RISK FACTORS AND PREVENTIVE MEASURES AGAINST URINARY TRACT INFECTION

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ABSTRACT
Urinary-tract infections are among the most common entities encountered in medical practice. Urinary-tract infections, including cystitis, pyelonephritis, asymptomatic bacteriuria, and acute urethral syndrome, constitute one of the most frequent causes of illness in humans. The goal of this review is to provide an up to date summary of the literature with particular attention to practical questions about risk factors and preventive measures of urinary tract infection.

Keywords: Urinary tract, microorganism, pathogen, cystitis, infection, measures, urethra

INTRODUCTION
Urinary tract infections (UTIs) are defined as the presence of pathogenic microorganisms within the genitourinary tract with concomitant symptoms (Scan et al; 2004). Urinary tract infections can cause acute morbidity and may result in severe problems, including hypertension and reduced renal function (Gov et al; 2001). Urinary-tract infections are among the most common entities encountered in medical practice. Urinary-tract infections, including cystitis, pyelonephritis, asymptomatic bacteriuria, and acute urethral syndrome, constitute one of the most frequent causes of illness in humans (David et al, 1998, Finkelstein et al, 1998, Foxman et al; 1995). Most such infections are caused by a few genera of bacteria, and the presence of these microorganisms in the urine is known as bacteriuria. Among Gram-positive bacteria, the possible pathogens of UTI can be *Staphylococcus* and *streptococci*, where as among Gram-negative organisms, the possible UTI pathogens could be *Escherichia coli*, proteus species, *Pseudomonas aeruginosa* and *klebsiella* species (McTaggart et al; 1990). UTIs are common clinical entities occurring in a variety of patient groups, most frequently caused by uropathogenic *Escherichia coli* (Stapleton, 2003). Although UTIs occur very often in children up to 6 years old and in young women, the prevalence of these infections increases as age advances, becoming a disease of great importance in elderly adult’s (Dalbosco et al; 2003). Approximately 3% of prepubertal girls are diagnosed with UTI and approximately one third recur within 3 years (Foxman, 2002.)

Infections of the urinary tract occur commonly in the pediatric population, because of the high association of pediatric UTI, with congenital structural anomalies of the urinary tract and with dysfunctional elimination syndromes (Koyle et al; 2003). The role of vesicoureteral reflux in recurrent child hood UTI is probably overestimated in the medical literature and is important only in a small group of children with high-grade reflux (Finer, and landan, 2004.). A longer duration of breast-feeding gave a lower risk of UTI because protective role of breast-feeding was strongest directly after birth, then decreased until 7 months of age, after which, no effect was, demonstrated (Marlid et al; 2004). UTI affect at least 10% to 20% of the female population. Recurrent urinary tract infections are common among girls and young women; these infections are a main source of morbidity and health care costs in this population (Cardenas et al; 1986). Urinary tract infections occur more frequently in women than men due to the shortness of the female urethra; symptomatic and asymptomatic UTIs common in pregnancy. The incidence of bacteriuria during pregnancy in western population is 2.5%-8.7%, which is almost equivalence to the 4%-6% incidence of the general population (Sheikh et al/2000).
Risk factors for developing a UTI during pregnancy include prior history of UTI, long duration of pregnancy, sickle cell trait, and low socioeconomic states. Also pregnant patients are more apt to suffer severe consequences of a UTI and have an increased risk of pyelonephritis, preterm labor, fetal mortality and gestational hyper tension (Patterson, and Andriole; 1987).

Causative agents of UTI

*E. coli* predominates as the causative agent in more than 80% of UTI, followed by *Staphylococcus saprophyticus* at nearly 15% (Ronald, 2002). UTIs caused by *Pseudomonas*, proteus, and *klebsiella* species are associated with hospital acquired infections, often following catheterization or gynecological surgery. Risk of infection is increased when there is urine retention due to bladder not emptying completely; or when urinary flow is obstructed due to renal stones, urinary schistosomiasis, enlarged prostate (commonest cause of recurring until in men). Infection of the anterior urinary tract (urethritis) is mainly caused by *N. gonorrhoeae* (especially in men), staphylococci and streptococci (Monica, 2002).

Symptoms of UTI

The most chief complaint with UTI is dysuria. Other complains include urgency, frequency, nocturia, gross haematuria, and any change in the color. Associated signs and symptoms include fever, chills, back pain or supra pubic pain, prostatic enlargement in elderly men, urinary dribbling or hesitancy.

WHAT ARE THE RISK FACTORS FOR URINARY TRACT INFECTIONS?

