting Results. Open Forum Infect Dis. 1(1):ofu019. doi: 10.1093/ofid/ofu019
e. Wilson ML and Gaido L. 2004. Laboratory Diagnosis of Urinary Tract Infections in Adult Patients. Clin Infect Dis. 38 (8): 1150-1158. doi: 10.1086/383029

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
d. Revision/Review History:
SASS team: 11/14/2017
e. Approvals
i. Antimicrobial Subcommittee: approved 11/16/2017
ii. P&T: pending approval 12/2017

Stanford Health Care
Stanford, CA 94305