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
  - Uncomplicated UTI
    Occurs in otherwise normal urinary tract
    Usually only involves
  - Complicated UTI
    Coexists with:

Obstruction or stones, Catheters, Abnormal GU tract, Diabetes/neurologic disease,
Occurs with:
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:
  - Acidic pH (less than 6.0)
  - High urea concentration
  - 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 bacteruria; frequent UTI's; unresponsive to tx
-Imaging studies: Ultrasound, CT scan (CT urogram) r/o obstruction

- Interprofessional Care: Drug Therapy

  - **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(Macrodantin); 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 (Macrodantin)
      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)

  - **Antifungals**

    Amphotericin or fluconazole (Diflucan)
      UTIs secondary to fungi

  - **Urinary analgesic**

    Phenazopyridine (AZO, Pyridium)
      Used in combination with antibiotics
      Provides soothing effect on urinary tract mucosa
      Stains urine reddish orange

- 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*

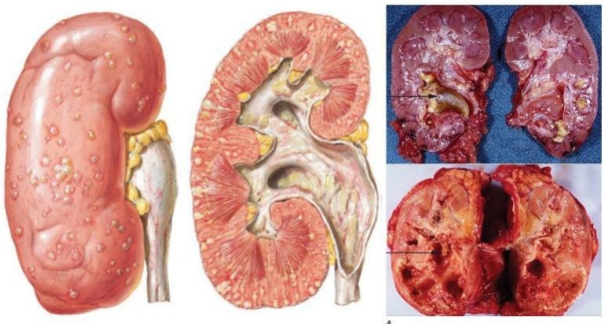
- Objective Data
  -Fever
  -Hematuria, foul-smelling urine, tender, enlarged kidney
  -Dx Findings: Leukocytosis; positive UA for: bacteria, WBCs, RBCs, pyuria; ultrasound, CT scan, IVP
- Nursing Diagnoses
  Impaired urinary elimination
  Readiness for enhanced health management
  Acute pain
  Ineffective 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

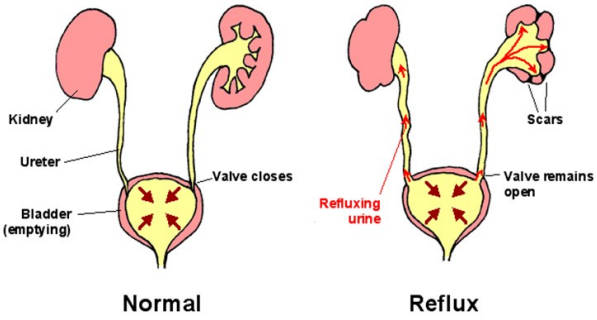


- Etiology and Pathophysiology
    - Inflammation of renal parenchyma and collecting system (including the renal pelvis)
    - Usually begins with colonization and infection of lower tract via ascending urethral route
    - Frequent causes: e.coli; proteus, klebsiella, enterobacter

    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)

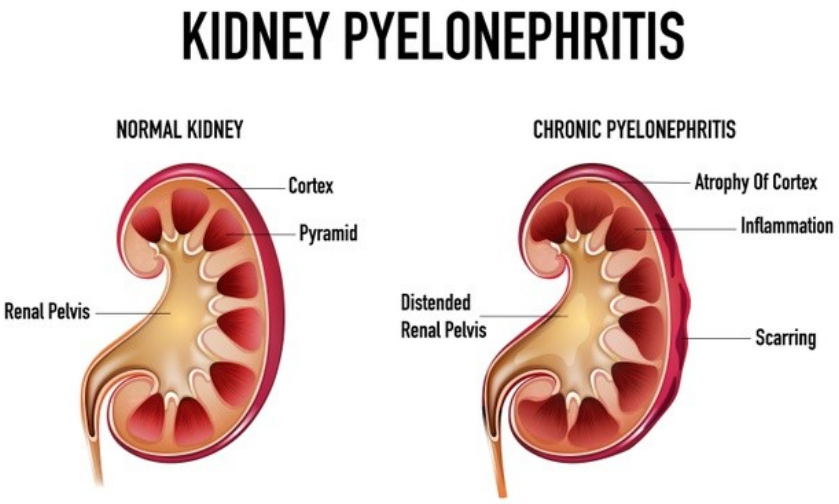
Previous UTIs, calculi, stasis, retention, pregnancy, STIs, bladder cancer
Antibiotics, anticholinergic ’s, antispasmodics
Urologic instrumentation
Urinary hygiene
Nausea, vomiting, anorexia, chills, nocturia, frequency, urgency
Suprapubic or lower back pain, bladder spasms, dysuria, burning sensation 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

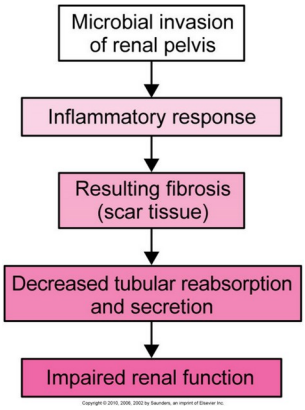
Medications
Follow-up urine cx
Recognition of relapse
Fluids
Rest
Long-term abx

Chronic Pyelonephritis



- 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 (diuretics, antihtn's, restrict protein, abx if infection)

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+ 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