

# Chapter 37

## Nursing Care of Patients With Disorders of the Urinary System

# Learning Outcomes

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- Explain the predisposing causes, symptoms, laboratory abnormalities, and treatment of urinary tract infections.
- Explain the predisposing causes, symptoms, treatment, and teaching for kidney stones.
- List risk factors and signs and symptoms of cancer of the bladder.
- List risk factors and signs and symptoms of cancer of the kidneys.

# Learning Outcomes (continued\_1)

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- Discuss nursing care for a patient with an ileal conduit or continent reservoir.
- Explain the pathophysiology and nursing care for diabetic nephropathy, nephrosclerosis, hydronephrosis, and glomerulonephritis.
- Describe the signs and symptoms for patients with acute kidney injury.
- Describe the signs and symptoms for patients with chronic kidney disease.

# Learning Outcomes (continued\_2)

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- Plan nursing care for patients with acute kidney injury.
- Plan nursing care for patients with chronic kidney disease.
- Discuss nursing care for a vascular access site.
- Plan nursing care for patients on hemodialysis.
- Plan nursing care for patients on peritoneal dialysis.

# Urinary Tract Infections (U T I's)

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- Invasion of urinary tract by bacteria
- Urinary tract sterile beyond urethra
- Most common hospital-acquired infection
- Ascends from external urinary meatus
- Most caused by bacterium *Escherichia coli*

# U T I Risk Factors

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- Incomplete bladder emptying
- Contamination in perineal/urethral area
- Instrumentation
- Reflex from faulty valves
- Previous U T I's
- Female anatomy
- Aging changes
- Genital piercing

# U T I Signs and Symptoms

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- Common
  - Urgency, frequency; burning; cloudy, foul-smelling urine; hematuria; pelvic pain
- Older adult: Fatigue, confusion, delirium
- Cystitis: Common + pelvic pain or pressure
- Pyelonephritis: Common + costovertebral tenderness, high fever, chills, nausea/vomiting

# U T I Types

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- Urethritis

- Inflammation due to infection, irritant, trauma of urethra

- Cystitis

- Inflammation due to infection of bladder wall

- Pyelonephritis

- Infection of the kidney(s)



# U T I Complications

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- Urosepsis: Sepsis caused by U T I
- Serious
- Common in older adult

# U T I Nursing Data Collection

- Predisposing factors?
  - Catheter, recent urinary instrumentation, surgery
- Voiding pattern
- Signs/symptoms: Urgency, frequency; burning; foul-smelling urine; hematuria; pelvic pain
- Inspect urine for volume, color, concentration, cloudiness, blood, foul odor.
- Review urinalysis and culture results.

# U T I Nursing Process

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- Nursing diagnoses
  - *Acute Pain*
  - *Impaired Urinary Elimination*
  - *Ineffective Health Maintenance*

# U T I Nursing Process (continued\_1)

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## ■ Nursing care

- Administer antimicrobials as ordered.
- Provide pain control: Heat, urinary analgesic.
- Monitor symptoms.
- Monitor intake and output.

# U T I Nursing Process (continued\_2)

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## ■ Teaching

- Medications: Take all antimicrobial medication.
- Fluids: Increase.
- U T I signs and symptoms: Recognize and report.
- Prevention: Interventions

# Urological Obstructions

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- Obstructed urine flow
  - Always significant
  - Partial or complete
  - Unilateral or bilateral
  - Develops rapidly or slowly
  - Backward pressure damages kidney tissue and can lead to chronic kidney disease
  - Distends kidney (hydronephrosis)

