

## Pre-Lecture

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### I. You are the Provider

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Time: 10 minutes

Small Group Activity/Discussion

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#### **Purpose**

This activity is designed to help introduce your students to the content of this chapter.

#### **Instructor Directions**

1. Direct students to read the “You are the Provider” scenario found throughout Chapter 32.
2. You may wish to assign students to a partner or a group. Direct them to review the discussion questions at the end of the scenario and prepare a response to each question. Facilitate a class dialogue centered on the discussion questions.
3. You may also assign this as an activity and ask students to hand in their comments on a separate piece of paper.

## Lecture

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### I. Introduction

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Time: 5 minutes

Slides: 2–4

Lecture

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#### **A. Urinary System**

1. Two main functions
  - a. Keeps track of the electrolytes, water content, and acids of the blood
  - b. Removes metabolic wastes, drug metabolites, and excess fluids
2. Kidneys
  - a. Perform these functions continuously
  - b. Filter 200 L of blood each day

#### **B. Renal Disorders**

1. Kidney disease
  - a. Affects more than 20 million Americans
  - b. Approximately 50,000 Americans die of kidney disease each year.
  - c. 30,000 require dialysis.

2. Renal calculi
  - a. Kidney stones
  - b. Most common acute renal disease
  - c. 2 million cases diagnosed each year
3. Other common types
  - a. Urinary tract infections
  - b. Enlargement of the prostate

## II. Anatomy and Physiology

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Time: 20 minutes

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Slides: 5–17

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Lecture

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### A. Urinary System

1. Kidneys
  - a. Filter blood and produce urine
  - b. Bean-shaped
  - c. Found in the retroperitoneal space
  - d. Right slightly lower than the left (liver)
  - e. Hilus: cleft where the ureters, blood vessels, lymphatic vessels, and nerves enter and leave the kidney
2. Urinary bladder
  - a. Stores urine until it is released
3. Ureters
  - a. Transport the urine from the kidneys to the bladder
4. Urethra
  - a. Transports urine from the bladder out of the body
5. Renal fascia
  - a. Layer of dense fibrous connective tissue
  - b. Anchors the kidney to the abdominal wall
6. Internal anatomy of the kidney
  - a. Cortex: light-colored outer region closest to the capsule
  - b. Medulla: includes the renal pyramids and renal columns
  - c. Renal pelvis: flat, funnel-shaped tube that fills the sinus at the level of the hilus
  - d. Calyces: branch off the pelvis and connect with the renal pyramids to receive the urine draining from the collecting tubules
7. Cardiac output
  - a. Approximately one fourth of the body's systemic cardiac output of blood flows through the kidneys each minute.
  - b. Afferent arteriole: branches off the abdominal aorta
  - c. Glomerulus: main filter of blood in the kidney; tuft of capillaries

- d. Efferent arteriole: blood flows from the glomerulus
  - e. Peritubular capillaries: tubular resorption occurs
8. Nephrons
- a. Found in the cortex
  - b. Structural and functional units of the kidney
  - c. Form urine
  - d. Composed of the glomerulus, the glomerular capsule, the proximal convoluted tubule (PCT), the loop of Henle, and the distal convoluted tubule (DCT)
  - e. Each kidney contains approximately 1.25 million nephrons.
9. Glomerular capsule
- a. Double-layered cup
  - b. Podocytes: special cells that wrap around the capillaries forming filtration slits
  - c. Glomerular filtration rate (GFR): maintained at a rate of 125 mL/min in healthy adults
10. The loop of Henle
- a. Descending limb: cells permeable to water but impermeable to sodium and chloride ions
  - b. Ascending limb: cells impermeable to water but permeable to sodium and chloride ions
  - c. Vasa recta: series of peritubular capillaries surrounding the loop of Henle
  - d. Countercurrent multiplier: allows the body to produce either concentrated or diluted urine, depending on the body's needs
11. Juxtaglomerular apparatus
- a. Site where the efferent arteriole comes in contact with the DCT
  - b. Releases rennin (enzyme)
12. Hormones
- a. Antidiuretic (ADH): produced by the hypothalamus and stored in the posterior lobe of the pituitary
  - b. Aldosterone: produced in the adrenal glands; increases the rate of active resorption of sodium and chloride ions into the blood
  - c. Diuretics: chemicals that increase urinary output
13. Micturition reflex
- a. Stretching of the bladder wall stimulates nerve impulses
  - b. Spinal reflex that causes contraction of the bladder's smooth muscles, which in turn produces the urge to void as pressure is exerted
14. Female urethra
- a. Exits at the site of the external genitalia
  - b. Shorter than the male urethra (4 cm versus 20 cm)
15. Male urethra
- a. Prostatic: begins at the bladder and extends through the prostate gland
  - b. Membranous: extends from the prostate gland through the abdominal wall and into the penis

