

URINARY TRACT INFECTIONS

Urinary tract infections occur as a result of bacteria commonly found in the rectum colonizing the opening to the vagina (introitus) and urethra, and ascending to the bladder. Urinary tract infections may involve the urethra and bladder alone (lower urinary tract), the kidneys and ureters (upper urinary tract), or both.¹⁰ Urinary tract infections may or may not cause symptoms. During pregnancy approximately 1% of women experience symptomatic urinary infections (acute cystitis), while asymptomatic bacteriuria, sometimes called ASB, occurs among 2-7% of pregnant women.^{10,11}

Complications in Pregnancy

Up to 40% of pregnant women with asymptomatic bacteriuria develop kidney infection or pyelonephritis.¹⁰ Some of the physiologic changes which occur in pregnancy are thought to increase the risk of developing pyelonephritis when ASB is present. These pregnancy-related changes include changes in the immune response to causative bacteria, smooth muscle relaxation and resulting dilation of the ureters, and pressure on the bladder from the growing fetus. Most cases of pyelonephritis occur in the second and third trimesters. Complications such as maternal sepsis, acute respiratory distress syndrome, and renal dysfunction occur among 20% of women who develop pyelonephritis. In pregnant women with pyelonephritis, preterm birth occurs among 20 to 50% of women.¹⁰ Cerebral palsy is linked to both preterm birth and UTI/ASB.¹¹

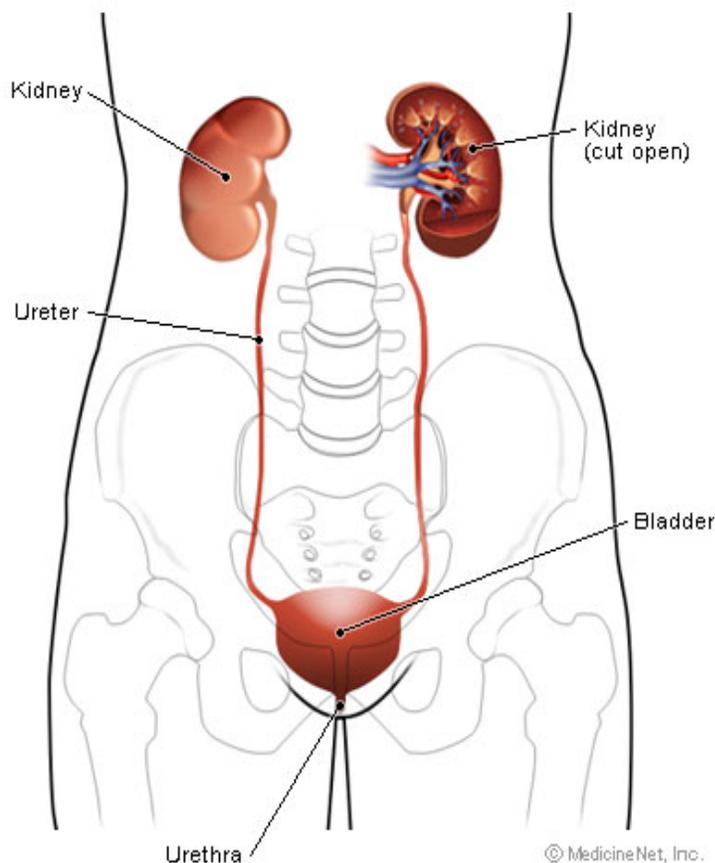


Figure 1 Structures in upper and lower urinary tract.