# Urological Obstructions (continued\_1)

## ■ Urethral strictures

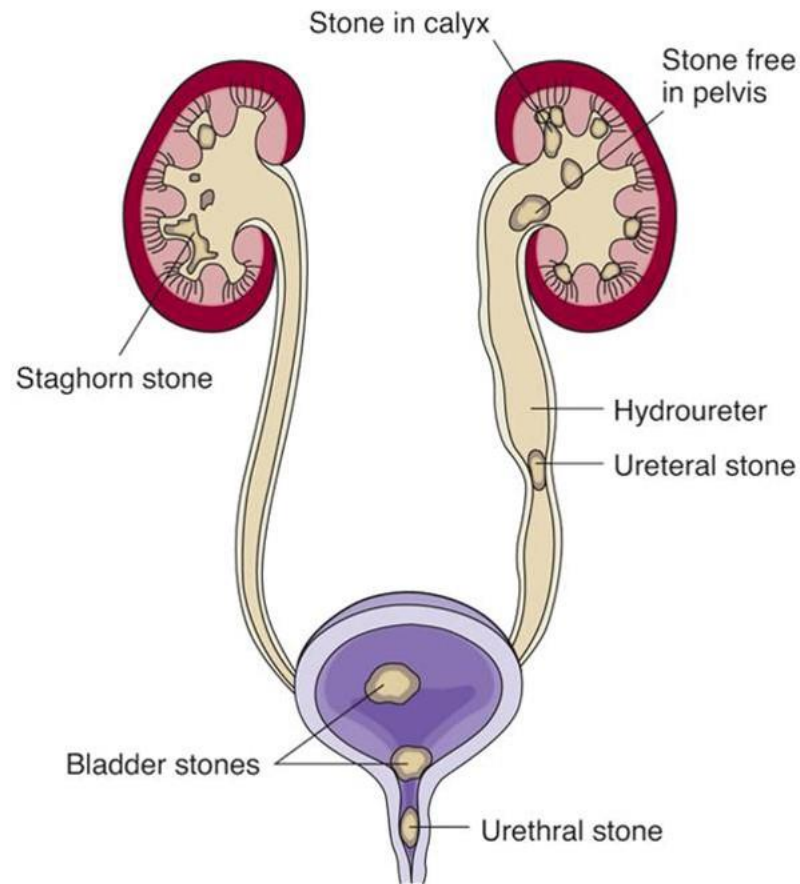
- Urethra lumen narrowing due to scar tissue
- Causes: Injury, sexually transmitted infections, tissue trauma from catheters or surgical instruments, cancer, enlarged prostate
- Incidence: Men greater than women
- Signs/symptoms: Diminished urinary stream, dysuria, frequency, frequent U T I's
- Treatment: Catheterization, urethral dilation, endoscopic urethrotomy, urethroplasty

# Urological Obstructions (continued\_2)

- Renal calculi (urolithiasis)
  - Hard, small stones in urinary tract
  - Calculi is term for stones
  - Nephrolithiasis
    - Kidney stones
  - Ureterolithiasis
    - Ureter stones



# Calculi in Urinary Tract



# Renal Calculi (Urolithiasis)

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## ■ Pathophysiology

- Concentrated urinary salts settle out.
- Stones form in kidney, ureter, or bladder.
- Stones less than 5 millimeters easily passed in urine.
- Larger stones can be painful and require treatment.

# Renal Calculi (Urolithiasis) (continued\_1)

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## ■ Etiology

- Heredity
- Chronic dehydration
- Diet: High sodium, sugar, protein
- Obesity
- Infection

## ■ Incidence: Men greater than women

# Renal Calculi (Urolithiasis) (continued\_2)

- Signs and symptoms
  - Nephrolithiasis
    - Costovertebral angle pain
    - Hematuria
  - Ureterolithiasis
    - Flank, side, or lower abdomen pain
    - Pain radiation to genitalia
    - Intense urge to void
    - Frequency, dysuria, reduced output
    - Hematuria
    - Nausea, vomiting

# Renal Calculi (Urolithiasis) (continued\_3)

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- Signs and symptoms
  - Bladder stones
    - Hematuria
    - Oliguria with obstruction of bladder outlet

# Renal Calculi (Urolithiasis) (continued\_4)

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## ■ Prevention

- Hydration
- Diet
- Exercise

# Renal Calculi (Urolithiasis) (continued\_5)

## ■ Diagnostic tests

- Blood tests: Calcium, uric acid, blood urea nitrogen (B U N), creatinine
- Urinalysis: Hematuria, crystals, urine pH
- Two 24-hour urine collections
- Helical computed tomography (C T) scan
- Renal ultrasound
- Abdominal x-ray
- I V pyelogram

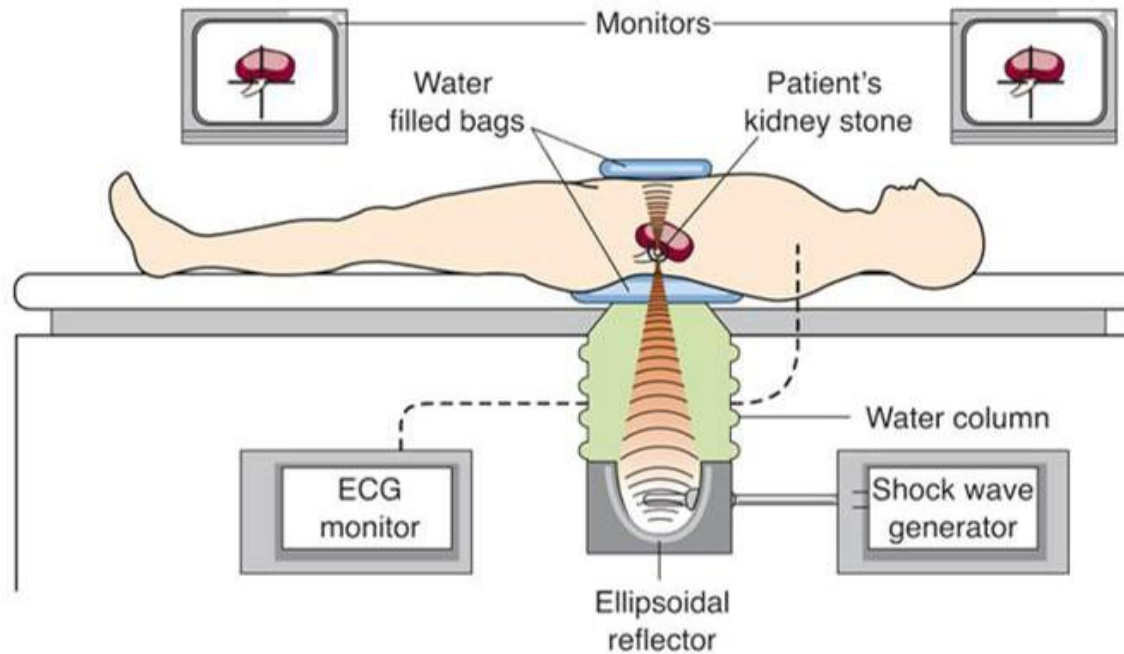
# Renal Calculi (Urolithiasis) (continued\_6)