- c. Penile: passes through the penis to the external urethral opening

## **B. You are the Provider**

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Slide: 18

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Lecture/Discussion

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1. Present the case study provided on the slide:
  - a. It is 3 AM, and you are dispatched to the residence of a 45-year-old male who is complaining of severe pain in the lower back that radiates to the groin area.
  - b. The scene appears safe, and the patient is conscious, alert, and oriented.

## **III. Pathophysiology**

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Time: 50 minutes

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Slides: 19–28, 30–41, and 43–51

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Lecture

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### **A. Urinary Tract Infections**

1. UTIs
  - a. Usually develop in the lower urinary tract (urethra and bladder)
  - b. Normal flora bacteria enter the urethra and grow.
  - c. More common in women
  - d. In the upper urinary tracts (ureters and kidneys) occur most often when lower UTIs go untreated
  - e. Pyelonephritis: inflammation of the kidney linings
  - f. Abscesses: reduce kidney function
  - g. Severe cases can lead to sepsis.
2. Symptoms
  - a. Painful urination
  - b. Frequent urges to urinate
  - c. Difficulty urinating
  - d. Bladder pain in women
  - e. Prostate pain in men
  - f. Urine may have a foul odor or appear cloudy.

### **B. Renal Calculi (Kidney Stones)**

1. Kidney stones
  - a. Originate in the renal pelvis
  - b. Result when an excess of insoluble salts or uric acid crystallizes in the urine
  - c. Insufficient water intake
  - d. Different types of chemicals, based on the precise imbalance in the urine
2. Calcium stones
  - a. Most common stones
  - b. Occur more frequently in men

- c. May have a hereditary component
- d. Metabolic disorders (gout or hormonal disorder)
- 3. Struvite stones
  - a. More common in women
  - b. Associated with chronic UTI or frequent catheterization
- 4. Uric acid and cystine stones
  - a. Least common
  - b. Uric acid stones tend to run in families.
  - c. Cystine stones are associated with a condition that causes large amounts of amino acids and proteins to accumulate in the urine.
- 5. Pain
  - a. Rated as 11 on a scale of 1 to 10
  - b. Usually starts as a vague discomfort in the flank
  - c. Becomes very intense within 30 to 60 minutes
  - d. May migrate forward and toward the groin
- 6. Patients
  - a. Some will be agitated and restless (walk and move to relieve pain)
  - b. Others will attempt to remain motionless and guard the abdomen
  - c. Palpation of the abdomen difficult
  - d. Vital signs will vary, depending on the severity of pain.
- 7. Stones lodged in lower ureter
  - a. Signs and symptoms of a UTI
  - b. No fever

### **C. Acute Renal Failure (ARF)**

- 1. Acute renal failure
  - a. Sudden decrease in filtration through the glomeruli
  - b. Accompanied by an increase of toxins in the blood
  - c. Accounts for 30% of all ICU patients (5% of all hospitalizations)
  - d. Overall mortality rate of 50%
  - e. Reversible if diagnosed and treated early
- 2. Oliguria
  - a. Urine output drops to less than 500 mL/day
- 3. Anuria
  - a. Urine production stops completely
- 4. Three types
  - a. Prerenal: caused by hypoperfusion of the kidneys (hypovolemia, trauma, shock sepsis, and heart failure)
  - b. Intrarenal: damage to one of three areas in the kidney (glomeruli capillaries and small blood vessels, the cells of the kidney tubules, or the renal parenchyma); damage often caused by immune-mediated diseases, toxins, chronic inflammation of the interstitial cells, or medications

