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Clinical Correlation**

**93 Lower Urinary Tract Infection**

**Patient Presentation**

**Chief Complaint**

“I have a burning sensation when I urinate”

**HPI**

Sharon Edwards is a 20 yr. Old woman who presents to University Health Care Clinic with a 2-day history of dysuria, frequency, and urgency. She has been in good general health prior to the abrupt onset of these symptoms.

**PMH**

Appendectomy at age 11  
No prior history of similar symptoms

**FH**

Non-contributory

**SH**

Smokes ½ ppd for the past 2 yrs.  
Lives with female roommate at a university dormitory  
Recent increase in sexual activity with a new boyfriend

**Meds**

Ortho-Novum 7/7/7-28 1 po QD

**All**

NKDA

**PE**

Gen  
Anxious young woman in NAD

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**VS**

BP 120/75, P 80. RR 15, T 37.2C; Wt. 55kg. Ht 170 cm

**Skin**

Mild facial acne

**HEENT**

PERRLA, EOMI, fundi benign, TMs intact

**Chest**

CTA

**CV**

RRR

**Abd**

Mild suprapubic tenderness, no flank pain

**Ext**

Pulses 2+ throughout; full ROM

**Neuro**

A&O X3; CNII-XII intact; reflexes 2+, sensory and motor levels intact

**Pelvic**

No vaginal discharge or lesions; LMP two weeks ago

**Labs**

None obtained

**UA**

WBC 10 to 15 cells/hpf, RBC 1-5 cells/hpf, bacteria 2-5/hpf

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### **Findings and Assessment**

The patient's complaints of burnings on urination and suprapubic tenderness on PE are consistent with typical symptoms of uncomplicated lower urinary tract infections. Other symptoms may include urgency, frequency and nocturia. Fever is uncommonly associated with lower urinary tract infection.

As with this patient, who relates recent increase in sexual activity with a new boyfriend, the vast majority of uncomplicated infections occur in young, sexually active women. When the infection is recurrent, occurring a few weeks or even months after the previous infection, it is not necessarily complicated. On the other hand, in a patient with multiple resistant organisms, the infection should be considered complicated. Complicated urinary tract infections are, in most cases, related to anatomical, metabolic and hormonal abnormalities or immune deficiencies. This patient relates none of these abnormalities on her PMH and her pelvic exam revealed no abnormalities.

This patient's urinalysis results are consistent with urinary tract infection. The presence of bacteria in the urine, bacteriuria, is not in itself an indicator of UTI, as it could be caused by a contaminated sample. The presence of WBC in the urine, pyuria, does generally indicate a significant inflammatory response to the bacteria, that is, infection. The inflammatory response that occurs when bacteria attach to the mucosa creates the symptoms of UTI. In females, colonization of the mucosa of the vaginal introitus is an essential step in the pathogenesis of UTI. The colonization is determined by the adhesive characteristics of the epithelial surface, and the fluid that bathes both surfaces.

The presence of RBC in the urine is another indicator of UTI in this patient who is two weeks past her LMP and had a negative pelvic exam. Hematuria is present in approximately 40% of UTI cases, though usually microscopic, and does not mean that the infection is complicated.

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As the majority of uncomplicated UTI occur in young sexually active females, this patient is at risk. Risk factors include sexual intercourse, especially with a new partner, unusually vigorous intercourse, and delayed micturation.

Information concerning the use of condoms was not included in the presentation, but would be useful to know, as it has also been implicated in UTI. Unlubricated condoms have been associated with 2-8-fold risk in UTI. The use of a diaphragm or spermicide has been linked with an increase in *Staphylococcus saprophyticus* UTI.

Urine cultures should be obtained in the presence of risk factors for complicated infection or in the setting of recurrent or unresponsive isolated infections but is usually not obtained in the case of presumed uncomplicated UTI, as in the case of this patient. The ideal would be to have culture and sensitivity results before starting the antimicrobial regimen but as antimicrobial sensitivity tests typically require 3-5 days to complete, the delay in starting treatment makes this practice prohibitive due to the risk of serious morbidity if the infection is allowed to continue untreated for the time required for the lab to identify the causative agent. The presumption is that it is not necessary in uncomplicated UTI because of predictable causative organisms and their known antimicrobial susceptibility patterns.

