1. **Selected Genitourinary Topics**
   - Cystitis
   - Pyelonephritis
   - Glomerulonephritis
   - Renal colic
   - Bladder cancer
   - Urinary diversions
   - Polycystic kidney disease

2. **Types of Cystitis**
   - Inflammation/infection of the urinary bladder
   - Infectious
     - Bacterial (majority of cases E. Coli) viral, fungal, parasitic
   - Non infectious cystitis
     - Radiation, medications, food, drinks, chemicals
   - Interstitial cystitis
     - Rare, idiopathic chronic inflammatory process, not caused by bacteria
   - Asymptomatic bacteruria

3. **Etiology and Contributing Factors**
   - Genitourinary factors
     - Obstruction, calculi, vesicoureteral reflux, incomplete emptying
   - Disease factors
     - Diabetes, cancer, neurological stressors, AIDS, SLE, hormonal imbalance
   - Urine characteristics
     - Alkaline, concentrated urine
   - Environmental factors
     - Instrumentation, sexual activity, hygiene
   - Anatomical factors
     - Maturational age, length of urethra

   Review table 73-1

4. **Pathophysiology**
   - Inflammation, infectious process or irritant entering the sterile environment of the bladder
   - Undiagnosed structural abnormality
   - Abnormal urodynamics
   - Nephritis and sepsis are primary complications

5. **Clinical Manifestations**
   - Dysuria
   - Frequency
   - Urgency
   - Hesitancy
   - Cloudy, malodorous urine
   - Lower abdominal pain
   - Mild fever <101°F, chills, malaise
   - In upper UTI (pyelonephritis) see rapid onset of high fever >102°F, shaking chills, N/V, flank pain
   - In elderly: fever or hypothermia, anorexia, lethargy, mental status changes may be only signs

6. **Labs and Diagnostics**
Nursing diagnoses and PC's

- PC: urosepsis
- PC: pyelonephritis
- Acute pain
- PC: antibiotic therapy adverse effects
- Impaired urinary elimination: Urge incontinence
- Risk for ineffective therapeutic regimen management

Management of Cystitis

- Eradication of infectious agent
  - Antifolates/Sulfonamides
    - Trimethoprim-sulfamethoxazole D.S. (TMP/SMZ, Bactrim). First choice and effective against most UTI pathogens. Check sulfa allergy. Drink large amounts of fluids to prevent sediment and calculi. Do not give Vitamin C; it increases calculi risk.
  - Fluoroquinolones/antimicrobials
    - Ciprofloxacin (cipro) used for pseudomonas and other multi-drug resistant organisms
    - Levofloxacin (levaquin)
  - Cephalosporins - cephalaxin (keflex), duracef
  - Penicillins: amoxicillin, augmentin
  - Urinary antiseptics - Nitrofurantoin (macrorbid)
  - Refer to chart 73-3 in text for further discussion

- Management of Cystitis
  - Acute pain
    - Pain management
      - Bladder anesthetic - Phenazopyridine (pyridium) decreases burning, give with food, turns urine red or orange
      - Antispasmodic
        - Anticholinergic - hyoscamine (anaspaz)
          - Watch for urinary retention
          - Safety issues
        - Increase fluid intake
          - 3-4 L/day, avoiding caffeine, alcohol, tea (bladder irritants).
          - take cranberry juice and Vitamin C to acidify urine
          - Heating pad to abdomen
          - Some sources recommend baths to relieve acute pain

- PC: Urosepsis/Pyelonephritis
  - Assess for s/s of urosepsis: fever <101°F, tachycardia, tachypnea, hypotension, AMS
  - Assess for s/s of pyelonephritis: fever >102°F, shaking chills, N/V, malaise, flank pain
11 Acute and Chronic Pyelonephritis

12 PC: Urosepsis/Pyelonephritis

- Monitor CBC, renal function labs, blood & urine cultures
- Administer antibiotics (outpatient for chronic)
- Administer IV fluids and Monitor intake and output; check for hematuria, cloudy urine (inpatient for acute)
- Observe diet consult
- Bedrest until stable
- Follow up urine cultures
- Assess s/s of septic shock, initiate emergency intervention and consult MD

