

## **Urinary System: Inflammations**

Urinary Tract Infections (urethritis, cystitis)

Pyelonephritis

Renal TB

Glomerulonephritis

## **Urinary Tract Infection (UTI)**

- Most common bacterial infection in women
- May be caused by a variety of disorders
  - Bacterial infection most common
- Bladder and its contents are free of bacteria
- Some have some bacteria colonizing in bladder:
  - Called *asymptomatic bacteriuria*
- \_\_\_\_\_ most common pathogen
- Fungal and parasitic infections may cause UTIs

- **Classification of UTI**

- Upper versus lower

- Upper urinary tract

- Renal parenchyma, pelvis, and ureters
    - fever, chills, flank pain
    - Example: \_\_\_\_\_

- Lower urinary tract

- no systemic manifestations
    - Examples: \_\_\_\_\_

- Urosepsis

UTI that has spread systemically

Life-threatening condition

- **Classification of UTI**

- Complicated versus uncomplicated

- o Uncomplicated UTI

Occurs in otherwise normal urinary tract

Usually only involves

- o Complicated UTI

Coexists with:

Obstruction or stones, Catheters, Abnormal GU tract, Diabetes/neurologic disease, Resistance to antibiotics, immunocompromised, Pregnancy-induced changes, recurrent infection

Complicated infection: r/f pyelonephritis, urosepsis, and renal damage

- Etiology and Pathophysiology

Urinary tract above urethra normally \_\_\_\_\_

Defense mechanisms =

- Complete emptying of bladder
- Ureterovesical junction competence
- Ureteral peristaltic activity
- Antibacterial characteristics:
  - o Acidic pH (less than 6.0)
  - o High urea concentration
  - o Abundant glycoproteins

*\*\*\*\*Alteration of defense mechanisms increases risk of contracting UTI*

- Predisposing factors:

Factors increasing urinary stasis

*Examples:* BPH, tumor, neurogenic bladder

Foreign bodies

*Examples:* catheters, calculi, instrumentation

Anatomic factors

*Examples:* obesity, congenital defects, fistula

Compromising immune response factors

*Examples:* age, HIV, diabetes

Functional disorders

*Example:* constipation

Other factors

*Examples:* pregnancy, multiple sex partners

- Organisms introduced **via ascending route** from urethra and originate in the perineum

-Less common routes

-Bloodstream- originates from injury to urinary tract such as: Obstruction of ureter, Damage from stones, Renal scars

-Lymphatics

- Gram-negative bacilli normally found in GI tract: common cause

Contributing factors:

- Urologic instrumentation  
Allows bacteria to enter urethra or bladder
- Sexual intercourse promotes “milking” of bacteria
- Catheter-associated urinary tract infections (CAUTI)  
Most under recognized and undertreated

- Clinical manifestations

- Range from painful urination in uncomplicated urethritis or cystitis
- To severe systemic illness → abdominal or back pain, fever, sepsis, and decreased kidney function

Lower urinary tract symptoms (**LUTS**) are experienced in BOTH UPPER & LOWER UTI's

Symptoms related to either bladder storage or bladder emptying

**Bladder storage**

- Urinary frequency – more than q2hrs
- Urgency
- Incontinence
- Nocturia
- Nocturnal enuresis

**Bladder emptying**

- Weak stream
- Hesitancy – difficulty starting
- Intermittency – interruption
- Post-void dribbling
- Urinary retention – inability to empty urine
- Dysuria

Flank pain, chills, and fever indicate infection of upper tract:

Significant bacteriuria may have no symptoms or nonspecific: fatigue, anorexia

- In older adults

- Symptoms often absent
- Non-localized abdominal discomfort rather than dysuria
- Cognitive impairment possible
- Fever less likely

- Diagnostic Studies:

- H&P
- Dipstick urinalysis: + nitrites, WBC's, leukocyte esterase (pyuria)
- Urine for culture and sensitivity – determines bacteria susceptibility; HAI; complicated; persistent bacteriuria; frequent UTI's; unresponsive to tx
- Imaging studies: Ultrasound, CT scan (CT urogram) r/o obstruction