- c. Postrenal: caused by obstruction of urine flow from the kidneys (prostate enlargement, renal calculi, or strictures)

#### **D. You are the Provider (continued)**

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Slide: 29

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Lecture/Discussion

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1. Continue reading the case study provided on the slide:
  - a. The patient states that he was awakened from sleep by pain in his lower back. The patient describes the initial pain level as 4 on a 10 scale.
  - b. You ask where the pain is located now, and the patient states that it is radiating through from the back to the groin area.
  - c. The patient relates a pain level now of 10.

#### **E. Chronic Renal Failure (CRF)**

1. Chronic renal failure
  - a. Progressive and irreversible inadequate kidney function due to permanent loss of nephrons
  - b. Develops over months or years
  - c. More than half caused by systemic diseases (diabetes or hypertension)
  - d. Can also be caused by congenital disorders or prolonged pyelonephritis
2. Nephrons
  - a. Damaged and ceased to function
  - b. Scarring in the kidneys
  - c. Tissue begins to shrink and waste away (further loss of nephrons and renal mass).
  - d. Kidney function diminishes, fluid builds up in the blood.
  - e. Uremia: increased urea and other waste products in the blood
  - f. Azotemia: increased nitrogenous wastes in the blood
3. Signs and symptoms
  - a. Altered level of consciousness due to electrolyte imbalance
  - b. Late stages: seizures and coma are possible
  - c. Lethargy, nausea, headaches, cramps, and signs of anemia
  - d. Skin: pale, cool, and moist
  - e. Jaundice due to buildup of nitrogenous wastes
  - f. Uremic frost: powdery accumulation of uric acid
  - g. Edema in the extremities and face
  - h. Hypotensive and tachycardia

#### **F. Renal Dialysis**

1. Renal dialysis
  - a. Not truly a urologic disorder
  - b. Technique for "filtering" toxic wastes from the blood, removing excess fluid, and restoring the normal balance of electrolytes.
2. Two types

- a. Peritoneal dialysis: large amounts of specially formulated dialysis fluid are infused into the abdominal cavity
  - b. Hemodialysis: patient's blood circulates through a dialysis machine (functions as a normal kidney); shunt (surgically created connection between a vein and an artery that allows blood to flow from the body into the dialysis machine)
  - c. Internal shunt: artificial connection between a vein and an artery that is usually located in the forearm or upper arm
3. Chronic dialysis
    - a. Go "on the machine" every 2 or 3 days for a period of 3 to 5 hours
    - b. Can suffer the same spectrum of illnesses and injuries as any other patients
    - c. Particularly vulnerable to certain problems
      - i. Accidental disconnection from the machine, malfunction of the machine, or rapid shifts in fluids and electrolytes
  4. Hypotension and shock
    - a. Sudden drop in blood pressure
    - b. Patient may feel lightheaded or become confused.
    - c. Shock secondary to bleeding is also possible.
    - d. Leaking shunt
  5. Potassium imbalance
    - a. Inability to excrete ingested potassium
    - b. Prone to developing hyperkalemia
    - c. May present with profound muscular weakness
    - d. On the ECG, peaked T waves, a prolonged QRS complex, and sometimes disappearance of the P waves
    - e. Complete heart block and asystole may occur.
    - f. Hypokalemia: overaggressive dialysis (hypotensive and cardiac dysrhythmias)
  6. Disequilibrium syndrome
    - a. Concentration of urea in the blood is lowered rapidly during dialysis.
    - b. Solute of CSF remains high.
    - c. Water shifts into the CSF, increasing ICP.
    - d. Symptoms: nausea, vomiting, headache, and confusion
    - e. May be impossible to distinguish between disequilibrium syndrome and subdural hematoma
  7. Air embolism
    - a. Loose fittings and connections in the dialysis system
    - b. Symptoms: sudden dyspnea, hypotension, and cyanosis

