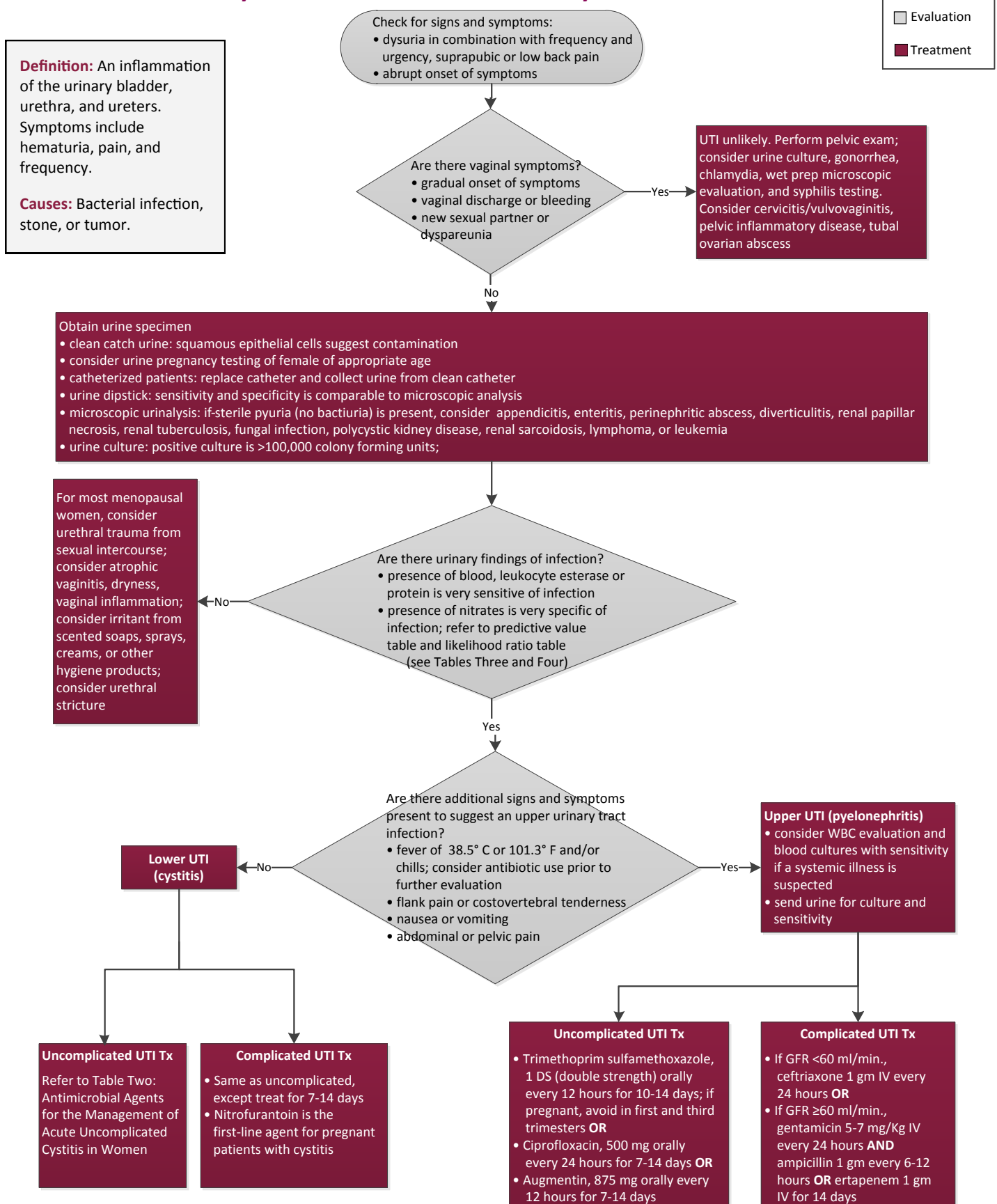