## ■ Therapeutic interventions

- Small stones
  - Hydration, analgesics, alpha-blocker (Tamsulosin)
- Large stones, symptomatic
  - I V fluids
  - Pain control
  - Thiazide diuretics
  - Allopurinol
  - Lithotripsy: Extracorporeal shock-wave lithotripsy



# Extracorporeal Shock-Wave Lithotripsy



# Renal Calculi (Urolithiasis) (continued\_7)

## ■ Surgery

- Cystoscopy
- Cystolitholapaxy
- Cystotomy
- Ureterolithotomy
- Percutaneous nephrolithotomy
  - Nephrostomy tube
- Nephrolithotomy
- Pyelolithotomy

# Renal Calculi (Urolithiasis) (continued\_8)

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## ■ Complications

- U T I
- Hydroureter
- Hydronephrosis
- Shock
- Sepsis
- Chronic kidney disease

# Renal Calculi (Urolithiasis) (continued\_9)

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- Nursing diagnoses
  - *Acute Pain*
  - *Risk for Infection*
  - *Deficient Knowledge*

# Renal Calculi (Urolithiasis) (continued\_10)

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- Nursing data collection
  - Health history
  - Vital signs, temperature
  - Pain
  - Strain all urine
  - Intake and output
  - Monitor symptoms

# Renal Calculi (Urolithiasis) (continued\_11)

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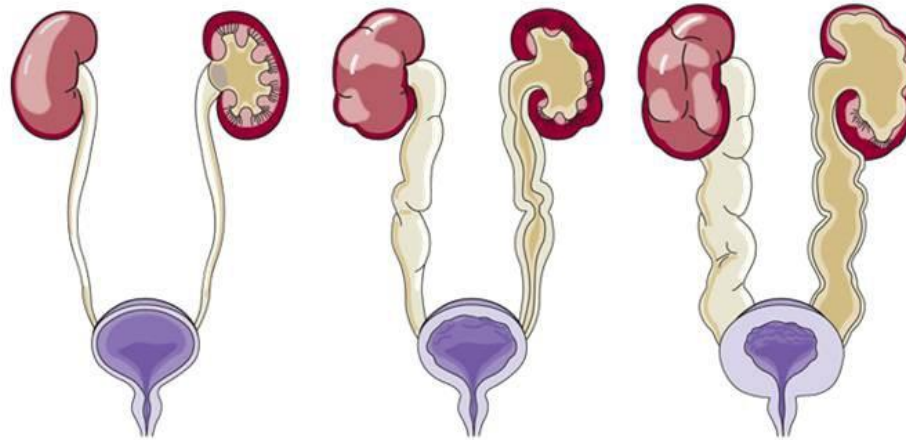
- Nursing care
  - Pain management
  - Strain all urine
  - Hydration
  - Teaching

# Hydronephrosis

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- Obstruction causes urine backup.
- Kidney enlarges as urine collects.
- Pressures in kidney increase.
- Kidney damage possible.
- Treat cause.

# Hydronephrosis (continued\_1)





# Hydronephrosis (continued\_2)

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- Signs and symptoms
  - Frequency
  - Urgency
  - Dysuria
  - Flank and back pain

# Hydronephrosis (continued\_3)

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- Therapeutic interventions
  - Treat cause
  - Urinary catheter
  - Stents
  - Nephrostomy tube
    - Prevent kinking or clamping.
  - Intake and output
    - Record urinary catheter and nephrostomy tube output separately.

