MedStar Health

Management of Urinary Tract Infections in Adults
Clinical Practice Guideline
MedStar Health

These guidelines are provided to assist physicians and other clinicians in making decisions regarding the care of their patients. They are not a substitute for individual judgment brought to each clinical situation by the patient's primary care provider-in collaboration with the patient. As with all clinical reference resources, they reflect the best understanding of the science of medicine at the time of publication but should be used with the clear understanding that continued research may result in new knowledge and recommendations.

Prevalence

Urinary tract infections are the most common bacterial infections in the outpatient setting and account for about 6 million office visits yearly. They are most often diagnosed in women and are common in both young sexually active women and post-menopausal women.

Complicated vs Uncomplicated

UTI's can be categorized as uncomplicated or complicated. Uncomplicated UTI's are episodes of cystitis and pyelonephritis in healthy premenopausal females with no abnormalities of the urinary tract. Other UTIs are considered complicated because the risk of treatment failure or poor outcome is higher. Included in this category are UTI's in men, patients with neurogenic bladder, patients with kidney stones or other urologic abnormalities, patients who are pregnant and those who are immunocompromised including patients post renal transplant. Other classifications of UTI's exist, with complicated UTI's including all urinary tract infections that have spread beyond the bladder and uncomplicated encompassing localized infections even in patients with underlying urologic abnormalities.

Simple cystitis

Cystitis typically presents with dysuria and or urgency, frequency, suprapubic pain, or hematuria without systemic symptoms. Onset is usually sudden. It is often recurrent, with 25% of women who experience one UTI experiencing a recurrence within 6 months. Women with one recurrence are more likely to experience subsequent recurrences. Cystitis has been associated with sexual activity and spermicide use.

Diagnosis can usually be made based on typical symptoms. The probability of cystitis is > 90% in women who have dysuria and frequency without vaginal discharge or irritation. Urine dipstick testing for leukocyte esterase (enzyme released by WBC's) and nitrites (produced when bacteria reduce nitrates to nitrites) can be helpful with sensitivity and specificity of 75% and 82% respectively. Urine cultures are usually not indicated.

Antibiotics should be selected that are active against the common pathogens: E coli, other Enterobacteriaceae and staph saprophyticus. Fluoroquinolones are not first line drugs for simple cystitis due to the prevalence of resistant organisms in the community, concerns that use will lead to resistant organisms, as well as safety concerns associated with this class of drugs.

Initial Approval Date and Reviews:	Most Recent Revision and Approval Date:	Next Scheduled Review Date:
September 2020 Ambulatory Best Practice Committee	September 2020	September 2022 Ambulatory Quality Best Practice

FIRST LINE DRUGS FOR SIMPLE CYSTITIS

Drug	Duration	Clinical Pearls
TMP/SMX 160 mg/800 mg twice a day ($8)	**3 days**	Halve dose for CrCl 15-30 mL/min Contraindicated if CrCl <15mL/min May cause photosensitivity Maintain hydration to avoid renal stone formation
Nitrofurantoin monohydrate macrocrystals 100 mg twice a day ($17)	**5 days**	Administer with food or milk Avoid concurrent administration of magnesium-containing compounds May cause brown-colored urine
Fosfomycin 3 gram sachet ($109)	**Single dose**	Do not administer in dry form To administer, dissolve sachet contents in 3-4oz of water, stir, and take immediately Do not use hot water to dissolve

*Average Wholesale Price for duration of treatment

Choice among first line agents depends on patient factors (drug allergy history, possibility of pregnancy, drug availability and local resistance patterns if known) If a patient has received one of these in the prior three months, a different antibiotic should be chosen. Nitrofurantoin rarely selects for resistant organisms but is not effective in pyelonephritis and should not be chosen if pyelonephritis is suspected. Likewise, Fosfomycin should be avoided if early pyelonephritis is suspected. A urinary analgesic, phenazopyridine, can also be prescribed for symptom control until the antibiotic starts to take effect.