Risk Factors for Primary UTIs in Women

After the flu and common cold, urinary tract infections are the most common medical complaint among women in their reproductive years. Women are 30 times more likely to have cystitis than men. An estimated 7 million episodes of urinary tract infection occur each year in the US, although this rate may be much higher. And, every year about 250,000 American women develop kidney infections (pyelonephritis), and 100,000 are hospitalized for treatment. On average, 10% to 20% of all women will develop a urinary tract infection at some time in their lives and 20% of those will have recurrent UTIs. The risk for UTIs, both symptomatic and asymptomatic, is highest after menopause. (About 2% to 5% of young women have asymptomatic bacteriuria; in women over 65 the prevalence is between 10% to 15%.)

Structure of the Female Urinary Tract:

In general, the higher risk in women is mostly due to the shortness of the female urethra, which is one and one half inches compared to eight inches in men. Bacteria from fecal matter can also be easily transferred to the vagina or the urethra.

Sexual Behavior:

Frequent sexual activity increases the risk of urinary tract infection, and studies indicate that nearly 80% of all urinary tract infections occur within 24 hours of intercourse. A number of different factors are responsible for the increased incidence of UTIs among sexually active women:

- Highly active sexual behavior may increase the risk for sexually transmitted infections such as Chlamydia, gonorrhea, or herpes simplex virus. Such agents may cause urethritis (infections in the urethra).
- Women having sex for the first time or who have intense and frequent sex after a period of abstinence are at risk for a condition called honeymoon cystitis.
- A sudden increase in the frequency of sexual intercourse poses a significant risk for UTI, particularly if a diaphragm is used.
- Contraceptives may also contribute to risk in a number of ways
- Some women experience UTI as an allergic reaction to latex in condoms or to oral contraceptives.

Pregnancy:

Although pregnancy does not increase the rates of asymptomatic bacteriuria, it does increase the risk that it will progress to a full-blown infection. About 2% to 11% of pregnant women have asymptomatic bacteriuria and, of those, 13% to 27% will develop kidney infection late in their term. (It should be noted, however, that in early pregnancy, frequent urination, a common symptom of UTI, is most likely due to pressure on the bladder). Women who have had a UTI before or during pregnancy also have a higher risk of developing recurrent urinary tract infections after delivery. Approximately 25% to 33% of women who experience bacteriuria during pregnancy will have another urinary tract infection, sometimes as long as ten to 14 years later.

Biologic and Physical Factors:

Some women may also have certain biologic or anatomical factors that
increase the risk for recurring UTIs are:
• Having a shorter than average distance between the urethra and the anus.
• Certain women may carry a compound called sialosyl galactosyl globoside (SGG) on the surface of kidney cells, which is a highly powerful receptor for E. coli bacteria.
• Certain women have a genetic susceptibility to greater numbers of infecting organisms in the vaginal areas that adhere to the lining.
• Certain women may be deficient in human beta-defensin-1 (HBD-1), believed to be a naturally occurring antibiotic.

Changes in the Aging Woman: Changes after menopause put older women at particular risk for primary and recurring UTIs. In fact, studies indicate that between 20% and 25% of women over 65 years old have UTIs. A number of biologic factors in older women may also contribute to this risk are:
• With estrogen loss, there is a reduction of certain immune factors in the vagina, which results in E. coli to adhere to vaginal cells.
• Lactobacilli levels (the protective organisms) decline after menopause (perhaps due to drops in estrogen).
• Some women carry the blood group PI, which, as they get older, makes them susceptible to large numbers of cells in the vagina and urethra that attract and bind a specific strain of E. coli. This strain is resistant to normal infection-fighting mechanisms.
• The walls of the urinary tract thin out, weakening the mucous membrane and reducing its ability to resist bacteria.
• The bladder may lose elasticity and fail to empty completely.

Aside from menopause, other very strong risk factors for recurrences that are associated with aging include urinary incontinence and previous operations on the genital or urinary tracts.

Risk Factors in Children
Primary UTIs in Children: About 2% of children develop urinary tract infections. Because males are more likely to be born with structural abnormalities of the urinary tract, UTIs during the first six months of life are more common in boys. The rates are about equal in toddlers. Afterward, however, UTIs are far more common in girls. By the age of five, UTIs are 50 times more common in girls than in boys. Within the first ten years, boys will have a 1% and girls a 3% chance for developing a UTI.

Vesicoureteral reflux: (VUR) is the source of urinary tract infections in 30% to 50% of childhood cases. This is a structural defect of the valve-like mechanism between the ureter and bladder which allows urine to flow backward, carrying infection from the bladder up into kidneys.

Recurring UTIs in Children: Recurrence will occur in about 30% of boys and 40% of girls. According to one study, the risk for recurrence is highest in children with severe UTI caused by vesicoureteral reflux, and such recurrences nearly always occurs within the first six months after the first UTI.

Risk Factors in Men: Men become more susceptible to UTI after 50 years of age, when they begin to develop prostate problems. From 5% to 15% of men over 65 will have asymptomatic bacteriuria.