## **G. Tumor of the Adrenal Gland**

1. Pheochromocytoma
  - a. Tumor of the adrenal gland
  - b. Usually in the medulla
  - c. Causes excess release of the hormones epinephrine and norepinephrine
  - d. Less than 10% malignant (cancerous)

- e. May occur at any age (most common in young to mid-adult life)
- f. Common clinical presentation: hypertension, anxiety, chest pain, abdominal pain, fatigue, weight loss, vision problems, and potentially seizures)

## **H. You are the Provider (continued)**

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Slide: 42

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Lecture/Discussion

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1. Continue reading the case study provided on the slide:
  - a. You inquire about the patient's history. He states that he has no prior history, except gout.
  - b. The patient states that he has a frequent urge to urinate, and he states that the last trip to the bathroom resulted in bloody urine.

## **I. Genitourinary Trauma**

1. Overview
  - a. Blunt or penetrating trauma
  - b. Consider trauma to the GU system whenever a patient has sustained injuries to the lower rib cage, abdomen, pelvis, or upper legs.
2. Kidney
  - a. Seen in less than 5% of all trauma patients
  - b. Generally involve large forces (falls from height, high-speed motor vehicle collisions, or sports-related injuries)
  - c. Blunt renal trauma: kidney compressed against the lower ribs or lumbar spine or when the upper abdomen becomes compressed just below the rib cage
  - d. Contact sports (football, soccer, hockey, boxing, and rugby) are common culprits.
  - e. Presentation: flank pain and hematuria (blood in the urine)
  - f. Penetrating renal trauma: gunshot or stab wounds in the abdomen or lower chest; more likely to be associated with injury to the liver, lung, and spleen
  - g. Prehospital care: basics of abdominal trauma
3. Ureter
  - a. Difficult, if not impossible, to identify in the prehospital setting
  - b. Rarely leads to an immediate life-threatening condition
4. Bladder and urethra
  - a. Often associated with other significant injuries
  - b. Blunt or penetrating trauma may result in bladder rupture or laceration.
  - c. Bladder rupture: associated with a high mortality rate (trauma required to pierce the bladder frequently damages other organs)
  - d. Inability to urinate, blood noted in the penile opening, or tenderness upon palpation of the suprapubic region
  - e. Care follows basic trauma principles.

## **J. Injuries to the Male Genitalia**

1. Testicle and scrotal sac
  - a. Testicles have two layers of covering (tunica albuginea and tunica vaginalis).

- b. Held outside the body in the scrotal sac
  - c. Can be retracted into a more protected position
  - d. Severe injuries rare
  - e. Blunt trauma: motor vehicle collisions, physical assaults, or sports injuries; simple contusions, rupture of the testicle, and torsion of the testicle
  - f. Present following trauma to the thighs, buttocks, penis, lower abdomen, and pelvis
  - g. Do not ignore testicular complaints even in the face of other trauma.
  - h. Penetrating trauma: high suspicion of other associated injuries
2. Penis
- a. Vital for both proper urination and sexual function
  - b. Blunt or penetrating trauma
  - c. Also from sexual behavior and self-mutilation
  - d. Becomes erect when blood fills the corpus cavernosa
  - e. Priapism: painful, tender, persistent erection
  - f. Fractured penis: erect penis is impacted against the partner's pubic symphysis or bent too far via self-mutilation; wall of corpus cavernosa is torn; pain and a large hematoma are the presenting signs and symptoms
  - g. Pediatric population: penile contusions (toilet seat falls unexpectedly); ice packs decrease swelling; may be a sign of abuse
  - h. Penetrating trauma most often from gunshot wounds
  - i. Self-mutilation or amputation of the penis (psychiatric disorders)
  - j. Objects placed around the penis, testicles, or both (can result in incarceration of the organ)