Prevention of Complications

Treatment for ASB reduces the occurrence of pyelonephritis by over 75%.¹² According to a Cochrane review, treatment for ASB can reduce the occurrence of low birthweight by nearly 40%.^{5,12} In other words, treating 21 women for ASB can prevent one low birthweight birth.⁵

Screening for Asymptomatic Bacteriuria

The U.S. Preventive Services Taskforce and the American Academy of Family Physicians currently recommend screening ALL pregnant women with a urine culture early in pregnancy.¹³ The most recent edition of Infectious Diseases in Obstetrics and Gynecology (2009) also recommends screening ALL pregnant women for ASB with a urine culture.¹⁰

Previous guidelines from the American College of Obstetricians and Gynecologists (ACOG) recommend screening all pregnant women early in pregnancy, using either a culture, or a urine leukocyte and esterase test followed by a urine culture if the urine dip is positive.¹⁴ However, there are problems with the urine dip as a test for ASB. Multiple studies show low sensitivity (ability to detect the infection when present) and negative predictive values (confidence that the infection is not present when the test is negative) for current urine dip screening tests.^{10,15,16} In spite of this evidence, and the proven efficacy of urine cultures, many providers continue to use the sub-optimal dip test to detect ASB in pregnancy, due to cost concerns. The example in Table 3 shows the number of infections missed by using a test of low sensitivity and the potential impact on pregnancy outcome.

Given the complications associated with ASB and the frequency with which it occurs in pregnancy, it is critical to use the most sensitive test available so that pregnant women with ASB can be identified early in pregnancy, and receive recommended antimicrobial treatment and test of cure follow-up.

Diagnosis

The clinical diagnosis of asymptomatic bacteriuria is made when a single positive clean-catch urine culture shows pathogen levels of 10^5 colony-forming units (≥ 10 CFUs) per milliliter, or greater.

The urine culture should be clearly marked as a prenatal specimen. This should prompt the **lab to report detection of group B streptococcus (GBS) in ANY amount.**¹⁷ Finding GBS in the urine indicates that the patient is colonized vaginally with high levels of GBS. The mother should be considered GBS positive and the chart should be flagged for group B streptococcus prophylaxis in labor.^{17,18}

A 2003 CDC survey of laboratory practices, including 26 laboratories in California, found that 17% of laboratories reported GBS only if the colony count was $\geq 10^5$ cfu/mL, and only a third of laboratories included information about pregnancy status on requisition forms.¹⁹ Important opportunities to prevent invasive neonatal GBS disease/damage continue to be missed as a result of these practices. It is critical for clinical practices to ensure and recheck reliable mechanisms for communicating recommended guidelines to their laboratories.

Urine culture is the gold standard for screening for asymptomatic bacteriuria during pregnancy...No currently available tests have a high enough sensitivity and negative predictive value in pregnant women to replace urine culture as the preferred screening test.

U.S. Preventive Services Taskforce, 2008¹³

In all pregnant women a urine culture should be performed for asymptomatic bacteriuria independent of symptoms, because of the 2-7% prevalence, combined with the significant sequelae of asymptomatic bacteriuria in pregnancy...Dipsticks are not adequate for UTI diagnosis in pregnancy. Cultures are recommended and should be used to guide therapy.

Infectious Diseases in Obstetrics and Gynecology. A Systematic Approach to Management, ACOG, 2009¹⁰

Table 3 Number of Women with Asymptomatic Bacteriuria Missed by Using the Leukocyte Esterase & Nitrite Dipstick Tests Followed by Culture

	Positive Urine Culture (ASB) 5% Prevalence	Negative Urine Culture	Total Number of Prenatal Clients per Year
Positive Leukocyte and Esterase Test (81% Sensitivity; 97% Specificity)ⁱ	202	142	
Negative Leukocyte/Esterase Test	48	4608	
	250	4750	5,000

The reported sensitivity of the urine dipstick for leukocyte esterase and nitrites for detecting asymptomatic bacteriuria ranges from 53 to 92%.^{i-v} The example above uses a mid-range sensitivity of 81% to illustrate the potential errors resulting from using a screening test with low sensitivity.

The shaded cells show women who were incorrectly classified using the dipstick test.

- 142 women were incorrectly designated as positive (false positives); and
- 48 women were incorrectly designated as negative (false negatives).