14 Impaired urinary elimination, Urge incontinence

- Assess urinary elimination pattern
  - Consider intake
- Encourage adequate hydration PO in addition to IV fluids
- Inform client of bladder irritants and how to avoid them
- Reinforce voiding as needed, do not wait
- Provide bladder anesthetics as ordered

15 Risk for ineffective therapeutic regimen management/recurrent UTI

- Teach s/s of UTI, when to call PCP
- Complete the course of medications
- Void when you have the urge
- Empty bladder completely
- 6-8 glasses of fluid per day
- Cleanse perineum, front to back
- Use white toilet paper
- No perfumes to perineal area

16 Risk for ineffective therapeutic regimen management/recurrent UTI

- Void before and after sexual intercourse
- Prophylactic single dose of antibiotics after intercourse if risk of chronic UTI high
- Daily low dose of TMP/SMZ or nitrofurantoin for 6 months or longer for high risk chronic UTI’s
- Showers better than baths
- Aseptic technique during catheterization
- Perineal cleansing around catheter
- Cranberry juice and Vitamin C
Acute Glomerulonephritis

- Inflammatory reaction in the glomeruli, secondary to systemic infections or stressors.
- Molecules formed from antigen-antibody reaction; renal tissue, bacteria, viruses, drugs, toxins lodge in glomeruli and cause injury
- See table 74-2 and 74-3 for systemic stressors/syndromes & infectious causes

Pathophysiology

- Kidneys enlarged, swollen, scarred
- Increased capillary permeability in kidneys
- Decreased GFR
- Azotemia—(elevated protein and BUN) nitrogenous waste products in blood

Collaborative Management: Assessment

- History of recent infection or illness
- Change in urine volume and color
- Fluid overload, s/s often confused with CHF
- Labs and diagnostics:
  - Hematuria, proteinuria
  - 24 hr urine for creatinine clearance shows decreased creatinine and ↓GFR
  - ↑BUN, ↓serum albumin
  - Positive autoimmune inflammatory tests
  - Renal biopsy identifies cell type, tissue deposits and presence of immunoglobulins

Collaborative management Interventions

- Antibiotics based on C & S, and gram stain: Penicillin, erythromycin
- Bed rest, energy conserving measures
- Monitor CMP
- Restrict Na
- ↓ protein if azotemia (↑BUN & protein)
- Loop diuretics, I & O
- Antihypertensive medications
- Corticosteroids for autoimmune inflammation
- Plasmapheresis to remove antibodies
- May need short term dialysis

Recovery phase of Acute Glomerulonephritis

- Diuresis begins 1-2 weeks after onset of symptoms
- Edema and Hypertension subside
- Proteinuria and microscopic hematuria persist for months

Client Education

- Regular check ups
- Report early signs of infection
- Report signs of renal failure: decreased urinary output-N&V, weight gain
- Medication instructions
23 Chronic Glomerulonephritis
- Develops over 20-30 years
- May be caused by acute form or may represent a milder type of antigen-antibody reaction
- Biopsy will show atrophic changes in kidney with greatly reduced functional nephrons
- Same s/s as acute GN, develop slowly
- Treatments same as acute GN, based on assessment of H & P, labs and diagnostics

24 Urolithiasis
- Common stressor
- Calculi formation originating in kidney, travels through ureters causing spasm and pain
- Acute pain referred to as renal colic
- Stone may lodge leading to hydrourerter, hydronephrosis, infection, and permanent kidney damage

25 Urolithiasis
- Precipitators of calculi:
  - Slow urine flow-urine saturates with calcium or other stone forming element
  - Damage to lining of urinary tract
  - Decreased inhibitor substances
  - Hypercalcemia
  - Dehydration
  - Hyperuricemia (gout)
  - Drugs: triamterene, indinavir,diamox
- In this scenario, the rolling stone gathers moss

26 Urolithiasis
- Types of Stones
  - Ca Phosphate or Ca Oxalate comprise 80% of stones
  - Uric Acid
  - Cystine- genetic autosomal recessive.
  - Struvite stones- triple phosphate-Ca, Mag, and Ammonium Phosphate-bacteria

27 Collaborative Management Assessment
- Family or client history of urolithiasis
- Severe pain (Renal colic)
- Urinary obstruction or bladder distension
- Tissue trauma with secondary hemorrhage and infection.
- Renal Colic- originates deep in lumbar region and radiates around the side and down toward the testicle in the male, labia and bladder in the female.
- N/V, diaphoresis 2dry to pain

