URINARY TRACT INFECTIONS

Anatomical Site	
Upper tract infection	**Lower tract infections**
Pyelonephritis	Cystitis, urethritis, prostatitis
Flank pain, abdominal pain, fever, headache, N/V, malaise → since nearby kidneys where there's vascular supply, tends to have systemic spread	Dysuria, urgency, frequency, nocturia, suprapubic heaviness/pain, gross hematuria in women
No clear line between upper/lower UTIs, can't reliably differentiate on symptoms alone	

Complicated	Uncomplicated
Structural/neurologic abnormality, interferes with normal flow or voiding	Occurs in childbearing age females who are otherwise healthy
UTIs in men are always considered complicated	
E. coli (50%), *Enterococci*	*E. coli* (>85%), *staph saprophyticus*
Others: *Protoeus spp, Klebsiella spp, Enterobacter spp, P. aeruginosa, staphylococci*	Others: *E. faecalis, K. pneumonia, Proteus spp, P. aeruginosa*
Majority of UTIs caused by single organism	

Recurrent	Relapse
Different organism	Same organism
> 2 weeks	< 2 weeks

TREATMENT

- **Acute uncomplicated cystitis (bladder infections)**
  - Most common type of UTI
  - Short-course empiric therapy without obtaining cultures → see what happens
  - Follow-up cultures only necessary for women who do not respond to therapy
  - Antibiotic choice depends on Bactrim resistance rates (< or > 20%)
    - Bactrim susceptible: Bactrim DS 1 tab q12h for 3 days
    - Bactrim resistant: Nitrofurantoin monohydrate 100mg po bid for 5 days

- **Symptomatic abacteriuria (acute urethral syndrome)**
  - Dysuria + pyuria but $<10^5$ bacteria/mL
  - Causes: *E. coli* or STDs (*Chlamydia, N. gonorrhoeae, G. vaginalis, U. urealyticum*)
  - Short-course therapy
  - For *chlamydia* infection: azithromycin 1g po single dose + treat sexual partners

- **Asymptomatic bacteriuria**
  - $>10^5$ CFU/mL but no symptoms
  - Candidates: elderly females or pregnant women
  - Treatment depends on age
    - Children: always treat to prevent urinary tract scarring
    - Elderly: generally not regarded as necessary to treat
    - Pregnant women: treat to prevent complications in pregnancy

- **Acute pyelonephritis (complicated UTI)**
  - Symptoms: high grade fever + severe flank pain
  - Urinalysis, culture, sensitivity, gram stain
  - Mild to moderate
    - For *enterobacteriaceae* (including *E. coli*), treat for 7-10 days
      - Bactrim DS 1 tab q12h for 2 weeks
      - Fluoroquinolones (ciprofloxacin 500mg q12h, levofloxacin 500mg qd)
    - For *enterococci*: ampicillin or amoxicillin
  - Seriously ill
    - Hospitalization and IV antibiotics
    - Traditional initial therapy: aminoglycoside + ampicillin
      - If penicillin allergy: use carbapenem instead (broad spectrum β-lactam)
      - Alternatives due to ampicillin resistance: piperacillin, piperacillin-tazobactam, ticarcillin-clavulanic acid, 3rd gen cephalosporins, aztreonam, IV fluoroquinolones
    - Possibility of *P. aeruginosa* & resistant organism
      - Due to hospitalization >6 months, indwelling catheter, nursing home
      - Combination therapy: aminoglycoside + other effective agent
    - Expect: stabilization in 12-24 hrs, ↓bacterial urine concentration in 48 hrs
    - Monitoring for 3-4 days
      - If patient doesn't respond → change therapy, more diagnostic tests
      - Parenteral therapy continued until afebrile for >24 hrs
      - If patient doesn't seem too sick → start oral therapy for 14 days
      - Follow-up urine cultures: 2 weeks post therapy

- **Male UTIs**
  - Complicated by definition
  - Urine culture before treatment initiation
  - Need prolonged treatment: 10-14 days (initial infections), 6 weeks (recurrent infections)
  - Follow-up cultures: 4-6 weeks post therapy

- **Recurrent infections**
  - Prophylaxis: single daily doses for 6 months
  - Bactrim SS 40mg/200mg 1 tab qd
  - Fluoroquinolone: ciprofloxacin or levofloxacin
  - Nitrofurantoin 50mg or 100mg qd

- **UTIs in pregnancy**
  - Treatment recommended to avoid complications in pregnancy (e.g. ectopic pregnancy)
  - Therapy for 7 days
    - Cephalexin 250-500mg q6h, ampicillin 250-500mg q6h, amoxicillin 250-500mg q8h
  - Avoid: tetracyclines, sulfonamides, quinolones
  - Follow-up cultures: 1-2 weeks post therapy

- **Catheterized patients**
  - Short-term catheterization (< 30days): remove catheter and treat as complicated UTI if symptomatic
  - Long-term catheterization (> 30days): bacteriuria inevitable; treat only symptomatic patients