UTI & PYELONEPHRITIS IN NON-PREGNANT WOMEN

FLAME LECTURE: 173A

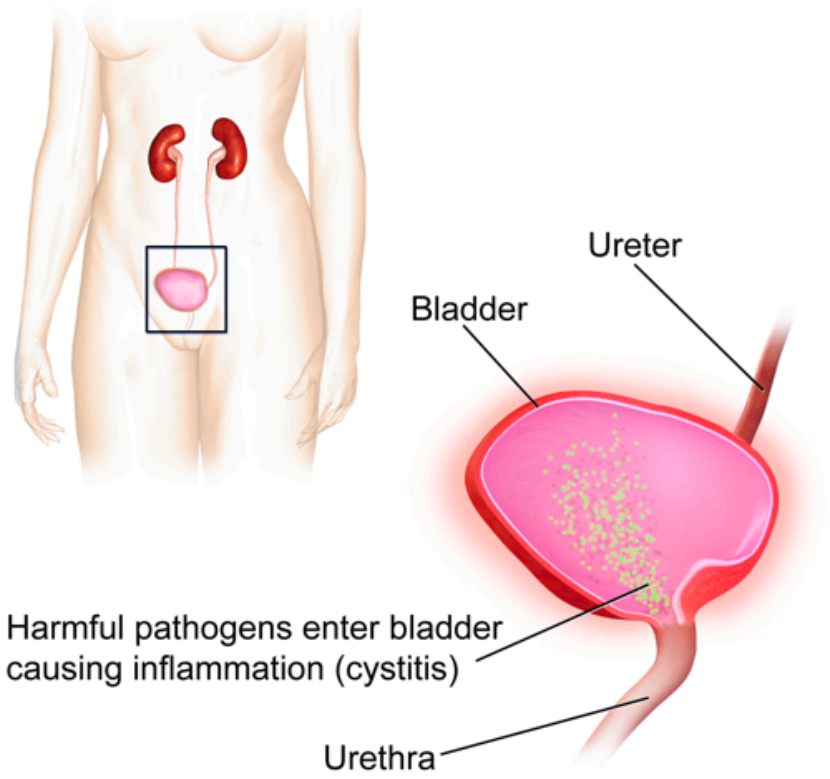
WANG / CHUN 8.7.19

LEARNING OBJECTIVES

- To understand the risk factors, clinical signs and symptoms, diagnosis, and management of UTIs
- To discuss specific treatments and prophylaxis for acute uncomplicated cystitis, pyelonephritis, and UTIs
- Prerequisites:
  - NONE
- Related:
  - FLAME 173B: UTIs in PREGNANT WOMEN

CLASSIFICATION

- Lower Urinary Tract Infection:
  - Urethritis – Infection of the urethra
  - Cystitis – Infection of the bladder
- Upper Urinary Tract Infection:
  - Ureteritis – Infection of the ureter
  - Pyelonephritis – Infection of the kidney



EPIDEMIOLOGY

- More than one half of women will have at least one UTI during their lifetime
- 3–5% of all women will have multiple recurrences
- The prevalence of asymptomatic bacteriuria is higher in women than men
  - 5–6 % in young, sexually active, nonpregnant women, compared with less than 0.1% in young men
  - Up to 20% in women older than 65 years

RISK FACTORS FOR UTI/PYELONEPHRITIS

- *Premenopausal Women*:
  - History of urinary tract infection
  - Frequent or recent sexual activity
  - Diaphragm or spermicidal contraceptives
  - Increasing parity / Pregnancy
  - Diabetes mellitus
  - Obesity
  - Sickle cell trait
  - Anatomic congenital genitourinary abnormalities
  - Urinary tract calculi
  - Neurologic disorders or medical conditions requiring indwelling or repetitive bladder catheterization
- *Postmenopausal Women*:
  - Vaginal atrophy
  - Incomplete bladder emptying
  - Poor perineal hygiene
  - Rectocele, cystocele, urethrocele, or uterovaginal prolapse
  - Lifetime history of urinary tract infection
  - Type 1 diabetes