## K. Injuries to the Female Genitalia

- 1. Uterus
  - a. Behind the bladder
  - b. Well-protected within the pelvis
- 2. Vaginal trauma
  - a. Blunt or penetrating trauma or self-inflicted
  - b. May produce contusions to the vulva or labia
  - c. Signs include hematomas and ecchymoses in the lower pelvic area; bleeding from the vagina and tenderness upon palpation of the lower pelvis.
  - d. Self-inflicted trauma reported in female children and in psychiatric patients (insert foreign bodies into their genitalia)

## IV. Assessment

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Time: 10 minutes

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Slides: 52–58

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Lecture

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### A. Overview

- 1. Same as with any other medical patient

- a. Scene size-up, initial assessment, focused history and physical exam, field impression and treatment decision, and perform ongoing assessments en route to the hospital
  - b. May present with similar symptoms to abdominal problems
2. Pain
- a. Often difficult to determine the source of the pain
  - b. Don't waste valuable time trying to determine the exact cause of pain
  - c. Visceral pain: occurs when receptors in the hollow structures become stimulated (ureters, bladder, and urethra); crampy, aching pain
  - d. Referred pain: originates in one area of the body but may be interpreted by the brain as coming from a different area of the body

## **B. Scene Size-up**

1. BSI precautions, consider mechanism of injury, assess for hazards and the need for additional help.
2. General impression
  - a. Reevaluated
  - b. Important to establish your "baseline impression" early in the process

## **C. Initial Assessment**

1. General impression and life-threatening conditions
  - a. Mental status and ABCs
  - b. Extremes of activity (kidney stone dance)

## **D. Focused History and Physical Exam/Detailed Physical Exam**

1. Provide information needed to successfully manage the patient
  - a. 80% of all medical diagnoses are based on the patient's history.
  - b. Determining the origin of the pain
  - c. SAMPLE
  - d. OPQRST
2. Physical exam
  - a. Monitor vital signs.
  - b. ECG because of possible electrolyte imbalances
  - c. Detailed performed en route

## **E. Field Impression and Treatment Plan**

1. Once you have completed the history and physical exam
  - a. Could be as simple as monitoring ABCs
  - b. Or as complex as adjusting medications and support in patients with renal failure
  - c. Includes transport decision

## **F. Ongoing Assessment**

1. Electrolyte imbalances
  - a. Caused by the buildup of toxins
  - b. Can cause major, rapid changes in the functioning of the body's organs

- c. Heart is particularly susceptible to electrolyte changes; cardiac monitoring is essential.

### **G. You are the Provider (continued)**

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Slide: 59

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Lecture/Discussion

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1. Continue reading the case study provided on the slide:
  - a. Vital signs are: BP: 160/100 mm Hg, pulse: 110 beats/min, and respiration 18 breaths/min.
  - b. *What are your suspicions?*
  - c. *What is your treatment plan?*

## **V. Management**

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Time: 5 minutes

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Slides: 60–62

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Lecture

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### **A. Overview**

1. UTI or renal calculi
  - a. Centers on comfort and support
  - b. Allow the patient to assume a position of comfort
  - c. Analgesia may be provided if necessary; don't mask abdominal pain; consult medical control before administering pain medication.
  - d. Establish an IV.
2. ARF and CRF
  - a. Can lead to life-threatening emergencies
  - b. Support of the ABCs is imperative.
  - c. Medications to regulate acidosis and electrolyte imbalance as well as fluids for volume regulation
3. See Table 32-2 Medical Emergencies in Dialysis Patients.

## **VI. Assessment and Management of Specific Emergencies**

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Time: 15 minutes

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Slides: 63–71

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Lecture

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### **A. Urinary Tract Infections**

1. Classic triad of symptoms
  - a. Painful urination
  - b. Frequency of urination
  - c. Difficulty of urination
  - d. Restless and uncomfortable

- e. Skin range from pale, cool, and moist (lower UTI) to warm and dry (upper UTI)
- 2. Management
  - a. Supportive care of the ABCs
  - b. Allow the patient to ride in a position of comfort.
  - c. Be prepared for nausea and vomiting.
  - d. Nonpharmacologic pain management (breathing and relaxation techniques)
  - e. Establish an IV.
  - f. Transport to the nearest appropriate facility for evaluation.

