

URINARY TRACT INFECTIONS IN ADULTS

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Overview^{2,6,7}

Urinary tract infections (UTIs) are very common with approximately 50-60% of adult women experiencing >1 UTI during their lifetime. It is estimated that approximately 1 in 4 women with UTIs will develop recurrent UTIs. The most common organisms that cause UTIs are the "KEEPS" bacteria: Klebsiella (3%), E.Coli (75%), Enterococcus sp. (3%), Proteus mirabilis (10%), Staphylococcus saprophyticus (15%). Other organisms such as Chlamydia, Neisseria Gonorrhoea, Candida and Herpes Simplex can mimic UTI symptoms and should be considered in those that do not respond to treatment.

Diagnostic considerations^{2, 4}

Definitions:

Urinary tract infection: A bacterial count (>10⁵ cfu/L) present in a clean-catch or MSU sample accompanied by symptoms of UTI and confirmed by urine C+S

Pyuria: leukocytes in urine

Recurrent UTI: >2 uncomplicated UTIs within 6 months or 3 positive cultures in previous 1 year.

Relapse: recurrence with same organism despite adequate antimicrobial coverage (<2 weeks) – rare (<10% of women)

Reinfection: recurrence with different organism (or same organism) after at least 2 weeks of resolution – more common.

Complicated UTI: If there are anatomical or functional factors that predispose to UTIs. This is typically due to mixed bacterial inoculation and generally more resistant to antimicrobial therapy.

History: new onset or change in urinary frequency/urgency, dysuria, incontinence (particularly in elderly), systemic features (fever, rigors), suprapubic or CVA tenderness, +/- hematuria, and delirium (elderly).

Physical examination: vital signs, abdominal examination, flank tenderness, pelvic examination if indicated (if suspect cystocele/prolapse).

Differentiating between Uncomplicated and Complicated UTIs²

Uncomplicated UTIs: young women (age of 1st UTI >15 yo), frequency of sexual intercourse, new sexual partner within last year, diaphragm or spermicide use, previous UTIs, infrequent voiding, family history of UTI.

Complicated UTIs:

Any UTI in a male

- **Anatomical abnormalities:** ureteric or urethral strictures, tumors of urinary tract (malignancies of prostate or bladder), urolithiasis, BPH, diverticulae, pelvic/colyceal obstruction, renal cysts, congenital abnormalities, pelvic prolapse, outlet obstruction, fecal impaction, vaginal atrophy secondary to estrogen deficiency
- **Functional:** neurogenic bladder, dementia, spinal cord injury, poor fluid intake.
- **Immunocompromised:** diabetes, immunosuppression, renal transplant
- **Instrumentation:** catheterization, nephrostomy tube, ureteric stent, urologic procedures

Investigations for uncomplicated and complicated UTIs³

Urinalysis:

- Leukocytes (> trace amount): leukocyte esterase is made by neutrophils.
- Nitrites (any positive test including trace): produced by bacteria which reduce urinary nitrates to nitrites. Positive result indicates infection, but negative does not rule out infection if patient is symptomatic. Reasons for negative nitrites: some bacteria lack enzyme to reduce nitrates, if urine has not been in urine x 4 hours (not enough time for reaction to occur).
- Blood: can confirm infection but can be associated with other clinical circumstances such as menstruation, recent instrumentation

Urine culture: Urine C+S, necessary as often resistant species or atypical organisms.

When considering whether to culture prior to treating, consider if patient has:

1) dysuria 2) +ve leukocytes 3) +ve nitrites

Prescribe empiric antibiotics without culture if pt has 2-3 of above. If pt has 0-1 of the above, culture urine prior to treating.

Investigations for complicated UTI:

Bloodwork: electrolytes, creatinine – to use for dosing in elderly and hydration status. For recurrent UTI, consider glucose (T2DM).

Imaging: Can consider renal or pelvic U/S, IVP (uncommon), CT or MRI, cystoscopy, urodynamic studies or retrograde pyelography. Men with UTI often have abnormality detected on imaging (KUB US).

Healthy young women with recurrent UTIs, further investigations are usually negative, hence no routine recommendation.

Postmenopausal women with recurrent infections should have investigations to rule out cystoceles as well as post void residual volume and consideration of vaginal atrophy.

Management Considerations^{1,2,4,5,6}

Prevention and Non-pharmacologic:

1. Avoid spermicide-containing contraception (increases rate of vaginal/periurethral colonization with E.coli)
2. Post-coital micturation, hygiene, frequent urination, weight loss, avoidance of tight clothing (limited evidence but unlikely to be harmful).
3. Cranberry juice or tablets (I-A), vaginal estrogen in postmenopausal women (if no contraindications) (I-A).

Asymptomatic bacteriuria:

-Screening is only warranted in pregnancy and for pre-op GU procedures

-Do not treat elderly with asymptomatic bacteriuria.

