Urinary Tract Infection (UTI) –Treatment Algorithm

Positive urine analysis and/or culture[1-3]?
AND
Presence of symptoms suggestive of UTI (i.e. frequency, urgency, dysuria, or suprapubic pain)[4?]

No

Treatment of asymptomatic bacteriuria is generally NOT recommended.
Exceptions:
- Pregnancy → refer to Table 1
- Neutropenic
- History of kidney transplant
- Require GU instrumentation
- Before transurethral resection of prostate

Yes

Complicating factors?
Presence of anatomic/functional/metabolic abnormality?

No

Acute Bacterial Cystitis, Uncomplicated
- Nitrofurantoin 100 mg PO BID x 5 days
- Cephalexin 500 mg PO QID x 3-7 days[5]
- Fosfomycin 3 g x 1 (if history of ESBL or VRE)

If PCN allergy (in order of preference):
- Nitrofurantoin 100 mg PO BID x 5 days
- Ciprofloxacin 500 mg PO BID x 3 days
- Levofloxacin 750 mg PO daily x 3 days
- TMP/SMX 1 DS tab PO BID x 3 days

Yes

Presence of at least one of the following?
Fever, flank pain, or other suspicion for pyelonephritis?
Urinary catheter?
Pregnancy?

No

Urinary Tract Infection, Complicated[6]
Mild-Moderate:
- Ceftriaxone 1-2 g IV Q 24hrs

Severe, recent fluoroquinolone, OR from long-term care facility:
- Cefepime 1 g IV Q 8hrs
- Piperacillin/tazobactam 3.375 g IV Q 8hrs
- Meropenem 1 g IV Q 8hrs (if history of MDRO)

If severe PCN and cephalosporin allergy:
- Gentamicin or Tobramycin (dosing per pharmacy)
  ***Use with caution in AKI/CKD*

Duration of treatment:
- Shorter courses (7 days) are reasonable if patient improves rapidly
- Longer courses (10-14 days) are reasonable if patient has a delayed response

Yes

Urinary Tract Infection, Complicated
In the presence of:
- Fever, flank pain, or other suspicion for pyelonephritis → refer to Table 2
- Urinary catheter → refer to Table 3
- Pregnancy → refer to Table 1

****For management of candiduria, *please refer to Table 4***

Note: All antibiotics listed (except Fosfomycin and Ceftriaxone) must be adjusted for renal insufficiency. Avoid Nitrofurantoin in CrCL 40-50 mL/min (drug will not reach bladder to adequately treat cystitis). Nitrofurantoin and Fosfomycin do not penetrate renal parenchyma and should not be used to treat pyelonephritis.

The above guidelines are recommendations based on the available literature and are not intended to replace clinical judgment.
Please note these recommendations reflect local antimicrobial susceptibility patterns and may differ from published guidelines.

Table 1. Asymptomatic Bacteriuria/ Acute Cystitis and Pyelonephritis in Pregnancy[7]

For asymptomatic bacteriuria/acute cystitis:

First line:

- Nitrofurantoin 100 mg PO BID x 5-7 days (avoid near-term[8])
- Cephalexin 500 mg PO QID x 5-7 days[5]

Second line:

- Cefuroxime 250-500 mg PO BID x 5-7 days
- TMP/SMX 1 DS tab PO BID x 5-7 days (avoid in 1st trimester and near term; supplement with multivitamin containing folic acid)

For Group B Strep:

- Penicillin VK 500 mg PO QID x 5-7 days
- Amoxicillin 500 mg PO TID x 5-7 days

For pyelonephritis: *IV therapy required until afebrile x 48 hrs, then switch to PO antibiotics if appropriate*

- Ceftriaxone 2g IV q 24hrs
- Gentamicin (dosing per pharmacy)
- Duration of treatment: 10-14 days total

Table 2. Pyelonephritis

Empiric Outpatient: *Consider initial dose of a parenteral agent*

- Ceftriaxone 1-2 g IV/IM x 1
- Gentamicin 5 mg/kg IV/IM x 1
- Ciprofloxacin 400 mg IV x 1 (not necessary if functioning GI tract)

Followed by

- Ciprofloxacin 500 mg PO BID
- Levofloxacin 750 mg PO daily
- Cefuroxime 500 mg PO BID

Empiric Inpatient[6]:

- Ceftriaxone 1-2 g IV once daily
- Gentamicin (dosing per pharmacy)
- Tobramycin (dosing per pharmacy)
- Piperacillin/tazobactam 3.375 g IV Q 8hrs
- If suspected Enterococcus spp. infection: Ampicillin 2 g IV Q 4hrs

Duration of Treatment:

- If treated with Ciprofloxacin: 7 days total
- If treated with Levofloxacin: 5 days total
- If treated with beta-lactam: 10-14 days total

Table 3. Catheter-Associated UTI

- Treatment of asymptomatic bacteriuria is NOT recommended
- Indwelling urinary catheters should be removed as soon as they are no longer required
- If an indwelling catheter has been in place for >2 weeks at the onset of CA-UTI and is still indicated, replacing the catheter is recommended
- If treatment required, please refer to recommendations for complicated UTI

Table 4. Candiduria

- For asymptomatic patients, candiduria often represents colonization. Removal of risk factors, i.e. indwelling catheters, is often sufficient to eradicate candiduria
- Consider ID-consult for non-*C. albicans* candiduria

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1. General management:
    - Only perform urine cultures if patient is symptomatic OR in patients who cannot provide history (i.e. intubated, dementia) and have sepsis without another source
    - Once culture and sensitivities are available, switch to narrow spectrum if possible
    - Follow-up cultures are NOT necessary if patient shows clinical improvement
2. Positive UA/UC: Leukocyte esterase (+), nitrite (+), >10 WBC/hpf, or culture ≥ 10^5 organisms /mL (≥ 10^3 organisms /mL in catheter urine specimen)
3. If culture MRSA positive, consider presentations of staphylococcal bacteremia (ID consult recommended)
4. Presentation variable dependent on host factors (i.e. elderly may only present with mental status changes, catheterized patients may only have fever, & quad/paraplegics may have fever and increased spasticity or autonomic dysreflexia)
5. Cephalexin susceptibility testing unreliable for MIC>4, please refer to cefuroxime susceptibilities or switch to another agent
6. Initial intravenous (IV) therapy is preferred until patient remains afebrile x 48 hrs, then switch to PO therapy
7. Cultures showing mixed gram-positive bacteria, lactobacilli, and Staphylococcus species (other than *S. saprophyticus*) may be presumed to be contaminants and may not be treated
8. Avoid nitrofurantoin if 38-42 weeks gestation in G6PD-deficient mothers due to risk of maternal & fetal hemolytic anemia

Frequently Asked Questions:

Q: Is it necessary to repeat urine cultures after treatment with antibiotics?

A: Follow up cultures are NOT necessary if the patient is clinically improving and/or is asymptomatic as it may lead to unnecessary antibiotic use.

Q: Is antibiotic prophylaxis recommended for recurrent UTIs?

A: Antibiotic prophylaxis may be considered in women with ≥ 2 urinary tract infections in 6 months or ≥ 3 urinary tract infections in 12 months. The decision must take into consideration frequency and severity of UTI versus adverse effects, such as adverse drug reactions, *C. difficile* colitis, and antibiotic resistance. Several types of management strategies exist (i.e. continuous antimicrobial prophylaxis, post-coital prophylaxis, and patient self-treatment). The type of strategy depends on patient-specific factors, as well as physician/patient preference.

References:

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