# Cancer of the Bladder

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- Most common urinary tract cancer
- Occurs in men more than women
- Commonly ages 50 to 70 years
- Etiology
  - Smoking: Two times the risk
    - Risk increases with each cigarette
  - Industrial pollution

# Cancer of the Bladder (continued\_1)

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## ■ Signs and symptoms

- Early
  - Painless
  - Hematuria
- Late
  - Pelvic pain
  - Lower back pain
  - Dysuria
  - Inability to void

# Cancer of the Bladder (continued\_2)

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## ■ Diagnostic tests

- Urinalysis
  - Telomerase
- Urine for cytology and culture
- Cystoscopy and transurethral biopsy
- I V pyelogram
- C T scan

# Cancer of the Bladder (continued\_3)

## ■ Therapeutic interventions

- Intravesical therapy
  - Chemotherapy
  - Immunotherapy: Bacillus Calmette-Guérin therapy
- Photodynamic therapy
- Surgery
  - Cystoscopy and pyelogram with fulguration
  - Laser
  - Robotic laparoscopic radical cystectomy
  - Urinary diversion

# Cancer of the Bladder (continued\_4)

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- Surgical procedures
  - Incontinent urinary diversion
    - Urostomy (ileal conduit creation)
      - Ileum used as conduit for urine
      - Stoma
      - Ostomy appliance

# Cancer of the Bladder (continued\_5)

- Surgical procedures (continued)
  - Continent urinary diversion
    - Kock pouch
    - Indiana pouch
    - Mainz pouch
    - Florida pouch
  - Orthotopic bladder substitution (neobladder)
    - Studer pouch
    - Hemi-Kock pouch
    - Ileal W–neobladder



# Cancer of the Bladder (continued\_6)

## ■ Nursing care

- Consult wound, ostomy, and continence (W O C) nurse.
- Provide pre-op and post-op care.
- Monitor urine output.
- Assist with body image coping.
- Teach
  - Care of urinary diversion and skin
  - Signs and symptoms of infection

# Cancer of the Kidney

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- Incidence
  - Top 10 cancers of both genders
  - Over age 55
  - Men twice that of women

# Cancer of the Kidney (continued\_1)

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## ■ Risk factors

- Smoking
- Obesity
- Hypertension
- Long-term kidney dialysis
- Exposure to radiation, asbestos, or industrial pollution

# Cancer of the Kidney (continued\_2)

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- Late classic signs and symptoms
  - Hematuria
  - Dull pain in flank area
  - Mass in kidney area

# Cancer of the Kidney (continued\_3)

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## ■ Diagnostic tests

- I V pyelogram
- Cystoscopy and pyelogram
- Ultrasound
- C T scan
- Magnetic resonance imaging (M R I)
- Renal biopsy

# Cancer of the Kidney (continued\_4)

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## ■ Therapeutic interventions

- Surgery
  - Radical nephrectomy
  - Nephron-sparing surgery
- Radiation therapy
- Immunotherapy
- Chemotherapy

# Cancer of the Kidney (continued\_5)

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## ■ Nursing care

- Pre-op and post-op care
- Monitor urine output
- Pneumothorax signs
  - Shortness of breath
  - Diminished breath sounds on affected side
- Education

# Renal Trauma

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- Data collection
  - Injury history
  - Inspection of abdomen and flank area
- Signs and symptoms
  - Bruising, swelling
  - Pain
  - Hematuria



# Renal Trauma (continued)

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- Diagnostic tests
  - Urinalysis, I V pyelogram, ultrasound, C T scan, M R I
- Treat injury
- Nursing care
  - Monitor vital signs, intake and output
  - I V fluids
  - Pain management

# Polycystic Kidney Disease

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- Hereditary
- Multiple cysts in the kidney
- Signs and symptoms
  - Dull heaviness in flank/back
  - Hematuria
  - Hypertension
  - U T I
- Progressive, no treatment

# Diabetic Nephropathy

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- Long-term complication of diabetes
- Most common cause of chronic kidney disease
- Atherosclerotic changes decrease blood to kidney.
- Chronic kidney disease can develop.

# Diabetic Nephropathy (continued)

## ■ Therapeutic interventions

- Early
  - Control blood glucose and blood pressure.
  - Restrict protein in diet.
- Later, as required
  - Dialysis
  - Kidney transplant

## ■ Nursing care

- Teach glucose and blood pressure control.

# Nephrotic Syndrome

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- Large amounts of protein lost in urine
- Increased glomerular membrane permeability
- Serum albumin decreased
- Low albumin causes edema.
- Liver increases L D L and triglycerides in response.

# Nephrosclerosis

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- Hypertension damages kidneys by sclerotic changes.
- Therapeutic interventions
  - Antihypertensives
- Nursing diagnosis
  - *Ineffective Health Maintenance*

# Glomerulonephritis

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- Inflammatory disease of the glomerulus
- Glomerulus more porous
- Antibodies form complexes that damage the basement membrane of the glomerulus.
- Proteins, white blood cells (W B C's), red blood cells (R B C's) leak into urine.