- Interprofessional Care: Drug Therapy

- o **Antibiotics**

- Selected on empiric therapy or results of sensitivity testing
- Only tx symptomatic UTI for client with chronic asymptomatic bacteriuria
- First-Choice: *trimethoprim/sulfamethoxazole(Bactrim)*;  
*nitrofurantoin(Macrochantin)*; *fosfomycin (Monurol)*

- Uncomplicated cystitis**

- Short-term course (typically 3 days)

- Complicated UTIs**

- Long-term treatment (7 to 14 days or more)

- Trimethoprim/sulfamethoxazole (Bactrim) abbreviated: TMP/SMX**

- Used to treat uncomplicated or initial UTI
- Advantage: Inexpensive; Taken BID
- Disadvantage: E.coli becoming resistant

- Nitrofurantoin (Macrochantin)**

- Given three or four times a day
- Long-acting (Macrobid) = twice daily
- Avoid sunlight; notify provider: fever, chills, cough, chest pain, dyspnea, rash, or N/T (hepatic dysfunction/neuropathy/interstitial pneumonitis or fibrosis)

- Ampicillin, Amoxicillin, Cephalosporin's**

- Treat uncomplicated UTI

- Fluoroquinolone's**

- Treat complicated UTIs
- Example: ciprofloxacin (Cipro); levofloxacin (Levaquin)

- o **Antifungals**

- Amphotericin or fluconazole (Diflucan)
- UTIs secondary to fungi

- o **Urinary analgesic**

- Phenazopyridine (AZO, Pyridium)

- Used in combination with antibiotics
- Provides soothing effect on urinary tract mucosa
- Stains urine reddish orange

- o Prophylactic or suppressive antibiotics sometimes administered to patients with repeated UTIs; low dose TMP/SMX or other abx on daily basis or a single dose prior to an event likely to cause UTI

- Nursing Assessment: Subjective & Objective data

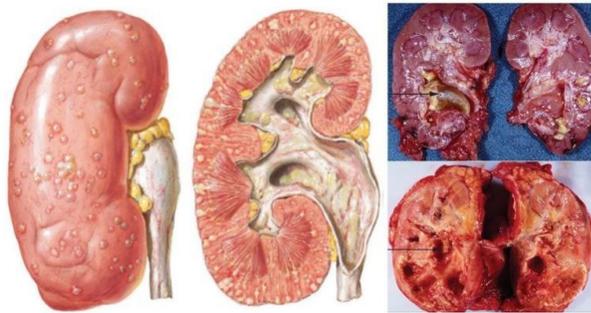
- Health history – previous UTIs, calculi, stasis, retention, pregnancy, STIs, bladder CA; mediations? Antibiotics? Anticholinergics? Antispasmodics? Urologic instrumentation? Urinary hygiene?
  - Experiencing: *nausea, vomiting, anorexia, chills, nocturia, frequency, urgency, pain, spasms, dysuria, burning*
- Objective Data
  - Fever
  - Hematuria, foul-smelling urine, tender, enlarged kidney
  - Dx Findings: Leukocytosis; positive UA for bacteria, WBCs, RBCs, pyuria; ultrasound, CT scan, IVP
- Nursing Diagnoses
  - Impaired urinary elimination
  - Readiness for enhanced health management
  - Acute pain
  - Ineffective health maintenance
  - Risk for urge urinary incontinence
- Health Promotion
  - Recognize individuals at risk
    - Debilitated persons
    - Older adults
    - Underlying diseases
    - Taking immunosuppressive drug or corticosteroids
  - Emptying bladder regularly and completely
  - Evacuating bowel regularly
  - Wiping perineal area front to back
  - Drinking adequate fluids (person's weight in pounds/2) = amount in oz
    - 20% of fluid comes from food
  - Cranberry juice or cranberry tablets
  - Avoid unnecessary catheterization and early removal
  - Aseptic technique
  - Routine and thorough perineal care
  - Answer call lights and offer bedpan or urinal at frequent intervals
  - Prevention of CAUTI
- Prevention of CAUTI
  - Follow aseptic technique
  - Follow CHORUS
  - Hand washing
  - Wear gloves for care of urinary catheters
- Acute Care
  - Adequate fluid intake
  - Avoid potential bladder irritants
  - Application: heat