Unhealthy Elderly Adults: All older adults are at risk that are immobilized, catheterized, or dehydrated. Nursing home patients, particularly those who are incontinent and demented, are at very high risk for UTIs. Up to 40% of elderly patients who live in nursing homes will contract a urinary tract infection. In most cases, the infections are asymptomatic and no more harmful than similar infections in the general population. Nursing home patients, however, are at higher risk for developing symptoms.

Specific Risk Factors for Complicated UTIs
Catheters and Hospitalizations: About 40% of all infections that develop in hospitalized patients are in the urinary tract, and 80% of those are due to catheters. Nearly all patients who need urinary catheters develop high levels of bacteria in their urine, and the longer the catheter is in place, the higher the risk for infection. Catheterized patients who develop diarrhea are nine times more likely to develop UTIs than are patients without diarrhea. In most cases of catheter-induced UTIs (90% in one study) the infection produces no symptoms. Because of the risk for wider infection, however, anyone requiring a catheter should be screened for infection. Catheters be used only when necessary and should be removed very soon.
**Kidney Stones:** Kidney stones, in some cases, can cause obstruction and cause infection, particularly pyelonephritis. Symptoms of severe urinary tract infection in people with a history of kidney stones may indicate obstruction of the urinary tract, which is a serious condition.

**Diabetes:** Diabetes puts women (but not men) at significantly higher risk for asymptomatic bacteriuria. The longer a woman has diabetes, the higher the risk. (Control of blood sugar has no effect on this condition.) The risk for symptomatic complicated UTIs may also be higher in people with diabetes. In fact, certain UTI-related abscesses are reported only in patients with diabetes. These patients are also at higher risk for fungal-related UTIs.

**Prostate Conditions in Men:** Benign prostatic hyperplasia can produce obstruction in the urinary tract and increase the risk for infection. In men, recurrent urinary tract infections are associated with prostatitis, an infection of the prostate gland that can also be caused by E. coli.

**Routine bacterial urine cultures:** Urine culture may not be necessary as part of the evaluation of outpatients with uncomplicated UTIs (Stamm and Hooton; 1993 Wing et al; 2000). However, urine cultures are necessary for outpatients who have recurrent UTIs, experience treatment failures, or have complicated UTIs. Urine cultures are also necessary for inpatients that develop UTIs. The bacterial culture remains an important test in the diagnosis of UTI, not only because it helps to document infection, but also because it is necessary for determination of the identity of the infecting microorganism(s) and for antimicrobial susceptibility which testing. This is particularly true because of the increased incidence of antimicrobial resistance. The most commonly used criterion for defining significant bacteriuria is the presence of ≥ 10⁵ cfu per milliliter of urine (Kass, 1956 and Kass, 1957). Catheterized patients (who may have low concentrations of bacteria that can progress to higher concentrations) and many patients with infections of the lower urinary tract have colony counts much lower than 10⁵ cfu/mL if the specimens are obtained via suprapubic aspirate or catheterization (Stark and Maki 1984). Accordingly, the most appropriate diagnostic criterion for urine culture specimens obtained via suprapubic aspirate or catheterization is a bacterial concentration of ≥ 10² cfu/mL (22). Routine follow-up cultures for test-of-cure are not recommended for patients who have been treated for asymptomatic bacteriuria, acute uncomplicated cystitis, or acute uncomplicated pyelonephritis (Winickoff et al; 1989) and for whom there is evidence of an appropriate clinical response to therapy. Follow-up cultures are, however, recommended for patients with infections that do not respond to therapy, patients who have recurrent UTIs, patients who have anatomic or functional abnormalities of the urinary tract, or patients who continue to have unexplained abnormal urinalysis findings.

**Treatment**
If there are bacteria in your urine several different antibiotics may be prescribed to treat uncomplicated infections.

**The regimen is usually:**
- antibiotics for 1-3 days for first infection
- antibiotics for 7-10 days

**Help Factors**
- Hot water bottles or heating pads to ease cramps and soothe the pain. If left untreated infections can result in:
  - kidney damage
  - death

**Prevention**

**Help Factors**

**Drink**
- a cup of water with a half a teaspoon of baking soda 1-2 times a day
- cranberry juice as it helps reduce the amount of bacteria in your urine
- large amounts of water to help flush the bacteria out of the system

**Avoid**
- Acid foods, alcohol, caffeine, chocolate, citrus fruits, spices, tomatoes
Other Factors

- Drink water before and after sex so that you will urinate a good volume with a steady stream afterward
- Regular testing of urine during pregnancy
- Urinating after sexual intercourse
- Wiping from the vagina to the anus after urinating to avoid spreading bacteria
- Wear cotton underwear as it is less irritating and provides more ventilation than nylon

REFERENCES