# Glomerulonephritis (continued\_1)

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## ■ Causes

- Acute poststreptococcal infection
- Goodpasture syndrome
- Chronic glomerulonephritis



# Glomerulonephritis (continued\_2)

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- Signs and symptoms
  - Oliguria
  - Hypertension
  - Electrolyte imbalances
  - Edema
  - Flank pain

# Glomerulonephritis (continued\_3)

- Diagnostic tests
  - Elevated creatinine and B U N
  - Urinalysis
    - R B C's, W B C's, protein, casts
  - Ultrasound
  - X-ray
  - Biopsy

# Glomerulonephritis (continued\_4)

- Therapeutic interventions
  - Most cases resolve spontaneously in 1 week
  - Kidney disease treatment
- Nursing care
  - Vital signs
  - Symptom support
  - Rest
  - Fluid, sodium, protein restrictions
  - Education

# Acute Kidney Injury

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- Sudden loss of kidney function
- Azotemia
  - Waste products accumulate
- Oliguric
- May recover if cause removed

# Acute Kidney Injury (continued\_1)

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## ■ Causes

- Prerenal failure
  - Decreased blood supply to kidneys
- Intrarenal failure
  - Damage to nephrons
- Postrenal failure
  - Obstruction

# Acute Kidney Injury (continued\_2)

## ■ Nephrotoxins

- Diagnostic contrast media (dyes)
- Medications
  - I V aminoglycosides, tobramycin (Tobrex), amikacin (Amikin), cisplatin (Platinol)
  - N S A I D's
- Chemicals

# Acute Kidney Injury (continued\_3)

## ■ Prevention

- Check glomerular filtration rate (G F R) and serum creatinine prior to contrast media or nephrotoxic medications.
- Follow protocols to prevent contrast-induced nephropathy.
- Hydrate before/after contrast media.
- Monitor peak/trough levels of nephrotoxic drugs per institutional policy.

# Acute Kidney Injury (continued\_4)

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- Phases

- Oliguric
- Diuretic
- Recovery



# Acute Kidney Injury (continued\_5)

## ■ Therapeutic measures

- Treat cause.
- Supportive treatment
- Dialysis
- Continuous renal replacement therapy
  - Removes fluid/solutes in controlled, continuous manner in unstable patients
  - Better tolerated by unstable patients
  - Blood flows through hemofilter; excess fluids/solutes move into collection bag

# Chronic Kidney Disease

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- Gradual decrease in kidney function
- Irreversible
- Etiology
  - Diabetic nephropathy
  - Hypertension
  - Nephrosclerosis
  - Glomerulonephritis
  - Autoimmune diseases

# Chronic Kidney Disease (continued\_1)

## ■ Pathophysiology

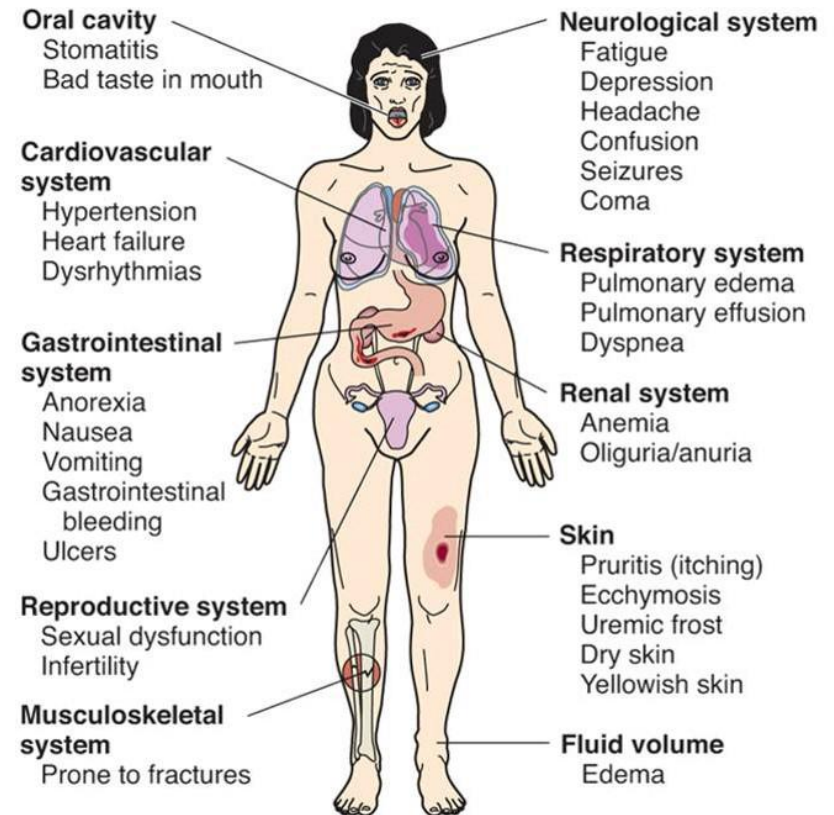
- Large proportion of nephrons damaged
- Progressive
- Renal insufficiency
  - 75% of nephrons lost
- End-stage
  - 90% of nephrons lost
- Uremia
  - Urea in the blood
- Affects all body systems