## **B. Kidney Stones**

- 1. Prehospital management
  - a. Centers on pain relief
  - b. Consider analgesia. (Narcotics should not be given if there is a possibility of a gastrointestinal condition).
  - c. Breathing techniques
  - d. Establish an IV line and administer fluids.
  - e. Transport to an appropriate facility with a lithotripsy unit.

## **C. Acute Renal Failure**

- 1. Toxic buildup
  - a. Nitrogenous waste and salts
  - b. Causes impaired mentation, hypotension, fluid retention, tachycardia, and increased PR and QT intervals associated with hyperkalemia
  - c. Skin will be pale, cool, and moist.
  - d. Edema will appear on the extremities and face.
  - e. Abdomen: look for scars, ecchymosis, or distention; palpate for any pulsing masses.
- 2. Metabolic changes
  - a. Can be life-threatening
  - b. Support the ABCs.
  - c. Provide high-flow supplemental oxygen and, if necessary, ventilatory support with bag-mask ventilation.
  - d. Place the patient in the shock position with the feet elevated to increase blood flow to the brain and vital organs.
  - e. Medications can be nephrotoxic; consult with medical control.
- 3. Psychological support
  - a. Talk with your patient.
  - b. Inform him or her of what you are doing and what is occurring.
  - c. Be confident and calm.

## **D. Chronic Renal Failure**

- 1. Assessment
  - a. Altered level of consciousness
  - b. In the late stages, seizures and coma

- c. Lethargy, nausea, headaches, cramps, and signs of anemia
  - d. Skin: pale, cool, and moist; may appear jaundiced; bruising may be present; edema in the extremities and face
  - e. Hypotensive and tachycardic
  - f. ECG monitor will show increasing PR and QT intervals.
2. Management
- a. Support the ABCs.
  - b. Center on the regulation of fluid imbalances and cardiovascular function.
  - c. Be conservative with your treatment plans.
  - d. Transport in a calm manner.

### E. You are the Provider Summary

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Slide: 72

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Lecture/Discussion

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1. Continue reading the case study provided on the slide:
  - a. The patient has a history of gout, but no other problems. Renal calculi are a consideration. You should:
    - i. Consider starting an IV to hydrate the patient and promote movement of the stone.
    - ii. Let the patient assume a position of comfort.
    - iii. Consider analgesia, possibly morphine sulfate or fentanyl.
  - b. Prompt transport to the hospital is indicated.

### F. Summary

1. Anatomy and physiology
2. Pathophysiology
3. Assessment
4. Management

## Post-Lecture

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### I. Prep Kit Activities

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Time: 55 minutes

*Note: This section contains various student-centered end-of-chapter activities designed as enhancement to instructor's preparation. As time permits, these activities may be presented in class. They are also designed to be used as outside homework/activities.*

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#### A. Assessment in Action

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Time: 20 minutes

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Individual/Small Group Activity/Discussion

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#### Purpose

This activity is designed to assist students in gaining a further understanding of the chapter content. This activity allows students an opportunity to analyze an emergency care scenario, develop responses, and integrate what they have learned.

### Instructor Directions

1. Direct students to read the "Assessment in Action" scenario located in the Prep Kit at the end of Chapter 32.
2. Direct students to read and individually answer the quiz questions at the end of the scenario. Facilitate a class review and dialogue of the answers, allowing students to correct responses as may be needed. Use the quiz question answers noted below to assist in building this review.
3. You may also wish to assign these as individual activities and ask students to turn in their comments on a separate piece of paper.