28 Labs/Diagnostics
- Urine studies
- WBC’s elevated
o Serum Ca. PHOS, Uric acid elevated
o KUB, IVP
o MRI, ultrasound
o Noncontrast helical CT (preferred radiological procedure)

29 Collaborative Management
o Pain management and facilitation of stone passage
  - Toradol
  - Morphine sulfate
  - Calcium channel blockers
  - Procardia relaxes smooth muscle
  - Spasmolytics: Ditropan, Pro-Banthine

o Identification and management of complications
  - Infection- Antibiotics
  - Obstruction
    - Extracorporeal shock-wavelithotripsy (ESWL)
    - Ureteroscopy with ureteral stent placement
    - Percutaneous nephrolithotomy

30 Collaborative Management
o Interventions to prevent recurring stones
  - Medications according to type of stone
    - Thiazide diuretics promote calcium restoration into the body
    - Allopurinol for uric acid stones
    - Allopurinol and Vit B6 for oxalate stones
  - Diet
    - Calcium, uric acid, oxalate restriction according to stone type
    - Avoid excessive salt and protein
    - Increase fluid intake
    - Moderate calcium consumption

31 Collaborative Management
o Nursing priorities
  - Care of client with UTI plus....
  - PC: hydronephrosis/hydroureter
  - Acute pain
  - Risk for ineffective therapeutic regimen management

32 Hydronephrosis/Hydroureter

33 Extracorporeal shock-wave Lithotripsy
o Use of shockwaves to break stones.
  - Client under minimal anesthesia
  - Contraindicated with sepsis, bleeding, obesity (>300lbs) and pregnancy
  - 90% effective

o Complications
  - Perinephric hematoma
  - Assess for severe pain, hypotension post-procedure and notify urologist if present
  - Hematuria and stone fragments
    - Strain all urine
    - Hydrate client

34 Ureteroscopy with stent placement
o Direct visualization for clients who are not candidates for ESWL
o Removes stones and restores patency of ureter

o Potential complications
  - Ureteral wall tears
  - Done in OR
Percutaneous Nephrostomy
- For clients who require drainage of kidney that cannot be done by other means
- Nephrostomy tube placed in kidney and connected to drainage bag
- Monitor for infection, patency, hematuria
- Never clamp nephrostomy tube
- May instill sterile NS, but do not irrigate

Client teaching R/T renal calculi
- Refer to table 73-6 for dietary management
- Refer to chart 73-12 for further teaching with client

Bladder Cancer and Urinary Diversions
- Risk Factors
  - Exposure to cigarette smoke
  - High fat fried food diet
  - Men>Women
  - Pelvic irradiation
  - Use of cytoxan for other cancers
  - Chronic cystitis
  - Pyelonephritis
  - Ureteral and renal calculi
  - Exposure to carcinogens

Collaborative Management Assessment
- Hematuria: slight rusty to bright red in color, first symptom, may be intermittent initially
- Dysuria & gross hematuria
- Obstruction from tumor with inability to void
- Pain during urinating
- Lower back pain

Collaborative Management Assessment
Labs and diagnostics
- Urine cytology
- Cystoscopy
- Biopsy
- IVP, CAT scan, MRI

Collaborative Management
Treatment
- Treatment is according to stage
- Radiation ~radium seed implants
- Chemotherapy instilled intravesically
  - Thiotepa
  - Mitomycin (Mutamycin)
  - Doxorubicin (Adriamycin)
- BCG administered intravesically for 6 weeks
- Systemic chemotherapy
- Systemic chemotherapy
  - Combination of drugs- (CM-VAC Cisplatin, Methotrexate, Vinblastine, Adriamycin) and
Cyclophosphamide -transitional cell type responds poorly.
- Doxorubicin

41 Collaborative Management
Treatment
- Surgical intervention
  - Local resection of tumors-Bladder Fulguration-transurethral resection-TURBT
  - Nephrostomy and insertion of catheter into renal pelvis, urine drains directly from kidney
  - Radical cystoprostatectomy (men) urine diverted
    - Remove the bladder, prostate, seminal vesicles and pelvic lymph nodes
    - Radical cystectomy
  - Anterior pelvic exenteration (women) urine diverted
    - Removal of bladder, urethra, uterus, ovaries and anterior vaginal wall