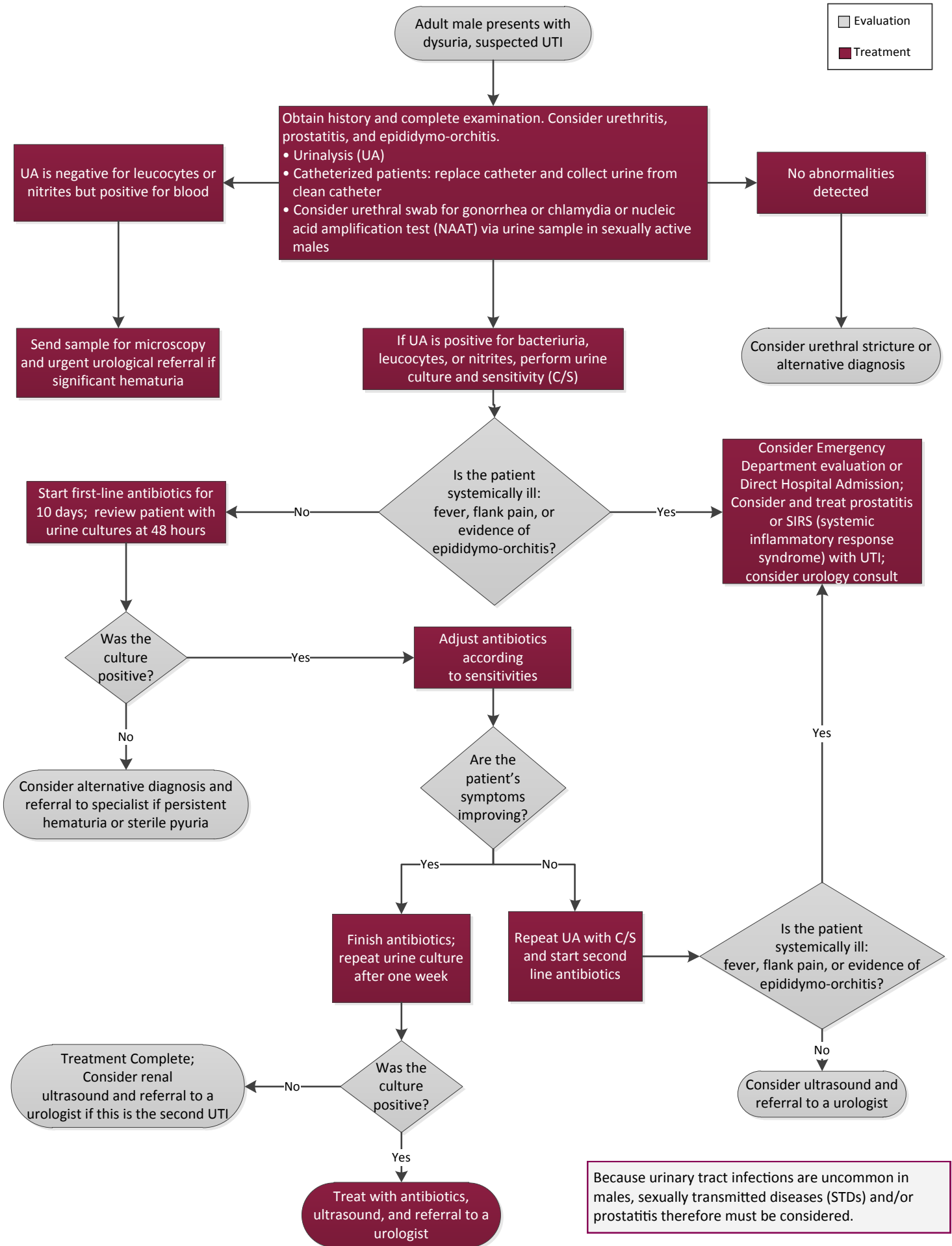