ACUTE UNCOMPLICATED CYSTITIS

- One of the most common infections of the lower urinary tract in sexually active young women and postmenopausal women
- Pathogenesis: ascending infection to bladder from colonization of vaginal introitus often by fecal flora
- Common pathogens: *E. coli* (75-90%), *Proteus, Klebsiella, Enterococcus, Staph saprophyticus, GBS*
- Clinical symptoms:
  - Dysuria, urinary frequency, urgency, suprapubic pain/pressure, and/or hematuria

PYELONEPHRITIS

- Infection of the upper urinary tract involving the kidneys
- Clinical symptoms:
  - Fever (>38°C), chills, flank pain, costovertebral angle tenderness (CVAT), nausea, vomiting
  - Symptoms of cystitis may or may not be present
- Serious complications:
  - Sepsis, shock, and/or acute renal failure

DIAGNOSIS

- Cystitis: diagnosis can be made based on clinical symptoms
  - In healthy, ambulatory women, UA or UCx not necessary to dx typical cases of uncomplicated cystitis, however, can be sent
- Pyelonephritis: diagnosis based on clinical symptoms with or without symptoms of cystitis
  - Urinalysis (either by dipstick or microscopy) and urine culture should be ordered
- Urine culture and sensitivities especially indicated for:
  - Pyelonephritis
  - Cystitis with atypical symptoms
  - If antimicrobial resistance is suspected
  - Symptoms persist or recur within 3 months of treatment

DIAGNOSIS (cont'd)

- Urine collection: use voided midstream clean-catch urine sample
- Urinalysis (by dipstick or microscopy)
  - (+) Leukocyte esterase: detects enzyme released by leukocytes
  - (+) Nitrite: detects *Enterobacteriaceae* (convert urinary nitrate to nitrite). Note: negative result does not rule out UTI, because a UTI can be caused by a non-nitrite producing organism
  - (+) Pyuria: ≥ 10 leukocytes/mL
- Urine culture:
  - $\geq 10^5$ colony forming units [CFU]/mL of pathogenic bacteria from clean-catch or indwelling catheter specimen
  - $\geq 10^2$ CFU/mL of pathogenic bacteria from straight catheter specimen

DIFFERENTIAL DIAGNOSIS

- If UA is negative, but pt is symptomatic, consider other diagnoses:
  - CT/GC urethritis
  - HSV urethritis
  - Vaginitis: yeast infection, trichomoniasis, bacterial vaginosis
  - Pelvic inflammatory disease (PID)
  - Overactive bladder
  - Interstitial cystitis
  - Painful bladder syndrome
  - Nephrolithiasis

TREATMENT OPTIONS FOR CYSTITIS

Antimicrobial Agent	Dose	Adverse Events
Trimethoprim-sulfamethoxazole	160 mg trimethoprim / 800 mg sulfamethoxazole q12h x 3d	Fever, rash, photosensitivity, neutropenia, thrombocytopenia, anorexia, nausea, vomiting, pruritis, headache, urticaria, Stevens-Johnson syndrome, toxic epidermal necrosis
Trimethoprim	100 mg q12 x 3d	Rash, pruritis, photosensitivity, exfoliative dermatitis, Stevens-Johnson syndrome, toxic epidermal necrosis, and aseptic meningitis
Ciprofloxacin	250 mg q12h x 3d	Rash, confusion, seizures, restlessness, headache, severe hypersensitibity, hypoglycemia, hyperglycemia, achilles tendon rupture (in patients > 60 y/o)
Levofloxacin Norfloxacin Gatifloxacin	250 mg q24h x 3d 400 mg q12h x 3d 200 mg q24h x 3d	Same as for Cipro
Nitrofurantoin macrocrystals	100 mg q12h x 7d	Anorexia, nausea, vomiting, hypersensitivity, peripheral neuropathy, hepatitis, hemolytic anemia, pulmonary reactions
Fosfomycin tromethamine	3000 mg once	Diarrhea, nausea, vomiting, rash, hypersensitivity

Treatment of Urinary Tract Infection in Non-pregnant Women. ACOG. March 2008. Reaffirmed 2016.