The false negative tests for ASB are especially concerning, given the strong association between ASB, pyelonephritis and preterm birth. Smaill estimated the number of women that would have to be treated in order to prevent one preterm birth, and found that one preterm birth could be prevented for every 21 women treated for ASB.^{vi} Thus, in this example, **two preterm births might have been prevented if all women received recommended urine culture screening and treatment** instead of the leukocyte esterase/nitrites test. The false positive tests would be corrected by completing a urine culture for all women with a positive dipstick test. Without follow-up culture for positive urine dip-sticks, 142 women would receive unnecessary treatment.

ⁱ Millar L, DeBuque L, Leialoha C, Grandinetti A, Killeen J. Rapid enzymatic urine screening test to detect bacteriuria in pregnancy. *Obstet Gynecol* 2000;95:601-4.

ⁱⁱ Jayalakshmi J, Jayaram VS. Evaluation of various screening tests to detect asymptomatic bacteriuria in pregnant women. *Indian J Pathol Microbiol* 2008;51:379-81.

ⁱⁱⁱ Mignini L, Carroli G, Abalos E, et al. Accuracy of diagnostic tests to detect asymptomatic bacteriuria during pregnancy *Obstet Gynecol* 2009;113(2Pt1):346-52.

^{iv} Robertson AW, Duff P. The nitrite and leukocyte esterase tests for the evaluation of asymptomatic bacteriuria in obstetric patients. *Obstet Gynecol* 1988;71(6):878-81.

^v Jones C, MacPherson SW, Stevens DL. Inability of the Chemstrip LA compared with quantitative urine culture to predict significant bacteriuria. *J Clin Microbiol* 1986;23:160-2.

^{vi} Smaill F. Antibiotics for asymptomatic bacteriuria in pregnancy. *Cochrane Database of Systematic Reviews*. 2001

GUIDELINES FOR ASYMPTOMATIC BACTERIURIA IN PREGNANCY

Treatment

Treatment of ASB is empirical since in vitro susceptibility testing is generally not recommended for the initial positive culture. However, the duration of treatment remains somewhat controversial since a Cochrane review concluded that there was insufficient evidence to recommend a specific antimicrobial therapy regimen for pregnant women out of the single-dose, 3-day, 4-day, and 7-day treatment regimens.²⁰ Many experts prefer the 7-day approach. Since *Escherichia coli* is the most common pathogen, the selection of the antimicrobial agent is dictated by the local antibiogram of that microorganism. The most commonly used antibiotics for ASB include nitrofurantoin, short-acting sulfonamides, and trimethoprim-sulfamethoxazole. The empiric selection of ampicillin or amoxicillin should be questioned because of the high resistance rates of *E. coli* to ampicillin in the United States ($\geq 30\%$). Fluoroquinolones are to be avoided in pregnancy and should only be used for resistant microorganisms; in such cases, short 3-day courses of ciprofloxacin 250 mg twice daily or levofloxacin 250 mg daily may be used. Sulfonamide medications should be avoided close to delivery as they may cause kernicterus at lower bilirubin levels.¹⁰

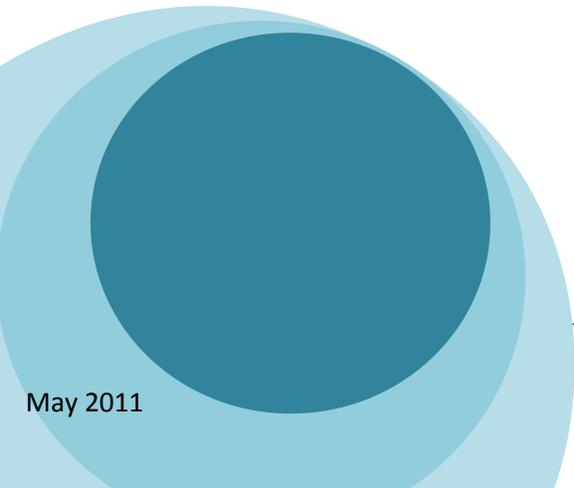
It is important to **treat for GBS in the urine even if the pathogen levels are less than 10^5** . A prospective, randomized, double-blind study demonstrated a significant decrease in the rate of preterm labor (5.4% vs. 38%) when patients with low-level asymptomatic GBS bacteriuria were treated with penicillin antepartum versus placebo at 27-31 weeks.^{17,21}

Recurrent ASB during pregnancy requires suppressive therapy with nitrofurantoin 100 mg, at bedtime, for the duration of pregnancy, as well as monthly urine cultures with sensitivities. Recurrent ASB, particularly with the same microorganism that is sensitive to the antibiotic used, may warrant an evaluation for possible renal calculi.