These infections are predominately caused by *Escherichia coli* in 85% of the cases and *Staphylococcus saprophyticus* accounting for 5-15%. Saint et al reports a study done by an HMO using these presumptions. The HMO used 2 control groups, and following cystitis clinical practice guidelines instituted a telephone-based clinic to evaluate outcomes and cost. Empirical antibiotic treatment without obtaining a urinalysis was used to reduce costs. These recommendations were limited to healthy women with presumed uncomplicated cystitis. Using the proportion of patients who required a return office visit for cystitis, STD or who developed pyelonephritis. Adverse outcomes did not increase significantly in either comparison. They concluded that guideline use decreased laboratory utilization and overall costs while maintaining or improving the quality of care for patients who were presumptively treated for acute, uncomplicated UTI.

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The desired outcome or goals of treatment for UTI are to prevent or resolve systemic consequences of infection, eradicate the invading organism, and prevent recurrence. The anti-infective agent chosen for treatment of uncomplicated UTI must have the ability to clear the infecting organism without disturbing the normal vaginal or fecal flora and setting up an environment for fungal superinfection. This ability to eradicate the bacteria is directly related to the sensitivity of the organism to the anti-infective agent and the achievable concentration of it in the urine. The choice of agent would include history of hypersensitivity, side effect and toxicity profile and cost.

Trimethoprim-sulfamethoxazole and quinolone are available for the treatment of uncomplicated UTI. TMP-SMX is highly effective against most aerobic bacteria and as prophylaxis for recurrent infections. It is inexpensive and has minimal adverse effects on vaginal and fecal flora. Its mechanism of action is that it antagonizes the bacterial folate mechanism. Side effects can include skin rash and G.I. complaints.

Quinolones have a very broad spectrum of activity against most urinary pathogens. It is effective due to its ability to inhibit bacterial DNA gyrase. It has minimal effect on the vaginal and fecal flora and is therefore well tolerated. On the negative side, it is more expensive and there have been recent reports of bacterial resistance though bacterial resistance initially seemed to be uncommon.

Amoxicillin-clavulanate is highly effective, at least equal to TMP/SMX. It acts by inhibiting bacterial cell wall synthesis. It is expensive and there are frequent occurrences of GI upset. Resistant strains have been reported. Based on this patient's presentation, TMP/SMX 160/800mg. PO BID x 3 days is recommended for initial therapy. This recommendation is based on the medication history of effectiveness, or its sensitivity to the presumed pathogen, minimal adverse effects on the vaginal flora, low incidence of the development of resistant strains, and cost effectiveness.

McCarty et al conducted comparative studies to determine the minimum effective dosing regimen for the treatment of acute uncomplicated UTI concluded that TMP/SMX 160/800mg.BID, Ciprofloxacin 100mg.

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BID, and Ofloxacin 200mg BID all 3 drugs had similar efficacy when given for 3 days as when given for 5 or 7 days.

There are differing opinions regarding obtaining a urinalysis or culture after completion of antimicrobial treatment in the absence of symptoms. The previously mentioned telephone-based HMO did no follow-up urinalysis unless the patient became symptomatic. Wells, et al is in agreement with this approach. Engel, in his article for the Urologic Clinics of North America recommends urinalysis after treatment in asymptomatic patients.

In the case of this otherwise healthy young female, monitoring for adverse effects TMP/SMX such as hypersensitivity, rash and GI upset would be related to the patient at the time of instituting the medication as being possible reportable adverse reactions. Other adverse reactions such as megaloblastic anemia and hematologic toxicity would be rare in this patient but may be seen in an immunosuppressed patient.

The patient should be counseled to take all medications and to refrain from using alcohol while on the medication. Metronidazole can interact with ethanol or ethanol containing drugs causing a "disulfiram reaction" that may include hypertension, flushing, headache and nausea.

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