Urinary Tract Infection Clinical Pathway for Females



UTI Treatment Algorithm for Adult Males



Because urinary tract infections are uncommon in males, sexually transmitted diseases (STDs) and/or prostatitis therefore must be considered.

Key Messages About Bacterial UTI (Uncomplicated)

The diagnosis of a urinary tract infection (UTI) is primarily based on symptoms and signs.

- Urine testing may contribute additional information towards management but rarely does testing that suggests or proves the presence of bacteria or white cells in the urine have important implications. Diagnosis should be guided by symptoms.
- In elderly patients, asymptomatic bacteriuria is common and there is evidence that treatment is more harmful than beneficial.
- Indirect indicators of the presence of bacteria are likely to be much less valuable than urine culture.

Management of UTI in Adult Women

Diagnosis

- If dysuria, frequent voiding of small volumes, and urinary urgency then probability of infection increases 10-fold to 50 percent. Therefore, presentation of one or more symptoms may be viewed as a valuable diagnostic test in itself.
- New onset of frequency and dysuria with absence of vaginal discharge or irritation has a positive predictive value of 90 percent for UTI.
- In women with symptoms of vaginal itching or discharge, explore alternative diagnoses and consider pelvic examination.
- The presence of back pain or fever increases the probability of upper urinary tract infection. Empirical treatment with an antibiotic should be started (see antibiotic choices on page 5) and a urine culture should be performed to guide the choice of antibiotic.
- Patients with persistent symptoms after 48-72 hours of treatment should undergo radiologic evaluation of the upper urinary tract.
- If a woman remains symptomatic after a single course of treatment, she should be investigated for other potential causes.

Antibiotic Treatment

Choosing an antibiotic depends on the agent's effectiveness, risks of adverse effects, and resistance rates.

Asymptomatic and Symptomatic Bacteriuria in Pregnant Women

- Treat with antibiotics:

Symptomatic Bacteriuria, Lower Urinary Tract Infection

- Non-pregnant women of any age with symptoms or signs of acute cystitis should be treated with trimethoprim-sulfamethoxazole for 3 days, or nitrofurantoin for 5 days.
- Women with lower urinary tract infection who are prescribed nitrofurantoin should be advised not to take alkalinizing agents such as potassium citrate.
- Women with renal impairment should not be treated with nitrofurantoin because an effective concentration of the antibiotic in the urine is not achievable and a toxic concentration of antibiotic can occur in the plasma.
- Patients who do not respond to trimethoprim or nitrofurantoin should have a urine culture performed to guide the change of antibiotic.

Pyelonephritis, Upper Urinary Tract Infection

- Non-pregnant women with symptoms or signs of acute upper urinary tract infection should be treated with ciprofloxacin 500mg orally for 7 days or trimethoprim-sulfamethoxazole DS one tab every 12 hours for 14 days.
- Urine should be taken for culture before immediate empirical treatment is started and treatment changed if there is an inadequate response.

Asymptomatic Bacteriuria

- Non-pregnant women and elderly women (over 65 years of age) with asymptomatic bacteriuria should not receive antibiotic treatment.
- Pregnant women with asymptomatic polyuria or bacteriuria should be treated aggressively as preterm labor can be precipitated, treat with nitrofurantoin or alternate treatment cephalosporin or amoxicillin for 7 to 10 days and obtain urine culture.

Management of UTI in Adult Men

- Because UTIs are atypical in males, prostatitis and sexually transmitted infections must be considered
- UTIs are uncommon in men due to the longer length and narrower caliber of the male urethra.
- UTIs in men are considered complicated and, therefore, cultures are generally indicated even in equivocal cases (such as trace leukocytes or just trace blood).
- In sexually active men, urethral swabs for *Neisseria gonorrhoea* and *Chlamydia trachomatis* or nucleic acid amplification test (NAAT) via urine sample should be considered when urethritis is the predominant symptom.
- Males with prostatitis will generally present as a febrile UTI with pain reported in the abdomen, perineum, or rectum. They may also present with chills, myalgias or vomiting. Severe cases with change in mentation, sepsis should be considered.
- In older males may see urinary retention.