Instruct about drug therapy and side effects  
Full course of antibiotics  
Second or reduced dosage of a drug may be ordered after initial course in susceptible patients  
Instruct patient to monitor for signs of improvement and decrease in or cessation of symptoms  
Teach patient to promptly report to HCP: persistent LUTS, flank pain, fever

- Ambulatory Care

- Emphasize importance of compliance
- Maintain adequate fluids
- Regular voiding
- Void after intercourse
- Temporarily discontinue use of contraceptive diaphragm
- Instruct on follow-up care
- Recurrence of symptoms: 1-2 weeks after tx

### Acute Pyelonephritis

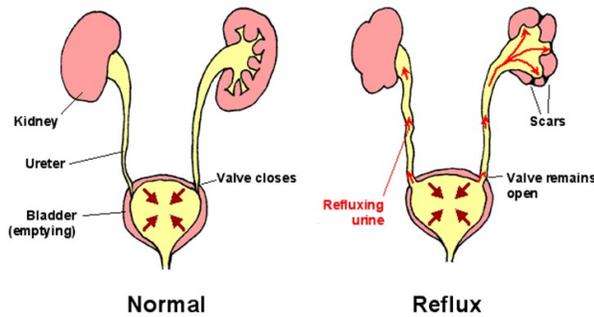


- Etiology and Pathophysiology

- Inflammation of renal parenchyma and collecting system (including the renal pelvis)
- Usually begins with colonization and infection of lower tract via ascending urethral route
- Frequent causes: e.coli; proteus, klebsiella, enterobacter

UROSEPSIS → SEPTIC SHOCK

- Preexisting factor usually present
  - Vesicoureteral reflux
  - Dysfunction of lower urinary tract (obstruction, stricture)
  - CAUTI



Starts in renal medulla → adjacent cortex  
 Leads to: *scarring, poor function, chronic pyelonephritis*

**Clinical Manifestations:**

Mild fatigue, Chills, Fever, Vomiting, Malaise, Flank pain, LUTS, CVA tenderness  
*Manifestations may subside in a few days, even without therapy*

• Diagnostic Studies

- History & Physical examination
  - Palpation for CVA pain
- Laboratory tests
  - Urinalysis (pyuria, bacteriuria, hematuria, WBC casts)
  - Urine for C&S
  - CBC with WBC differential (leukocytosis, increase in bands (immature neutrophils))
  - Blood culture
- Ultrasound (abnormalities, hydronephrosis, abscesses, stones)
- CT urogram (infection, impaired renal function, scarring, chronic pyelonephritis, abscesses)

• Interprofessional Care

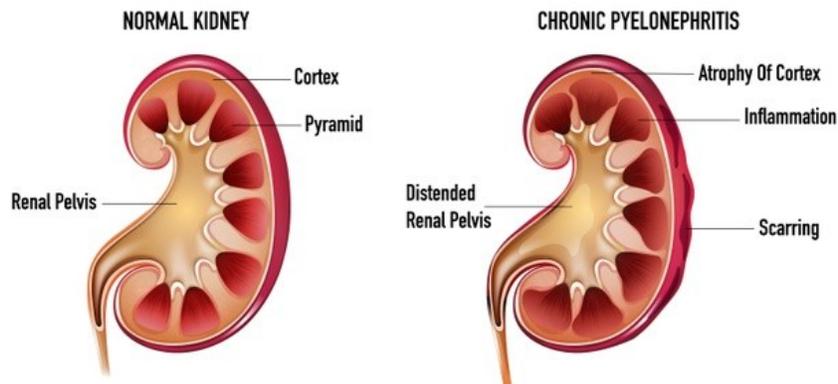
- Hospitalization → severe infections and complications
  - nausea and vomiting with dehydration
- S/sx typically improve within 48 to 72 hours after therapy starts
- Mild s/sx – outpt with abx for 14-21 days
- Drug therapy:
  - Antibiotics (IV inpt)
  - NSAIDs or antipyretic drugs (Fever, discomfort)
  - Urinary analgesics
- Relapses: with 6-week course
  - Antibiotic prophylaxis: for recurrent infection
  - Follow-up urine culture and imaging
- Urosepsis = bacteriuria and bacteremia