Pharmacologic Management:

In general for uncomplicated UTI, 3 days of treatment will result in better compliance, lower cost and less adverse reactions

If antibiotics have been used in past 3-6 months – use alternative antibiotic to decrease risk of resistance

Fluoroquinolones are not first line for UTI due to cost, increasing resistance

Consultation with a physiotherapist or massage therapist may be very effective and should be considered in all soft tissue injuries to achieve above goals.

Pharmacologic management of UTI

Treatment of Uncomplicated UTI (females >12 years)			
<i>E. Coli</i> (80-90%) <i>S. Saprophyticus</i> <i>Other Gram Neg Bacilli</i>	First Line	TMP/SMX (Cotrimoxazole) Nitrofurantoin** Trimethoprim*	2 tabs BID or 1 DS tab BID 50-100 mg QID or Macrobid 100 mg BID 100 mg BID or 200 mg once daily
	Second Line	Amoxicillin* Norfloxacin Ciprofloxacin	500 mg TID 400 mg BID 250 mg BID or 500 mg (extended release) once daily
	Third Line	Cephalexin Levofloxacin	250-500 mg QID 250 mg once daily
Duration of treatment			
Uncomplicated UTI		TMP/SMX or Quinolones Nitrofurantoin or Macrobid	3 days 5 days
Complicated UTI: - generally 7-10 days - consider 7-10 day rx in elderly pts		Lower tract Upper tract (CVA tenderness, fever, nausea/vomiting)	7-10 days 10-14 days (may require further work-up)

*Avoid amoxicillin and Trimethoprim alone as high resistance rates. Note, quinolones resistance emerging (may use if Pseudomonas is suspected).

**Avoid nitrofurantoin if CrCl is < 60

Special considerations^{2, 4}

Recurrent UTIs in females:

- Women with recurrent UTIs can self-diagnose based on symptoms very accurately with 84% positive culture rate.
- Perform MSU C+S and urinalysis at onset of symptoms of UTI prior to treatment (III-L) to establish correct diagnosis of recurrent UTI
- Consider prophylaxis for recurrent UTIs when a patient has relapse despite adequate treatment as evidenced by negative cultures 1-2 weeks after treatment (III-L)
- Consider prophylaxis in women having >2 clearly documented UTIs in 6 months, or >3 UTIs in 12 months. Treat for 6 to 12 months (I-A).
- 1st line agents for daily prophylaxis include:
 - Septra 1 tab or 0.5 DS tab daily
 - Nitrofurantoin 50mg daily
 - Macrobid 100 mg daily or post-coitally
 - TMP 100mg qhs or post-coitally

-If UTIs are associated with intercourse, offer post-coital prophylaxis as alternative to continuous daily therapy (I-A).

-Consider vaginal estrogen to postmenopausal women who have recurrent UTI and no contraindications

UTIs in pregnancy:

- Perform repeat cultures monthly if high risk of recurrence.
- Perform urine culture prior to treatment and repeat culture after treatment to test for cure.
- First line agents in pregnancy include:
 - cephalixin, amoxicillin, and nitrofurantoin.
- Avoid nitrofurantoin after 36 weeks gestation and in neonates → haemolytic anemia
- Avoid TMP and TMP/SMX during first trimester and last 6 weeks of pregnancy.
- Consider prophylaxis in pregnancy for all women with pre-pregnancy history of recurrent UTIs OR persistent symptomatic/asymptomatic bacteriuria (after 2 rounds of antibiotic treatment) OR after one UTI for women who has other conditions that may increase risk of UTIs (anatomic abnormalities)
 - Prophylactic agents in pregnancy: nitrofurantoin 50 mg qd (not after 36 weeks GA) and cephalixin 250mg qd

Nursing Home patients:

- Treating asymptomatic bacteriuria in NH patients may have harmful consequences.
- Always culture prior to starting Rx!
- In patients without indwelling catheter, intermittent catheterization, or condom catheter, treatment may be initiated if patient has either:
 - 1) acute dysuria or 2) fever + >1 of new urgency, frequency, suprapubic tenderness, hematuria, CVA tenderness, incontinence.
- If pt has indwelling catheter, initiate treatment if >1 of fever, CVA tenderness, rigors, delirium.
- Treatment regimen usually 7 days, if febrile or systemic symptoms then treat for 10-14 days.

Follow-up and When to refer^{1, 2, 4}

Follow up cultures are not necessary in asymptomatic patients unless early recurrence (<4 weeks), or patient does not improve with Abx.

Refer if:

- Persistent hematuria after resolution of infection
- Recurrent UTIs not managed with prophylactic antibiotics
- For correction of anatomic abnormalities, i.e. prolapse, strictures

References can be found online at http://www.dfc.utoronto.ca/programs/postgraduateprograme/One_Pager_Project_References.htm