Objectives

1. Define key terms introduced in this chapter.
2. Explain the importance of knowledge of anatomy and physiology to patient assessment and care (slides 28-39).
3. Define the terms anatomy and physiology (slides 28-40).

Objectives

4. Describe each of the following terms of position (slides 30-34):
   a. Anatomical position
   b. Supine
   c. Prone
   d. Lateral recumbent
   e. Fowler position
   f. Semi-Fowler position
   g. Trendelenburg position
   h. Shock position
Objectives

5. Identify each of the following anatomical terms (slides 35-37):
   a. Midline
   b. Sagittal plane
   c. Frontal plane
   d. Transverse plane
   e. Midaxillary line
   f. Midclavicular line
   g. Anterior and posterior
   h. Dorsal and ventral

   i. Right and left
   j. Superior and inferior
   k. Medial and lateral
   l. Proximal and distal
   m. Plantar
   n. Palmar
   o. Abdominal quadrants: right upper quadrant, left upper quadrant, left lower quadrant, right lower quadrant

Objectives

6. State the function of each of the following musculoskeletal system structures (slide 40):
   a. Skeletal muscle
   b. Tendons
   c. Ligaments
   d. Bone

7. Describe each of the following components of the skeleton, including its location, the bones that make it up, and its function (slides 41-47):
   a. Skull
      i. Cranium
      ii. Face
Objectives

7. Describe each of the following components of the skeleton, including its location, the bones that make it up, and its function (slides 41-47):
   b. Spinal column
      i. Cervical spine
      ii. Thoracic spine
      iii. Lumbar spine
      iv. Sacral spine
      v. Coccyx
   c. Thorax
      i. Sternum (including manubrium, body, and xiphoid process)
      ii. Ribs
   d. Pelvis
      i. Ilium and iliac crest
      ii. Ischium
      iii. Pubis
      iv. Acetabulum
   e. Upper extremities
      i. Clavicle
      ii. Scapula, including acromion process
      iii. Humerus
      iv. Radius
      v. Ulna, including olecranon process
      vi. Carpals
      vii. Metacarpals
      viii. Phalanges
Objectives

7. Describe each of the following components of the skeleton, including its location, the bones that make it up, and its function (slides 41-47):
   f. Lower extremities
      i. Femur
      ii. Patella
      iii. Tibia, including medial malleolus
      iv. Fibula, including lateral malleolus
      v. Tarsals, including the calcaneus
      vi. Metatarsals
      vii. Phalanges

Objectives

8. Demonstrate each of the following joint movements (slide 48):
   a. Flexion and extension
   b. Adduction and abduction
   c. Circumduction
   d. Pronation and supination

9. Describe each of the following types of joints (slide 49):
   a. Ball-and-socket
   b. Hinge
   c. Pivot
   d. Gliding
   e. Saddle
   f. Condyloid

Objectives

10. Differentiate between skeletal (voluntary), smooth (involuntary), and cardiac muscle (slide 55).
11. Identify the basic functions of the respiratory system (slide 56).
12. Identify the following structures of the respiratory system (slides 57-58):
    a. Upper airway: nose, mouth, pharynx, nasopharynx, larynx
    b. Lower airway: trachea, bronchi, bronchioles, alveoli
    c. Epiglottis
    d. Lungs
    e. Pleura
    f. Diaphragm
Objectives

13. Identify important differences in respiratory system anatomy in children (slides 59-60).

14. Describe the basic mechanics and physiology of normal ventilation, respiration, and oxygenation, including (slides 61-65):
   a. Inhalation and exhalation
   b. Use of intercostal muscles and diaphragm
   c. Negative and positive pressure
   d. Nervous system control of respiration
   e. Alveolar/capillary exchange of oxygen and carbon dioxide
   f. Capillary/cell exchange of oxygen and carbon dioxide

Objectives

15. Identify characteristics of both adequate and inadequate breathing (slides 66-67).

16. List the functions of the circulatory (cardiovascular) system (slides 68-69).

17. Describe the anatomy and physiology of the heart to include (slides 70-72):
   a. Location and size
   b. Tissue layers
   c. Chambers
   d. Valves
   e. Blood supply
   f. Blood flow through the heart
   g. Conduction system

Objectives

18. Discuss the anatomy and physiology of the blood, circulation, perfusion, and metabolism to convey basic comprehension of (slides 73-83):
   a. Arteries and arterioles
   b. Capillaries
   c. Veins and venules
   d. Blood composition
   e. Perfusion and capillary exchange
   f. Cell metabolism

19. Describe the basic functions of the nervous system (slide 84).

20. Differentiate between the structural components and basic functions of the central nervous system and peripheral nervous system (slides 84-86).
Objectives

21. Differentiate between the functional divisions of the peripheral nervous system (slide 87):
   a. Voluntary (somatic) nervous system
   b. Involuntary (autonomic) nervous system
      i. Sympathetic division
      ii. Parasympathetic division
22. Describe the basic role of the reticular activating system (RAS) and cerebral hemispheres in consciousness and unconsciousness (slides 88-89).
23. Explain the overall function of the endocrine system (slide 90).

Objectives

24. Discuss the location and general function of each of the following components of the endocrine system (slides 92-93):
   a. Thyroid gland
   b. Parathyroid glands
   c. Adrenal glands
   d. Gonads
   e. Islets of Langerhans of the pancreas, insulin, and glucagon
   f. Pituitary gland
25. Describe the general actions of epinephrine and norepinephrine on beta_1, beta_2, alpha_1, and alpha_2 receptors of the sympathetic nervous system (slide 94).