## MONITOR VITALS

- Health History (same as UTI)  
Previous UTIs, calculi, stasis, retention, pregnancy, STIs, bladder cancer  
Antibiotics, anticholinergic 's, antispasmodics  
Urologic instrumentation  
Urinary hygiene  
Nausea, vomiting, anorexia, chills, nocturia, frequency, urgency  
Suprapubic or lower back pain, bladder spasms, dysuria, burning sensation on urination
- Objective Data  
Fever  
Hematuria, foul-smelling urine, tender, enlarged kidney  
Leukocytosis; + bacteria, WBCs, RBCs; pyuria; ultrasound, CT scan, and IVP abnormalities
- Health Promotion  
Early treatment for cystitis
- Ambulatory Care  
Medications  
Follow-up urine cx  
Recognition of relapse  
Fluids  
Rest  
Long-term abx

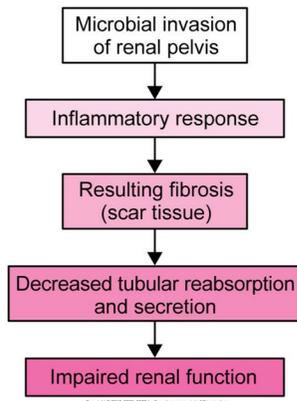
## Chronic Pyelonephritis

### KIDNEY PYELONEPHRITIS



- Slowly progressive disease
- Pathophysiology
  - Kidneys become contracted
  - Number of functioning nephrons decreases & replaced by scar tissue

- Renal insufficiency & renal failure



- Predisposing Factors

- Obstruction
- Neurogenic bladder
- Reflux
- Recurrent UTIs

- HTN

- May be asymptomatic

- Diagnosis

- Radiologic imaging & biopsy (loss of nephrons, fibrosis, inflammation)

- Treatment

- Antibiotics
- Rest
- Control HTN

## **Renal Tuberculosis/GUTB**

- Mycobacterium tuberculosis reaches kidney via blood (from lungs)

- Slow progression

- Large caseating masses → fuse together & destroy kidney tissue

- Clinical Manifestations

- Urinary symptoms, weight loss, low fever, night sweats, flank pain, hematuria, malaise

- Diagnosis

- Urine Culture (mycobacterium)
- IVP – shows extent
- May have + TB skin test

- Treatment

- Combination drug therapy

- *Rifampin, isoniazid, pyrazinamide, ethambutol*

- Surgery: partial or total nephrectomy – if persistent infection; urinary diversion

## **Glomerulonephritis**

- Inflammation of the glomerulus; acute or chronic
- Both kidneys
- With acute, symptoms appear suddenly and may be temporary or reversible

## **Acute Glomerulonephritis**

- APSGN – acute post streptococcal glomerulonephritis
- Usually follows a strep infection of the throat or skin – 1-2 weeks after the initial infection
- Children, young adults, adults > 60
- S/sx: *edema, HTN, oliguria, hematuria, proteinuria*
- TX = Symptomatic relief

## **Chronic Glomerulonephritis**

- End stage of glomerular inflammatory disease
- Proteinuria, hematuria, slow development of uremia
- Diagnosis
  - Health History
  - Abnormal UA, HTN, may or may not have acute infection first
  - US and CT preferred; Bx to determine exact cause
  - Ask about exposure to drugs, immunizations, microbial infections, viral infections- hepatitis, and autoimmune – lupus
- Treatment
  - Depends on cause: dialysis or transplant
  - Antihypertensive's; diuretics, K<sup>+</sup> lowering agents, antacids, CHF medications
  - Bed rest
  - Low protein
  - Avoid infection
  - Anemia
  - Avoid pregnancy
  - CKD treatment

NDx: deficient knowledge; R/F vascular resistance; R/F infection; R/F impaired skin integrity;  
R/F social isolation