### Answers to Multiple-Choice Questions

*You are dispatched to the home of a 54-year-old man complaining of abdominal pain. When you arrive, you find the patient doubled over in pain, and he states that this began approximately 2 hours ago. It is the worst pain he has ever had, and he tells you that it "burns" when he urinates. His blood pressure is 140/90 mm Hg; pulse rate is 110 beats/min, and respiratory rate is 24 breaths/min. His rhythm on the monitor indicates sinus tachycardia. His pulse oximetry reading on room air is 100%. He has no medical problems and has no allergies.*

1. \_\_\_\_\_ originate(s) in the renal pelvis and result(s) from an excess of insoluble salts or uric acid crystallizing in the urine.
  - A. Gall stones
  - B. Urinary tract infections
  - C. Kidney stones
  - D. Pyelonephritis

**Answer: C.** Kidney stones are due to an excess of salts from insufficient water intake to dissolve the salts. The stones consist of different types of chemicals depending on the imbalance in the urine.

2. The most common type of stone is a:
  - A. struvite stone.
  - B. calcium stone.
  - C. uric stone.
  - D. cystine stone.

**Answer: B.** Calcium stones are more common in men than in women and may have a hereditary link. Calcium stones also occur in patients with a metabolic disorder such as gout or a hormonal disorder. Struvite stones are more often found in women and are usually associated with chronic urinary tract infection or frequent catheterization.

3. If a stone has become lodged in the lower ureter, signs and symptoms of a \_\_\_\_\_ may be present
- A. UTI
  - B. uric event
  - C. URI
  - D. MRSA

**Answer: A.** Signs and symptoms of a urinary tract infection (UTI) may be present (frequency and urgency of urination, painful urination, and hematuria) but the patient will not have a fever. If a kidney stone is present, it is important to obtain both a patient history and a family history.

4. Patients who are experiencing renal problems may exhibit many of the same symptoms as a patient with other abdominal problems. These symptoms include nausea and vomiting, constipation or diarrhea, weight loss, abdominal pain, and:
- A. chest pain.
  - B. headache.
  - C. dizziness.
  - D. back pain.

**Answer: A.** These patients may also experience chest pain. Because pain is a common symptom in both abdominal and urologic ailments, it is often difficult to determine the source of the pain. Your physical exam and focused assessment will help you make this determination.

5. The most common type of pain associated with urologic problems is:
- A. referred pain.
  - B. pain in the urethra.
  - C. visceral pain.
  - D. pain that can be pinpointed to a specific location.

**Answer: C.** Visceral pain usually occurs when receptors in the hollow structures such as the uterus, urinary bladder, and urethra become stimulated. Visceral pain is described as crampy, aching pain deep within the body. It is usually hard to pinpoint the source because there are usually only a few nerve fibers involved in the pain transmission.

6. Pain that may be interpreted by the brain as coming from another area of the body is called:
- A. visceral pain.
  - B. urethra pain.
  - C. pleuralisy.
  - D. referred pain.

**Answer: D.** Referred pain can be used as a diagnostic tool in some urologic and renal diseases. Assessment of urologic emergencies, as with all abdominal emergencies, is

designed to detect and prevent life threats and provide supportive care for the patient. Do not try to determine the exact cause of the pain in the prehospital setting.

### Challenging Questions

*You are dispatched to the high school for a football player who was injured. When you arrive on scene, you find the patient complaining of right flank pain. You find out that the patient was running with the football and was tackled from the side. He was jolted and immediately felt a sharp pain in his side. He thought the pain would subside, but it hasn't. You observe his abdominal area and see a contusion in the right flank region and some bruising near his spine. You provide full c-spine precautions and begin transport to the hospital. His vital signs appear to be within normal limits; however, he is in a great deal of pain.*

7. What do you suspect is wrong with the patient?

**Rationale:** Renal trauma is seen in less than 5% of all trauma patients. The kidneys, as you know, are located on either side of the abdomen in the retroperitoneum and are partially protected by the 11th and 12th ribs. Blood is supplied to the kidneys by the renal arteries. Blunt trauma results when the kidney is compressed against the lower ribs or lumbar spine or when the upper abdomen is compressed just below the rib cage. Contact sports are the common culprits in renal injury. The most frequent presentation of blunt renal trauma is flank pain and blood in the urine (which is not detected until evaluation in the emergency room). You should have a high index of suspicion for renal injuries whenever a patient has obvious hematomas or ecchymoses over the upper abdomen, the lateral aspects of the mid-back, or the lower rib cage.