Table 4 outlines the key principles for best practices in screening, treating, and providing follow-up for asymptomatic bacteriuria in pregnancy.

Table 4 Key Principles of Best Practices for Screening, Treatment and Follow-up for Asymptomatic Bacteriuria in Pregnancy

Screening	Treatment
<p>Urine</p> <ul style="list-style-type: none"> • Culture all pregnant women for urinary tract infection/asymptomatic bacteriuria (UTI/ASB) at the 1st PNV. ➤ Label specimen as prenatal urine to assist lab processing and reporting of group B streptococcus results(GBS).¹⁹ ➤ Lab report should include reporting for GBS and other gram positive bacteria. 	<ul style="list-style-type: none"> • Treat based on culture results and antibiotic safety in pregnancy²⁰ • 3-day or 7-day treatment Nitrofurantoin 100 mg, 2 times daily; Sulfasoxazole 2 gm initially, then 1 gm, 4 times daily; Trimethoprim-sulfamethoxazole 160/800 mg 2 times daily; Ampicillin 250 mg, 4 times daily; Amoxicillin 500 mg, 3 times daily; • Cephalexin 250-500 mg, 4 times daily; • Any level of colony count for GBS in urine should be treated during pregnancy
Follow-up	Treatment
<ul style="list-style-type: none"> • Test of Cure (TOC) culture 1 month after treatment. • Re-screen women with a past positive urine culture in the current pregnancy at 20 weeks. 	<ul style="list-style-type: none"> • Treat based on culture results and antibiotic safety in pregnancy • Recurrent ASB during pregnancy requires suppressive therapy with nitrofurantoin 100 mg, at bedtime, for the duration of pregnancy, as well as monthly urine cultures with sensitivities.



PATIENT EDUCATIONAL MATERIALS

In this section you will find examples of patient education materials for urinary tract infections and asymptomatic bacteriuria.

Please see the links below for the most up-to-date patient education materials.

American Congress of Obstetricians and Gynecologists:

Urinary Tract Infection Fact Sheet

http://www.acog.org/publications/patient_education/bp050.cfm

American Academy of Family Physicians:

Urinary Tract Infection Fact Sheet

<http://familydoctor.org/online/famdocen/home/women/gen-health/190.html>

Medline Plus- US National Library of Medicine, National Institutes of Health

Urinary Tract Infection

Asymptomatic Bacteriuria

<http://www.nlm.nih.gov/medlineplus/urinarytractinfections.html>

Patient Instructions for Collection of a Mid-Stream Clean Catch Urine Specimen

- Wash your hands thoroughly with soap and water.
- Tear open 3 sterile cleansing towelettes, and put them on the table so that you can reach them with one hand.
- Open the lid of the urine container carefully; avoid touching the inside of the container.
- Stand astride the toilet and use the fingers of one hand to separate and hold open the folds of skin (labia) around your vagina.
- Using the first towelette, starting in the front, wipe the urinary opening and labia moving from front to back.
- Discard the towelette.
- Keep holding the labia open so that they do not touch and repeat this cleansing with each towelette.
- Keep holding your labia open and begin urinating into the toilet bowl. After the urine has flowed for a few seconds into the toilet, put the sterile urine cup into the flow of urine to catch the urine flow in the cup. When the cup is approximately one-half full, remove the cup and finish urinating into the toilet.
- Place the lid on the container and screw it on tightly.
- Wipe the outside of the container with a paper towel.
- Wash your hands thoroughly with soap and water.
- Check the specimen label to assure that it contains your correct identification information.