# Chronic Kidney Disease (continued\_2)

- Signs and symptoms
  - Fluid accumulation
    - Edema, shortness of breath
  - Electrolyte imbalances
    - Elevated potassium, decreased or increased sodium
    - Decreased calcium, increased phosphorus
  - Waste products retained
  - Acid–base imbalances
  - Anemia

# Chronic Kidney Disease (continued\_3)

## Symptoms



# Chronic Kidney Disease (continued\_4)

- Therapeutic interventions
  - Diet
    - High calorie
    - Low protein (unless on dialysis)
    - Low sodium, potassium, phosphorus
    - Increased calcium
    - Vitamins
  - Fluid restriction

# Chronic Kidney Disease (continued\_5)

- Therapeutic interventions (continued)
  - Medications
    - Diuretics
    - Antihypertensives
    - Phosphate binders
    - Vitamin D/calcium supplements
    - Potassium reducers as needed
      - Calcium gluconate I V
      - Insulin/glucose I V
      - Sodium polystyrene sulfonate (Kayexalate) oral, enema
      - Patiromer (Veltassa) oral

# Chronic Kidney Disease (continued\_6)

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- Therapeutic interventions (continued)
  - Dialysis
    - Symptoms of fluid overload
    - High potassium
    - Neurological signs
    - Uremia

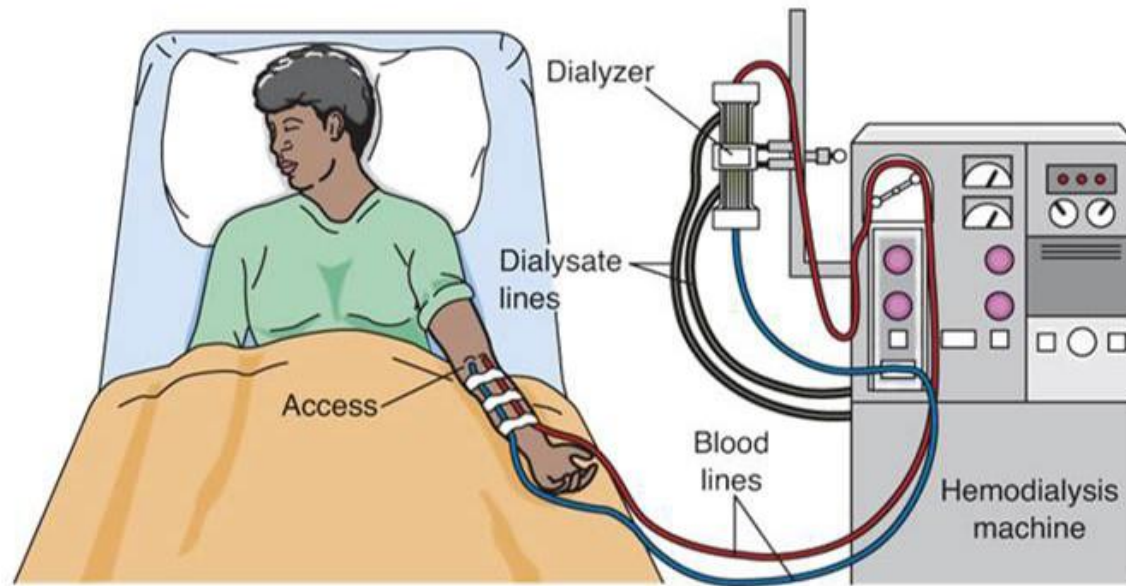


# Hemodialysis

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- Artificial kidney removes waste products and excess water from blood
- Vascular access
  - Temporary
    - Central vein
  - Permanent
    - Arteriovenous fistula
    - Vascular access graft