8. How would you begin treatment of this patient?

**Rationale:** Prehospital care of renal injuries relies on the basics of abdominal trauma. If obvious external abdominal hemorrhage is present, address it. You should begin intravenous hydration in the field per protocol.

### B. Points to Ponder

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Time: 20 minutes

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Individual/Small Group Activity/Discussion

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This activity addresses the affective objectives of the chapter, allowing you to help students probe the more difficult situations that they face. Use this as an opportunity to allow them to express differences of opinion and approach, while directing them to be thorough and decisive in their answers. Encourage challenges.

### Purpose

To allow students an opportunity to apply critical thinking analysis to a given case study.

### Instructor Directions

1. Direct students to read the "Points to Ponder" scenario found in the Prep Kit at the end of Chapter 32.

2. You may wish to assign students to a partner or a group and direct them to review the discussion question at the end of the scenario and prepare a response. Facilitate a class dialogue centered on the discussion point.
3. You may also ask students to complete this activity on their own and hand in their comments on a separate piece of paper.
4. Personally review the scenario and discussion question based on your experience and knowledge as an emergency care professional. Develop your own key points for guiding this discussion.

### Scenario

*You and your partner are dispatched to the dialysis center in your town for an unconscious patient. When you arrive on scene, you find a patient sitting in the chair in the dialysis center and the staff tells you that after the patient received dialysis, he had an episode of syncope. The patient's blood pressure is 80/40 mm Hg; pulse rate, 64 beats/min; respiratory rate, 18 breaths/min; and pulse oximetry reading on room air, 97%.*

Why might a patient who had received dialysis experience syncope?

### Issues

Understanding the Role of the Kidneys, Treating Patients Who Received Dialysis, Understanding Renal Dialysis.

### Discussion

Renal dialysis is a technique for filtering the blood of its toxic wastes, removing excess fluids, and restoring the normal balance of electrolytes. Dialysis can be performed in one of two ways. One is peritoneal dialysis, in which large amounts of specially formulated dialysis fluid are infused into the abdominal cavity. The fluid will stay there for about an hour or two. This type of dialysis is effective, but there is a high risk of peritonitis and aseptic technique is essential. The other type of dialysis, hemodialysis, is performed by circulating the patient's blood through a dialysis machine that functions in very much the same way as normal kidneys.

A sudden drop in blood pressure is not uncommon during or immediately after dialysis. The patient may feel light-headed or confused. Be sure to monitor the ECG for the patient's rhythm as an electrolyte imbalance may occur.

## II. Lesson Review

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Time: 10 minutes

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Discussion

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*Note: Facilitate the review of this lesson's major topics using the review questions as direct questions or overhead transparencies. Answers are found throughout this lesson plan. Each question includes a reference to the slide where the information is covered.*

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1. Name the main components of the urinary system. (Lecture II-A)

2. What is the purpose of the nephrons? (Lecture II-A)
3. What is the term for the filtration rate? (Lecture II-A)
4. Name the three types of kidney stones? (Lecture III-B)
5. Why are UTIs more common in women? (Lecture III-A)
6. What is the most common electrolyte imbalanced in chronic renal failure? (Lecture III-D)
7. Name the most common causes of trauma to the kidney? (Lecture III-G)
8. Describe the importance of IV fluids in UTI. (Lecture VI-A)
9. What treatment is important to consider in cases of suspected kidney stones? (Lecture VI-B)
10. What important issue in ARF should be considered when considering medication use? (Lecture VI-C)

### III. Assignments

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Time: 5 minutes

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Lecture

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1. Review all materials from this lesson and be prepared for a lesson quiz to be administered (date to be determined by instructor).
2. Read Chapter 33: *Toxicology: Substance Abuse and Poisoning* for the next class session.