SHARE WITH WOMEN



URINARY TRACT INFECTIONS

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Urinary tract infections (UTIs), often called bladder infections, are a common problem for women. The information in this handout will help you learn what causes UTIs and list some good practices that can help prevent them.

What Causes UTIs?

Most UTIs are caused by bacteria (germs) that are normally present in your intestines or on your skin around your anus and vagina where they do not cause harm. About 8 of every 10 UTIs are caused by the bacteria *E. coli*. The bacteria can get into your urethra when you wipe yourself after urinating or when you have sex. They travel up the urethra to the bladder, where they attach to the walls and grow. After 24 to 48 hours, you start to get the symptoms of a UTI.

What Are the Symptoms of a UTI?

The symptoms of a UTI include the following:

- Burning or pain when you urinate
- A feeling of pressure in your bladder
- A feeling like you have to urinate, but when you try, there is little or no urine
- Cloudy urine
- Bad smelling urine

Is a UTI a Sexually Transmitted Disease (STD)?

UTIs are not STDs because you do not get the bacteria from your partner. However, having sex is one of the most common ways the bacteria are moved from the skin around your anus and vagina forward to the urethra. Having sex can also cause a little bruising of your urethra, which may make you feel like you have a UTI. Bruising in the urethra can make it easier for bacteria to travel up the urethra into the bladder.

Why Am I More Likely to Get a UTI If I Am Pregnant?

- Pregnancy makes the urethra and bladder more relaxed (open) and easier for bacteria to enter.
- Pregnancy makes your immune system act slower.
- During pregnancy, women often have a small amount of urine in the bladder even after urinating, which can help bacteria grow.

What Is Asymptomatic Bacteriuria?

Health care providers often test a urine sample early in pregnancy to see if you have bacteria in your bladder. "Asymptomatic bacteriuria" is the name used when you have bacteria in the bladder but no pain or problems urinating. About 1 of every 4 women with asymptomatic bacteriuria in pregnancy will go on to have a painful UTI. A few will get kidney infections—a serious infection during pregnancy. Asymptomatic bacteriuria increases your risk of having preterm labor. If you have asymptomatic bacteriuria during pregnancy, your health care provider will give you a prescription for an antibiotic. Fortunately, there are several antibiotics for UTIs that are safe to take during pregnancy.





From the National Women's Information Center.

Preventing a UTI

- Drink lots of water every day (6–8 glasses per day). This helps flush out your bladder.
- Urinate several times each day (every 2 hours). Don't hold urine in when you feel the urge to urinate; go right away. When you urinate often, the bacteria don't have time to "stick" to the wall of your bladder and begin growing.
- Urinate soon (within 30 minutes) after having sex. This helps flush out any bacteria that may have been moved up to your urethra. It may also help to use a water-based vaginal lubricant when you have sex. This can help to avoid bruising of your urethra.
- Wipe from FRONT to BACK after urinating or having bowel movements. This will help keep bacteria away from your urethra (See Picture).
- Eat well, get enough sleep, and exercise regularly. A healthy body will have a stronger immune system. This will help you avoid all kinds of infections, including UTIs.
- Drink cranberry juice. Drink 1 glass of cranberry juice, or take a cranberry tablet (available in most stores) every 8 hours. Cranberry juice helps by making it hard for bacteria to stick to the lining of your bladder. Cranberry juice may help prevent UTIs, but it is not helpful once you have a UTI.
- Antibiotics: If your health care provider gave you a prescription for antibiotics to treat a UTI, be sure to take ALL of the medicine! If you skip pills or only take some of the medicine, you may get another UTI that is more serious than the first one.

FOR MORE INFORMATION

National Women's Health Information Center
<http://www.4woman.gov/faq/Easyread/uti-etr.htm#6>
 National Institute of Health, "Urinary Tract Infections in Adults"
<http://kidney.niddk.nih.gov/kudiseases/pubs/utiadult/>
 American Pregnancy Association web site
<http://www.americanpregnancy.org/pregnancycomplications/utiduringpreg.html>

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