# Hemodialysis (continued\_1)



# Patient Undergoing Hemodialysis



# Hemodialysis (continued\_2)

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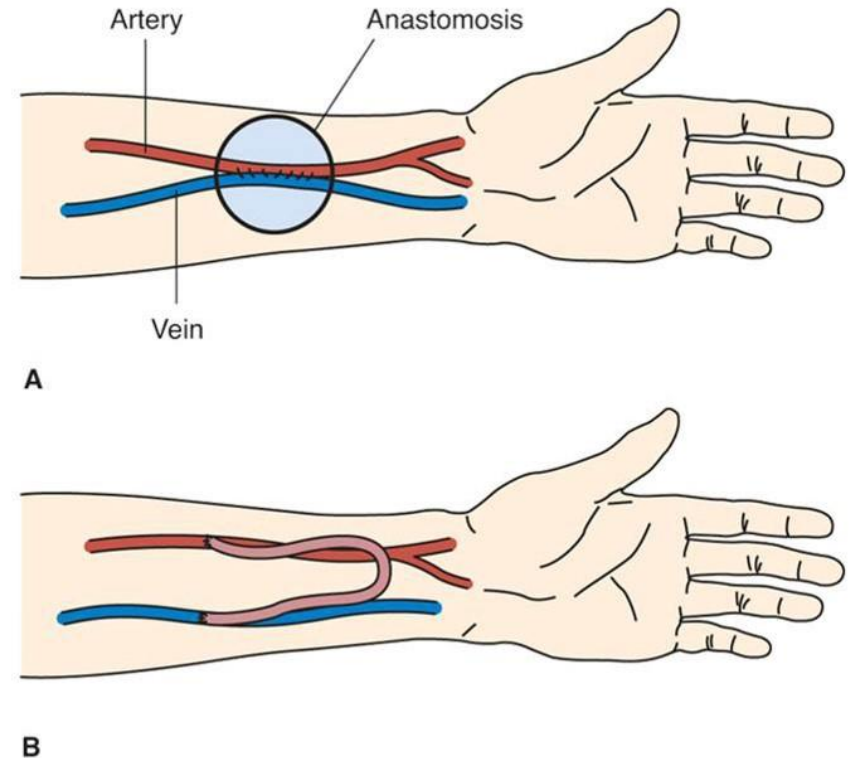
- Permanent vascular access care
  - Postoperative fistula or graft creation
    - NV checks, pain
    - Elevate extremity.
    - Verify thrill, bruit patency.
    - Protect access: No blood pressure, lab draws.
    - Educate patient.

# Hemodialysis (continued\_3)

## ■ Access sites

A. Fistula

B. Graft



# Peritoneal Dialysis

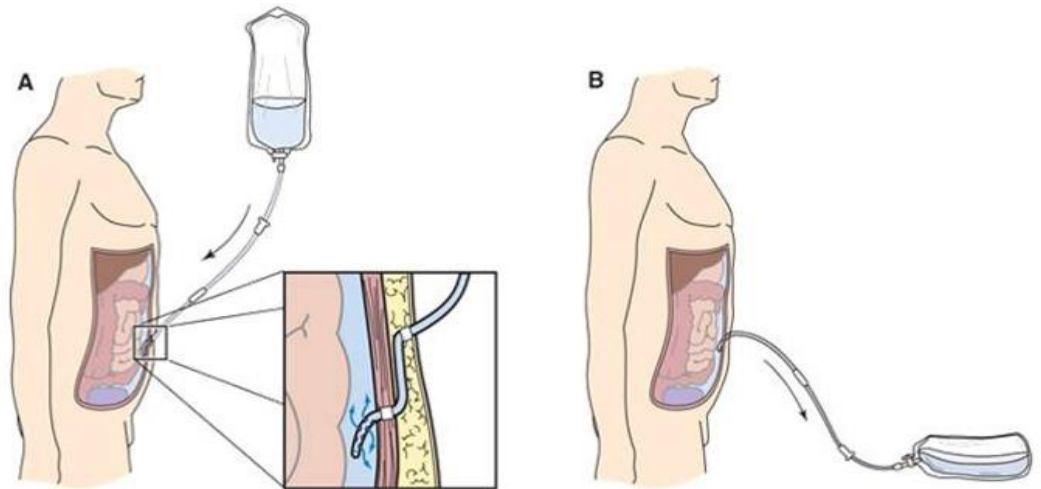
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- Therapeutic interventions
  - Continuous dialysis performed by patient
  - Peritoneal membrane is semipermeable membrane, across which excess wastes/fluids move from blood.
  - Peritoneal catheter
  - Exchange process: Fill, dwell time, drain