TREATMENT FOR PYELONEPHRITIS
OUTPATIENT

- Considerations for outpatient management:
  - Mild symptoms
  - Can tolerate PO, no severe nausea/vomiting
  - No evidence of sepsis
  - No underling medical conditions
  - Reliable to follow-up
- Antibiotic choice should be guided by UCx susceptibility results (see next slide), though often when deciding on an initial outpatient management regimen, this information will not yet be available

TREATMENT FOR PYELONEPHRITIS

OUTPATIENT ANTIBIOTICS

- Fluoroquinolones preferred for susceptible pathogens
  - Ciprofloxacin 500 mg BID x 7 days OR
  - Ciprofloxacin XR 1000 mg QD x 7 days OR
  - Levofloxacin 750 mg QD x 5 days
- Alternatives if fluoroquinolone resistance in the community is >10%, if there is known resistance, or pt has hypersensitivity:
  - TMP-SMX DS 160/800 mg BID x 14 days OR
  - β-lactam agents x 14 days (less effective)
- If susceptibility data is not available:
  - **Give initial IV dose of Ceftriaxone (Rocephin) 1 g IV x 1** OR consolidated 24-hr dose of aminoglycoside
  - Alternative: Aztreonam 1 g IV q8-12 hrs

TREATMENT FOR PYELONEPHRITIS
INPATIENT

- Initial management recommendations if not eligible for outpatient management or failed outpatient management:
  - IV fluids, monitor urine output
  - Send UCx, CBC, BMP (trend WBC or electrolytes as necessary)
  - CXR/CT Chest if patient having dyspnea (Risk of ARDS or alternative pathology)
  - Consider renal U/S to r/o obstruction or abscess if symptoms or fevers persists > 24-48 hours after initiation of treatment
  - Again, antibiotic choice should be guided by UCx susceptibility results (see next slide), though often when deciding on an initial management regimen, this information will not yet be available

TREATMENT FOR PYELONEPHRITIS
INPATIENT ANTIBIOTICS

- Ceftriaxone 1-2 g IV q24h OR Cefazolin (Ancef) 1-2 g IV q8h
- If pt remains febrile after 48 hrs, ADD gentamicin 1.5 mg/kg q8h OR Aztreonam 1 g q8-12h
- Can D/C IV abx and start PO antibiotics after patient is afebrile for 24-28h and asymptomatic
  - PO antibiotics: ciprofloxacin, levofloxacin, or TMP/SMX based on susceptibility results often to complete a 14-day course
- Pyelonephritis caused by ESBL strains should be treated with Carbapenem

RECURRENT UTI

- Antimicrobial prophylaxis may be indicated for women with ≥ 2 symptomatic UTIs within past six months or ≥ 3 UTIs over 12 months
- Continuous prophylaxis, postcoital prophylaxis, and intermittent self-treatment all effective in mgmt of recurrent uncomplicated cystitis
- Risk of recurrent pyelonephritis is 6-8% in women
- Common suppressive regimens for cystitis:
  - Cephalexin 250-500 mg once daily at bedtime
  - Nitrofurantoin 50-100 mg once daily at bedtime
- Other strategies: avoid spermicides, postcoital voiding, cranberry juice, and probiotics

RECURRENT UTI (cont'd)

- When are urologic studies (e.g. excretory urography, cystoscopy) indicated?
  - Routine urologic evaluation of young women with recurrent UTIs has NOT been shown to be cost-effective and has a low diagnostic yield. Not likely to affect mgmt
  - Only considered after two recurrences of pyelonephritis or if any complicating factor is identified
    - Spiral CT or renal ultrasound recommended to rule out nephrolithiasis or obstructive uropathy before conducting more invasive studies like cystoscopy

IMPORTANT LINKS / REFERENCES

1. Gupta, K. et al. IDSA Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women. Clinical Infectious Diseases 2011;52(5):e103–e120.
2. Up To Date: Acute uncomplicated cystitis and pyelonephritis in women. 2019.
3. Up To Date: Recurrent urinary tract infection in women. 2019.
4. Angela Anttila, HEALTHCARE ASSOCIATED INFECTION (HAI) MODULE Urinary Tract Infections (UTI). CDC. 2017.
5. Treatment of Urinary Tract Infection in Non-pregnant Women. ACOG. March 2008. Reaffirmed 2016.