Table One: Summary Information for UTI Treatment in Adults

	Recurrent (Uncomplicated) UTIs in Women	Management of Bacterial UTI in Pregnant Women	Management of Bacterial UTI in Adult Men	Management of Bacterial UTI in Patients with Catheters
Diagnosis	<p>Recurrent UTIs are common among women, even though they have anatomically and physiologically normal urinary tracts.</p>	<ul style="list-style-type: none"> Standard quantitative urine culture should be performed routinely at the first antenatal visit. The presence of bacteria in urine should be confirmed with a second urine culture. Dipstick testing should not be used to screen for bacterial UTI at the first or subsequent antenatal visits. 	<ul style="list-style-type: none"> UTIs in men are generally viewed as complicated because they result from anatomic or functional anomaly of the genito-urinary tract. Prostatitis, sexually transmitted diseases (STDs) and epididymitis should be considered as possible diagnoses. In all men with symptoms of UTI, a urine sample should be taken for culture. In men with a history of fever or back pain, the possibility of UUTI should be considered and a urine culture should guide the choice of antibiotic. 	<p>Clinical symptoms or signs are not recommended for predicting the likelihood of symptomatic UTI in catheterized patients.</p> <p>In catheterized patients who present with fever:</p> <ul style="list-style-type: none"> Look for associated flank or suprapubic tenderness or systemic features. Exclude other potential sources of infection. Send urine culture to determine organism and susceptibility. Consider antibiotic therapy, taking into account the severity of the presentation and any comorbid factors. <p><u>Testing:</u></p> <ul style="list-style-type: none"> Urine samples should only be sent for laboratory culture if the patient has clinical sepsis, not because the appearance or smell of the urine suggests that bacteria are present. Laboratory microscopy should not be used to diagnose UTI in catheterized patients. Dipstick testing should not be used to diagnose UTI in catheterized patients.
Antibiotic Treatment	<p>The following prophylactic regimens are recommended:</p> <ul style="list-style-type: none"> Long-term, low-dose prophylactic antimicrobials taken at bedtime. Post-intercourse prophylactic antimicrobials for women in whom episodes of infection are associated with sexual intercourse. A patient-initiated treatment in well-informed young women. 	<p><i>Symptomatic Bacteriuria:</i> Pregnant women with symptomatic UTI should be treated with an antibiotic.</p> <p><i>Asymptomatic Bacteriuria:</i> If detected during pregnancy, should be treated with an antibiotic.</p> <p><i>Screening During Pregnancy:</i> Women with Bacteriuria confirmed by a second urine culture should be treated and have a repeat urine culture at each antenatal visit until delivery.</p>	<p><i>Symptomatic Bacteriuria:</i> Bacterial UTI in men should be treated empirically with a 2-week course of quinolone.</p> <p><i>Asymptomatic Bacteriuria:</i> Elderly men (over age 65) should not receive antibiotic treatment.</p>	<p><i>Symptomatic Bacteriuria:</i></p> <ol style="list-style-type: none"> Symptoms that may suggest UTI in patients with catheters Include fever, flank or suprapubic discomfort, change in voiding patterns, nausea, vomiting, malaise, or confusion. Catheterized patients with symptoms or signs of acute UUTI should be treated with ciprofloxacin or co-amoxiclav for 7 days. Patients should be admitted to the hospital if systemic symptoms such as fever, chills, vomiting, or confusion appear. Patients with long-term indwelling catheters should have the catheter changed before starting antibiotic treatment for symptomatic UTI. <p><i>Asymptomatic Bacteriuria:</i></p> <ol style="list-style-type: none"> Screening women after short-term catheterization is not recommended. Catheterized patients should not receive antibiotic treatment.
Additional Treatments and Referrals	<p>Cranberry Products: Women with recurrent UTIs should be advised to take oral cranberry products to reduce the frequency of recurrence. Patients taking warfarin should avoid taking cranberry products unless the health benefits are considered to outweigh any risks.</p> <p>Methenamine Hippurate: May be used to prevent symptomatic UTI in patients with known upper renal tract abnormalities.</p> <p>Estrogen: Oral Estrogen Not recommended for routine prevention of recurrent UTIs in postmenopausal women.</p>	Not applicable.	<p>Men should be referred for urological investigation if they:</p> <ul style="list-style-type: none"> have symptoms of upper urinary tract infection, fail to respond to appropriate antibiotics, or have recurrent UTIs. 	Not applicable.

Table Two: Antimicrobial Agents for the Management of Acute Uncomplicated Cystitis in Women

Tier	Drug (Brand Name)	Dosage	Pregnancy Category
First	Nitrofurantoin (macrobid, macrodantin*)	100 mg twice per day for five days	B
	Trimethoprim/sulfamethoxazole (Bactrim, Septra)	160/800 mg twice per day for three days	C
	Fosfomycin (Monurol)	3-g single dose	B
Second	Ciprofloxacin (Cipro)	250 mg twice per day for three days	C
	Ciprofloxacin, extended release (Cipro XR)	500 mg once per day for three days	C
	Levofloxacin (Levaquin)	250 mg per day for three days	C
Third**	Amoxicillin/clavulanate (Augmentin)	500/125 mg twice per day for seven days	B
	Cefdinir (Omnicef)	300 mg twice per day for 10 days	B
	Cefpodoxime (Vantin)	100 mg twice per day for seven days	B

*Beers List medication—to be used with caution in patients age 65 and older.