# Peritoneal Dialysis (continued)

A. Filling

B. Draining



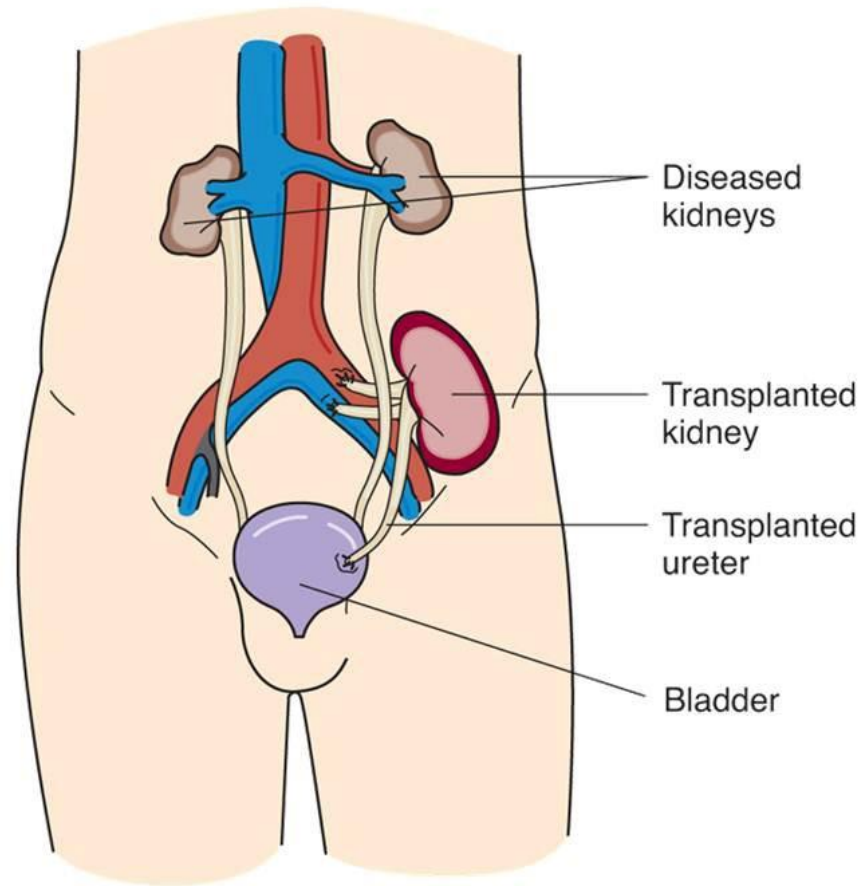
# Kidney Transplant

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- Therapeutic interventions
  - Living-related donor or cadaver donor
  - Antirejection drugs



# Kidney Transplant (continued)



# Chronic Kidney Disease Nursing Diagnoses

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- *Excess Fluid Volume*
- *Impaired Skin Integrity*
- *Activity Intolerance*
- *Risk for Injury*
- *Risk for Infection*
- *Imbalanced Nutrition*

# Chronic Kidney Disease Nursing Care

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- Excess fluid volume
  - Monitor weight.
  - Monitor intake and output.
  - Restrict fluids.
  - Monitor for fluid retention.
- Electrolyte imbalance
  - Monitor levels.
  - Restrict diet.
  - Monitor arrhythmias.

# Chronic Kidney Disease Nursing Care (continued)

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- Waste products
  - Oral care, skin care
  - Lotion
  - Protect from injury
- Impaired hematological function
  - Protect from injury/infection

# Review Question

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**The nurse is collecting data on a patient who has presented to the health care provider's office with a fever. Which of these findings are signs or symptoms of a U T I? Select all that apply.**

1. Dysuria
2. Urgency
3. Frequency
4. Amber urine
5. Ammonia-smelling urine

# Review Question Answer

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Correct Answer: **1, 2, 3**

# Review Question (continued\_1)

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**Which actions are essential for the nurse to take when providing care to a patient with a renal calculi? *Select all that apply.***

1. Limit fluids.
2. Strain all urine.
3. Maintain bedrest.
4. Restrict dairy products.
5. Provide pain relief.
6. Maintain I V hydration.

# Review Question Answer (continued\_1)

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Correct Answer: **2, 5, 6**



## Review Question (continued\_2)

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**Which of these actions should the nurse include in a teaching plan to help prevent or slow progression of diabetic nephropathy?**

*Select all that apply.*

1. Control blood glucose.
2. Control blood pressure.
3. Limit fluids.
4. Restrict protein in diet.
5. Increase insulin dose.

# Review Question Answer (continued\_2)

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Correct Answer: **1, 2, 4**

## Review Question (continued\_3)

**When the nurse is caring for a patient, what is the priority action to prevent acute kidney injury?**

1. Check glomerular filtration rate (G F R) and creatinine prior to contrast media or nephrotoxic medications.
2. Read protocols to prevent contrast-induced nephropathy.
3. Hydrate before/after contrast media.
4. Monitor nephrotoxic drugs trough levels.

# Review Question Answer (continued\_3)

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Correct Answer: **1**

## Review Question (continued\_4)

**Which of these is the nurse's priority during data collection for a patient with a vascular access? *Select all that apply.***

1. Listen for a bruit at the access.
2. Palpate the thrill at the access.
3. Document location of access.
4. Observe bruising at site.
5. Note tenderness at site.

# Review Question Answer (continued\_4)

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Correct Answer: **1, 2**