Objectives

26. List the general functions of the integumentary system (slide 95).
27. Identify the structures of the integumentary system, including the epidermis, dermis, and subcutaneous layer (slide 96).
28. Describe the basic anatomy and physiology of each of the following structures of the digestive system (slides 97-98):
   a. Stomach
   b. Pancreas
   c. Liver
   d. Gallbladder
   e. Small intestine (duodenum, jejunum, ileum)
   f. Colon
Objectives

29. List the basic structure and function of the organs of the urinary or renal system to include (slides 99-100):
   a. Kidneys
   b. Ureters
   c. Urinary bladder
   d. Urethra

Objectives

30. State the basic structure and function of the organs of the male and female reproductive systems (slides 101-102):
   a. Male
      i. Testes
      ii. Accessory glands
      iii. Penis
   b. Female
      i. Ovaries
      ii. Fallopian tubes
      iii. Uterus
      iv. Vagina
      v. External genitalia

Objectives

31. Explain the importance of knowledge of medical terminology in communication among health care team members (slide 103).
32. Apply knowledge of common prefixes, suffixes, and roots to interpret medical terms (slides 104-107).
EMS Unit 108

Respond to Centennial Park on Highland Avenue—you have a female patient at that location who suffered a burn.

Time out 1306

Upon Arrival

• You position the ambulance out of the flow of traffic
• A bystander runs up and says, “A woman was trying to refuel her son’s model airplane and it blew up!”
• The patient is sitting on a patch of grass about 15 feet away from a smoldering model plane

How would you proceed to assess and care for this patient?
Anatomical Terms

Anatomy versus Physiology

How the body is made

How the body works

Anatomical Position

• Standing erect
• Facing forward
• Arms at sides
• Palms forward
Trendelenburg's Position

No longer recommended for shock

Anatomical Planes

Chest Landmarks
Click here to view an exercise on skeletal system labeling.

Return to Directory

Skeletal System Labeling

The Musculoskeletal System

Bone Injury
The Musculoskeletal System

The Muscular System

- Large blood supply
- Severe bleeding
- May produce shock
Skeletal Muscle
- Voluntary
- Movement
- Protection

Cardiac Muscle
- Specialized
- Automaticity
- Intolerant of blood loss

Smooth Muscle
- Involuntary
- Nonstriated
- Found in blood vessels

The Respiratory System

Basic Anatomy

Respiratory Anatomy
The Respiratory System

Anatomy in Infants and Children

Pediatric Differences
The Respiratory System

Adequate and Inadequate Breathing

Back to Objectives
Inadequate Breathing

The Circulatory System

Basic Anatomy
Heart and Major Vessels

Click here to view an animation of the heart and major vessels.

Return to Directory

The Circulatory System

Composition of the Blood
• Red blood cells transport oxygen

• White blood cells are part of your immune system

• Platelets and other clotting factors cause clotting

• Plasma is the liquid part of blood

The Circulatory System

Physiology of Circulation

Perfusion: The delivery of oxygen, glucose, and nutrients to tissue, and the elimination of waste
The Circulatory System

Transport of Gases in the Blood

O₂

- 97% attached to hemoglobin
- 3% dissolved in plasma

CO₂

- 70% converted to bicarbonate
- 23% attached to hemoglobin
- 7% dissolved in plasma
The Circulatory System

Cell Metabolism

Aerobic Metabolism

Anaerobic Metabolism

Cell

O₂ → CO₂ → Acid

The Nervous System

Structural Divisions of the Nervous System
The Nervous System

Functional Divisions of the Nervous System

Central nervous system

Peripheral nervous system

Voluntary Nervous System

Autonomic Nervous System
  • Sympathetic
  • Parasympathetic
The Nervous System

Consciousness and Unconsciousness

Reticular activating system

Hemispheres: Left Right

Unconscious

The Endocrine System
The Endocrine System

Epinephrine and Norepinephrine

Endocrine System Components
Alpha 1
Constricts blood vessels

Alpha 2
Regulates Alpha 1 effects

Beta 1
Increases heart rate, force, and automaticity

Beta 2
Dilates smooth muscle

The Integumentary System (Skin)
Renal/Urinary System

The Reproductive System

Back to Objectives

Reproductive System
Medical Terminology

Medical Words and Word Parts

Combining Forms

cardi/o-
You position the ambulance out of the flow of traffic. A woman runs up to you and says, “A woman over here was trying to refuel her son’s model airplane when the gas tank blew up or something.” Your patient is sitting on a patch of grass about 15 feet away from a smoldering model plane.

**CASE STUDY**

**Upon Arrival**

You position the ambulance out of the flow of traffic. A woman runs up to you and says, “A woman over here was trying to refuel her son’s model airplane when the gas tank blew up or something.” Your patient is sitting on a patch of grass about 15 feet away from a smoldering model plane.

**Critical Thinking Scenario**

- 23-year-old male with multiple stab wounds to the neck, right front chest, and abdomen
- He is screaming in pain

**Vital signs:**
- BP: 88/68 mmHg
- Radial pulse is weak and rapid
- RR: 28 per minute
- Skin is pale, cool, and clammy

**Critical Thinking Questions**

1. What body systems do you suspect could be injured by the knife wounds?
2. Using medical terminology and anatomical terms, give hypothetical examples of how to describe the wounds to the neck, chest and abdomen in a written EMS report.
3. What is causing the elevated heart rate?
Critical Thinking Questions

4. What is causing the skin to be pale, cool, and clammy?
5. What is the significance of the systolic and diastolic blood pressure? How does it relate to pulse pressure?

Reinforce and Review

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