42 Urinary diversions
The ideal bladder substitute should:
- maintain continence;
- maintain sterile urine;
- warn against overdistention;
- empty completely;
- protect the kidneys;
- prevent absorption of waste products;
- be socially acceptable;
- Allow client to maintain a high quality of life

43 Urinary Diversions for treatment of bladder cancer
- Ureterostomies – single, bilateral, double-barrel (ureterureterostomy)
- Ileal Conduit (ureteroileostomy)
- Colon conduit-pouch
- Ureterosigmoidostomy-void through rectum
- Ureterolilosigmoidostomy-void through rectum

44 Urinary Diversions for treatment of bladder cancer
Complications of incontinent diversions:
- PC: wound infection, dehiscence
- PC: anastomotic leak
- PC: urinary leakage
- PC: ureteral obstruction
- PC: small bowel obstruction
- PC: stomal gangrene.
- Delayed complications- ureteral obstruction, stomal stenosis, pyelonephritis, hydronephrosis and renal calculi.
Assess, monitor, intervene to prevent complications and call physician at earliest sign.
An ounce of prevention is worth a pound of cure
Urinary Diversions for treatment of bladder cancer

Management of incontinent diversions:
- Drainage bag constantly worn.
- Stoma will shrink a little – use appropriate size appliance
- Bag is not changed unless leakage
- Hourly urines in early post-op period
- Urinary stoma smaller than bowel stoma
- Assess stoma for edema, bleeding, irritation and circulation - dark purple indicates impaired circulation.

Urinary Diversions for treatment of bladder cancer

Management of incontinent diversions:
- Inspect peristomal skin
- Proper fitting appliance and high fluid diet
- Alkaline skin crusting - from alkaline urine maintain acid urine to prevent alkaline irritation to skin. Ascorbic acid or cranberry juice (maintain urine ph at 6.5).
- wound infection: redness, drainage, odor
- Increase fluid intake
- Instruct pt to avoid gas forming foods

Urinary Diversions

- Variation of Kock- pouch (orthotopic bladder-ileocystoplasty) Neobladder
  - Pouch attached to uretha
  - Voids through uretha
  - Post-op: foley catheter, suprapubic catheter
  - Adequate output before removal of catheters
  - Performed mostly in men, uretha is spared
  - Some centers are also offering the procedure to females; neourethra with sphincter is created in addition to neobladder. Client has volitional control of urination and voids by Valsalva
  - Mucus production expected

Polycystic Kidney Disease (PKD)

- Fluid filled cysts develop in the epithelial cells of the nephrons of the kidney.
- Cysts can grow very large, affecting kidney function (filtration, reabsorption, secretion)
- Kidney tissue is replaced by non-functioning kidney cysts
- Kidneys can enlarge to 3X normal
- Kidney failure can occur

Etiology-Polycystic Kidney Disease

- Inherited disorder
  - Autosomal dominant trait (most common form). Offspring of parents have 50% chance of inheriting the gene. 100% of these children will develop renal cysts by age 30, and half will develop renal failure by age 50
  - Autosomal recessive trait (rare). To inherit this gene, both parents must carry a copy of the mutated allele and both must be inherited by child. Each child has 1 in 4 chance of inheriting ARPKD
- No way to prevent PKD at present

Clinical Manifestations

Polycystic Disease
Clinical Manifestations
Polycystic Disease cont’d
- Hypertension
- Abdominal and flank pain
- Nocturia -(early sign)
- Dysuria
- Bright red or cola colored urine if cyst ruptures
- Increased abdominal girth

Diagnosis of PKD
- UA-protein in urine, hematuria
- C&S -bacteria
- BUN and Creatinine elevated as kidney function decreases
- 24 hour creatinine clearance-decreases –no creatinine in urine, staying in the blood
- Sonogram, CT scan, MRI

Collaborative Management
Nursing priorities
- Acute pain
- Chronic pain
- Constipation
- Risk for infection
- PC: sepsis
- PC: hypertension
- PC: renal calculi
- PC: renal failure

Collaborative Management
Interventions
- Review chart 74-2 for NIC interventions for clients with renal stressors
- Review plan of care for clients with UTI’s, Cystitis, renal calculi and renal failure, infection, sepsis
- Review plan of care for clients with acute and chronic pain, constipation, and hypertension