If first line agents cannot be used, second line agents include the following:

- Beta lactams: amoxicillin-clavulanate 500 mg bid, cefpodoxime 100 mg bid, cefdinir 300 mg bid and cefadroxil 500 mg bid for 5-7 days
- Fluoroquinolones: ciprofloxacin 250 mg tid or extended release 500 mg daily or levofloxacin 250 mg daily for 3 days

Acute pyelonephritis

Acute pyelonephritis typically presents with bladder irritative symptoms (frequency, urgency and dysuria) associated with systemic symptoms (fever, chills, nausea, vomiting, back or flank pain). The spectrum of disease severity is wide, ranging from mild to life threatening. Sicker patients are more likely to be bacteremic, though the presence of positive blood cultures does not change antibiotic choice or duration.

Most episodes of acute pyelonephritis are caused by E coli though other gram-negative organisms, gram positive organisms and candida account for some infections. Bacteria typically reach the kidney in an ascending fashion, though hematogenous spread can also be the cause, particularly if Staph aureus or candida is found.

The diagnosis should be confirmed by a positive urine culture (> 10,000 cfu/ml). Imaging is indicated on presentation if obstruction or abscess is infected (known or suspected urolithiasis, sepsis or new decrease in GFR). Imaging is also indicated in patients who deteriorate clinically or who fail to improve after 24-28 hrs.

Antibiotic choice should take into consideration the most likely pathogen, recent antibiotic use by the patient, drug allergies and interactions, and local resistance patterns if known. Note that nitrofurantoin and Fosfomycin, used in simple cystitis, are inappropriate choices for pyelonephritis since they do not reach adequate levels in the kidney or bloodstream. It is sometimes reasonable to give an initial dose of a long acting parenteral antibiotic, such as ceftriaxone, ertapenem or an aminoglycoside in addition to oral therapy while awaiting culture results.

DRUGS for PYELONEPHRITIS

Drug	Duration	Indication	Clinical Pearls
Levofloxacin 750 mg daily ($2)	5 days	Gram neg rods	**Boxed Warning** for tendon rupture, peripheral neuropathy, and CNS effects – reserve for last line use Increase dosing interval to every 48 hours if CrCl 20-49mL/min Hydrate adequately to prevent crystalluria Space administration of any compounds containing metal cations by at least 2 hours May cause photosensitivity May prolong QT interval, especially when used with other medications that may prolong it
Ciprofloxacin 500 mg bid or 1000 mg extended release daily ($78)	7 days	Gram neg rods	**Boxed Warning** for tendon rupture, peripheral neuropathy, and CNS effects – reserve for last line use Adjust dose based on renal function – dose or interval changed depending on labs and formulation being used Contraindicated if using tizanidine Do not crush any formulation May cause photosensitivity Take at least 2 hours before or 6 hours after any compound that contains metal cations
TMP-SMX 160 mg/800 mg bid ($39.20)	10-14 days	Gram neg rods	Halve dose for CrCl 15-30 mL/min Contraindicated if CrCl <15mL/min May cause photosensitivity Maintain hydration to avoid renal stone formation
Amoxicillin-clavulanate	10-14 days	Enterococci and some Gram- negative rods	Do not use if CrCl <30 mL/min or patient is on hemodialysis

875 mg amoxicillin and 125 mg clavulanate bid ($20)			Absorption decreased on empty stomach – take at start of meal May decrease effectiveness of oral contraceptives
Cefixime 400 mg daily ($329)	10-14 days	Active against many resistant Gram neg rods	Adjust dose based on renal function and formulation being used
Cefpodoxime 200 mg bid ($237)	10-14 days	Active against many resistant Gram neg rods	Administer every 24 hours if CrCl<30 mL/min Administer tablet with food Suspension may be given without regard to food

Adapted from Acute pyelonephritis in Adults NEJM 2018
*Average Wholesale Price for maximum duration of treatment

Indications for hospitalization include vomiting or nausea with inability to keep down oral antibiotics, volume depletion requiring more than mild fluid resuscitation, hypotension, unstable comorbid conditions, immunosuppression, unreliable home situation, and need for drainage of an infectious focus.

Recurrent UTI

Urinary symptoms that persist or recur within 2 weeks suggest that the infecting organism was resistant to the antibiotic chosen or that there is a persistent focus (such as subclinical pyelonephritis) causing relapse. A urine culture should be performed, and treatment should be started with a broader spectrum agent such as a quinolone.

Most episodes of recurrent cystitis are reinfections, however, and are caused by pathogenic strains of bacteria which can persist in the fecal flora for years. Some women may be genetically pre-disposed to colonization with pathogenic bacterial strains. For recurrences within 6 months, treatment with a different first line agent should be considered.