**Not generally recommended because of relatively high rates of resistance. Third-tier options include beta-lactam antibiotics.

*****2016: FDA Drug Safety Communication: FDA updates warnings for oral and injectable fluoroquinolone antibiotics due to disabling side effects**

Health care professionals should not prescribe systemic fluoroquinolones to patients who have other treatment options for acute bacterial sinusitis (ABS), acute bacterial exacerbation of chronic bronchitis (ABECB), and **uncomplicated urinary tract infections (UTI)** because the risks outweigh the benefits in these patients. Stop fluoroquinolone treatment immediately if a patient reports serious side effects, and switch to a non-fluoroquinolone antibacterial drug to complete the patient’s treatment course.

Box One: Risk Factors for Complicated UTI

Note: Recommended treatment is for 7-14 days

- pregnancy
- moderate to severe diabetes or other immunosuppressed state
- structural abnormalities of urinary tract (kidney stones, renal and perinephric abscess, emphysematous pyelonephritis, or polycystic kidney disease)
- functional abnormality of urinary tract (vesicoureteral reflex, spinal cord injury, neurogenic bladder)
- hospital-acquired infections
- presence of external catheters (urethral, suprapubic, or nephrostomy tubes)

Box Two: Uncomplicated vs Complicated UTI

Uncomplicated:

Note: Recommended treatment is for 3 days

- lower UTI in nonpregnant female
- nontoxic appearing
- healthy
- premenopausal nonpregnant females
- normal urogenital anatomy

Complicated:

Note: Recommended treatment is for 7-14 days

- upper UTI (pyelonephritis)
- pregnant female
- moderate or severe diabetes
- anatomic abnormalities
- cancer, chemotherapy, immunosuppression
- impaired micturition
- catheter, stent, or tube in urinary system
- obstructive stone
- hospital-associated UTI
- treatment failure
- renal failure or insufficiency

Table Three: Positive and Negative Predictive Values of Urine Dipstick and Microscopic Urinalysis With Corresponding Overtreatment and Undertreatment Rates

Testing Modality	PPV (%)	NPV (%)	Overtreatment Rate (%)	Undertreatment Rate (%)
Urine Dipstick				
LE or N or blood	51	94	49	6
LE <2 and N	88	52	13	48
Microscopic Urinalysis				
RBC or WBC	50	93	50	7
RBC >50 or WBC >10	64	74	37	25

Abbreviations: LE, leukocyte esterase; N, nitrate; NPV, negative predictive value; PPV, positive predictive value; RBC, red blood cell; WBC, white blood cell.

Table Four: Sensitivity, Specificity, and Likelihood Ratio for Urine Dipstick and Microscopic Urinalysis

Testing Modality	Sensitivity (%)	Specificity (%)	Positive LR (%)	Negative LR (%)
Urine Dipstick				
LE	75 - 91	41 - 87	1.59 - 5.6	0.2 - 0.4
N	34 - 42	94 - 98	7.5 - 24.6	0.6 - 0.7
Blood	92	42	2.6	0.2
Protein	83	44	2.1	0.3
LE + N	30 - 38	91 - 100	3.4 to infinity	0.6 - 0.8
LE or N	91 - 92	39 - 41	1.5 - 1.6	0.2
Microscopic Urinalysis				
WBC Men >5 Women >10	57 - 90	47 - 89	1.7 - 5.0	0.2 - 0.5
Bacteria >0	9 - 83	59 - 72	2.3 - 2.9	0.1 - 0.5
RBC >5	59 - 63	67 - 74	1.6	0
WBC or bacteria	100	39	1.6	0
WBC and bacteria	58	81	3	0.5

Abbreviations: LE, leukocyte esterase; LR, likelihood ratio; N, nitrate; NPV, negative predictive value; PPV, positive predictive value; RBC, red blood cell; WBC, white blood cell.

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This clinical guideline outlines the recommendations of Mount Carmel Health Partners for this medical condition and is based upon the referenced best practices. It is not intended to serve as a substitute for professional medical judgment in the diagnosis and treatment of a particular patient. Decisions regarding care are subject to individual consideration and should be made by the patient and treating physician in concert.