Anatomy and Physiology
• Kidneys, ureters, bladder, and urethra
• Kidneys are responsible for removing waste products from the bloodstream

Anatomy and Physiology
• Ureters are tubules that run from kidney to bladder transporting urine
• Bladder is a muscular organ that holds urine
• Urethra carries urine to outside of body

Anatomy and Physiology
• Urine is normally
  – Clear
  – Slightly yellow to gold
  – Free from sediments
  – Distinct odor but not foul smelling

Anatomy and Physiology
• Urine is normally
  – Specific Gravity is 1.005 to 1.030
  – pH is 6
  – Changes in these values indicate disease
Common Signs and Symptoms

- Urinary Disease
  - Hematuria
  - Pyuria
  - Proteinuria
  - Dysuria

Common Signs and Symptoms

- Urinary Disease
  - Nocturia
  - Oliguria
  - Anuria
  - Frequency/urgency

Diagnostic Tests

- Urinalysis
- Urine culture and sensitivity
- Blood tests including BUN and creatinine clearance
- IVP
- KUB

Diagnostic Tests

- Cystogram
- Cystoscopy
- Bladder and kidney biopsy
- Catheterization

Common Diseases of the Urinary Tract

- Urinary Tract Infections (UTIs)
  - Broad diagnosis covering infections of urinary tract including the urethra, bladder, and kidneys
  - Caused by virus and fungi but most often are bacterial
  - Most common bacteria is escherichia coli (E.coli)

Common Diseases of the Urinary Tract

- Affects females more frequently than males
  - Female urethra is shorter
  - Female urethral opening is closer to rectum
  - Improper female toilet habits
Common Diseases of the Urinary Tract

• Affects females more frequently than males
  – Vaginal secretions may harbor bacteria
  – Sexual intercourse may cause trauma to urethra and bladder leading to inflammation and infection

Common Diseases of the Urinary Tract

• Affects females more frequently than males
  – Pregnant females are more susceptible to infection due to pressure of uterus on urinary tract
  – Male prostatic secretions have antibacterial effect, reducing risk of UTI

Common Diseases of the Urinary Tract

• Diagnosis by urinalysis and culture of urine specimen
  • Treatment is usually antibiotics

Common Diseases of the Urinary Tract

• Urethritis
  – Inflammation of the urethra
  – More common in men
  – Commonly occurs with cystitis
  – Symptoms include swelling of the urethra, dysuria, and urethral discharge

Common Diseases of the Urinary Tract

• Cystitis - Inflammation of the bladder
  • Commonly called “bladder infection”
  • Occurring in females as they become sexually active is “honeymoon cystitis”

• Treatment is antibiotics
  • Antispasmodic medications such as Pyridium may decrease bladder spasms
  • May cause urine to turn reddish orange
Common Diseases of the Urinary Tract

- Pyelitis - Inflammation of pelvis of the kidney
- Result of ascending infection from bladder
- Rapid diagnosis and treatment is imperative to prevent spread of infection

Common Diseases of the Urinary Tract

- Pyelonephritis
  - May be due to an ascending or hematogenous infection and may affect one or both kidneys
  - Symptoms include sudden onset of fever and chills with flank pain and hematuria
  - Treated effectively with antibiotics

Common Diseases of the Kidney

- Glomerulonephritis (Acute)
  - Inflammation of glomerulus or filtering unit of kidney
  - Most common disease of kidney
  - Occurs 1 to 4 weeks after strep infection

Common Diseases of the Kidney

- Glomerulonephritis (Acute)
  - Symptoms
    - Flank pain
    - Fever
    - Loss of appetite

Common Diseases of the Kidney

- Glomerulonephritis (Acute)
  - Symptoms
    - Malaise
    - Eyes and ankles are edematous
    - Oliguria
    - Hematuria

Common Diseases of the Kidney

- Glomerulonephritis (Acute)
  - Treatment
    - Antipyretic
    - Diuretic
    - Salt restriction
    - Protein restrictions
    - Fluid restrictions
Common Diseases of the Kidney

• Glomerulonephritis (chronic)
  – Repeated bouts lead to chronic condition
  – Symptoms include those of acute glomerulonephritis and hypertension
  – Uremia may occur during late stages
  – Treatment includes peritoneal or hemodialysis

Common Diseases of the Kidney

• Hydronephrosis
  – Urine in renal pelvis due to obstruction causing dilation and distention of kidney pelvis
  – Diagnosis is confirmed by pyelogram
  – Treatment includes draining of kidney pelvis by surgery or relief of obstruction

Common Diseases of the Kidney

• Renal Calculi
  – Called “kidney stones”
  – Form in pelvis of kidney
  – Symptoms are hematuria and renal or urinary colic and extreme spasmodic flank pain

Common Diseases of the Kidney

• Renal Calculi
  – Diagnosis confirmed by IVP, KUB, renal ultrasound
  – Treatment is pain medication, increasing fluid intake, strain urine, surgery

Common Diseases of the Kidney

• Polycystic Disease
  – Inherited disease causing enlargement of kidneys due to grape-like cysts
  – Symptoms
    • Lumbar pain
    • Hematuria
    • Recurrent UTIs

Common Diseases of the Kidney

• Polycystic Disease
  – Treatment
    • Management of hypertension and UTIs
    • Dialysis and kidney transplant
  – Slow progressive disease and not curable
Common Diseases of the Kidney

• Renal Failure
  – Failure of kidneys to cleanse blood of waste products
  – BUN and creatinine measure kidney function
  – Can be acute or chronic

Common Diseases of the Kidney

• Renal Failure
  – Symptoms are not significant until 75 percent of kidney function is destroyed

Common Diseases of the Kidney

• Renal Failure
  – Treatment
    • Management of cause of failure
    • Limiting sodium and protein
    • I & O

Common Diseases of the Kidney

• Adenocarcinoma of the Kidney
  – Cigarette smoking is a risk factor
  – Frequently metastasizes to liver, brain, and bone before symptoms appear

Common Diseases of the Kidney

• Adenocarcinoma of the Kidney
  – Symptoms include painless hematuria, flank pain, and fever
  – Diagnosis: KUB, IVP, CT, and biopsy
  – Treatment is nephrectomy, chemotherapy and radiation
Diseases of the Bladder

• Urinary Incontinence - loss of urine flow control
• Types of incontinence
  – Stress
  – Urge
  – Overflow

Diseases of the Bladder

• Treatment of Incontinence
  – Empty bladder
  – Kegel’s exercises to strengthen pelvic muscles
  – Collagen injections near external sphincter to narrow the urethra
  – Marshall-Marchetti-Krantz procedure

Diseases of the Bladder

• Transitional Cell Carcinoma of Bladder
  – Most common neoplasm of urinary tract arising from lining of bladder
  – Diagnosis: cystoscopy and biopsy
  – Treatment depends on stage of tumor, TUR, cystectomy

Trauma

• Straddle Injuries
• Neurogenic bladder

Rare Diseases

• Goodpasture’s Syndrome
• Interstitial Cystitis - nonbacterial cystitis due to inflammation of inner lining of bladder

Effects of Aging on the System

• Urinary incontinence
• Prostatic hypertrophy (older males): dribbling, frequency, pain or burning, and difficulty starting urine flow