Multiple strategies to prevent or manage recurrent episodes of cystitis exist and can be separated into non-pharmacologic and pharmacologic.

Nonpharmacologic strategies
Reduce frequency of intercourse
Eliminate use of spermicides
Increase fluid intake (increase by 1.5 liters over baseline)
Urinate after intercourse
Cranberry tablets, capsules or juice
Pharmacologic strategies
Patient initiated treatment at onset of symptoms
Postcoital antimicrobial prophylaxis—single dose as soon as possible after intercourse
Continuous antimicrobial prophylaxis—daily bedtime dose
Vaginal estrogen for post-menopausal women

Data supporting the effectiveness of the non-pharmacologic strategies is sparse. Pharmacologic prophylaxis, however, is ~ 95% effective in preventing recurrences. It should be limited to women with three recurrences in the past 12 months or two or more in the past 6 months.

Urologic work up is low yield and should be limited to situations in which the patient has persistent hematuria, multiple recurrences with the same strain of organism, complicated UTI with failure to improve in 48-72 hours or if there are other clues to structural abnormalities such as infection with proteus mirabilis.

Special populations

- Pregnant women—30-40% of pregnant women will have asymptomatic bacteriuria and are at risk for symptomatic UTI and adverse pregnancy outcomes. Asymptomatic bacteriuria as well as symptomatic UTI should be treated with antibiotics safe in pregnancy. Resolution should be confirmed by repeat urine culture.
- Men—The spectrum of UTI in men includes urethritis, cystitis, pyelonephritis and prostatitis (acute and chronic). UTIs in men should be confirmed by urine culture. Evaluation for structural abnormalities by imaging (CT or US) and cystoscopy should be undertaken in older men and for recurrences or if structural abnormalities are suspected (persistent hematuria, for example). Prostatitis may be acute, chronic or asymptomatic, and bacterial prostatitis requires a lengthy course of an antibiotic that can penetrate prostatic tissue.

Prostatitis Type	Features	Treatment
Acute Prostatitis	**Fever, UTI symptoms, pelvic pain** **GNR on urine culture**	**TMP/SMX, Quinolone for 6 weeks**
Chronic Bacterial Prostatitis	**Low grade fever, UTI symptoms** **May be subtle or asymptomatic** **GNR isolated from post-massage urine or expressed prostatic secretions**	**Quinolone for 6 weeks** **May recur and require re-treatment**
Chronic prostatitis/Chronic pelvic pain syndrome	**Pain, voiding difficulty** **Inflammatory/Non-inflammatory** **Cultures neg** **Association with other pain syndromes**	**Alpha blocker +antibiotic (quinolone)** **Finasteride** **NSAID** **Psych support**
Asymptomatic inflammatory prostatitis	**Incidental finding on prostate biopsy**	

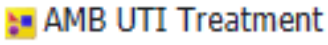
- Elderly—Asymptomatic bacteriuria (defined as $\geq 10^5$ cfu/ml on urine culture in a patient without symptoms) is common in elderly patients and associated with an increased risk of symptomatic UTI. There is no evidence, however, that treating asymptomatic bacteriuria reduces the

development of symptomatic UTI. Hence, asymptomatic bacteriuria should not be treated. Diagnosing symptomatic UTI in the elderly can also be difficult for many reasons: chronic incontinence, making it hard to know which symptoms are new; cognitive impairment which may make history taking difficult; and nonspecific symptoms that may be incorrectly attributed to a urinary tract infection. Urine testing should be limited to patients with classic UTI symptoms or signs of serious acute illness such as fever and alteration of consciousness.

- Post renal transplant—Urinary tract infections in the post-transplant patient are associated with acute cellular rejection, graft loss, impaired graft function, and death. Asymptomatic bacteriuria should be treated in the post-renal transplant patient. Urine cultures should be obtained in all patients with symptomatic UTI to guide therapy.

MedConnect Resources

A UTI specific power plan is present in MedConnect to facilitate appropriate treatment orders:



Patient Education

https://www.uptodate.com/contents/urinary-tract-infections-in-adults-the-basics?search=urinary%20tract%20infection&topicRef=8063&source=see_link

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