

CHAPTER 4

REVIEW OF ANATOMY AND PHYSIOLOGY

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Abstract

Human body comprises eleven major organ systems functioning synergistically to maintain homeostasis, with intricate relationships necessitating comprehensive understanding for accurate medical coding. Detailed anatomical and physiological descriptions cover major systems including integumentary, musculoskeletal, cardiovascular, respiratory, nervous, digestive, and endocrine systems. Common pathologies ranging from chronic conditions like hypertension and diabetes to acute conditions like pneumonia and fractures are examined alongside their clinical manifestations, characteristic signs, and symptoms aiding diagnosis and coding accuracy. Diagnostic procedures encompass laboratory studies, imaging techniques, and specialized system-specific examinations. Treatment approaches include pharmacological interventions, surgical procedures, therapeutic interventions, and alternative therapies. Understanding interconnected nature of body systems and how conditions affect multiple systems simultaneously proves crucial for precise medical coding. Preventive care measures and screening programs complete a comprehensive framework for understanding human anatomy, pathology, and treatment approaches in medical coding context.

Keywords: *Body systems; Clinical manifestations; Diagnostic procedures; Treatment modalities; Medical coding*

Learning Objectives

After completion of the chapter, the learner should be able to:

- Identify and describe the eleven major body systems and their primary functions in maintaining homeostasis
- Analyze common pathological conditions affecting multiple body systems and their characteristic manifestations
- Differentiate between various diagnostic procedures and their applications in disease identification
- Evaluate different treatment modalities and their appropriate coding requirements
- Apply knowledge of clinical manifestations to accurately interpret medical documentation
- Demonstrate understanding of system interactions and their impact on medical coding decisions.

BODY SYSTEMS OVERVIEW

The human body consists of eleven major organ systems working in concert to maintain homeostasis. Each system performs specific functions while maintaining intricate relationships with other systems. Understanding these relationships proves crucial for accurate medical coding, as conditions often affect multiple systems simultaneously.

Integumentary system

Structure

The integumentary system comprises the skin, hair, nails, and associated glands. The skin consists of three primary layers: epidermis (outer layer), dermis (middle

layer), and hypodermis (subcutaneous layer). Each layer contains specific structures contributing to overall skin function.

Table. Major Body Systems and Their Primary Functions

Body System	Primary Components	Functions	Common Pathologies
Integumentary	Skin, Hair, Nails	Protection, Temperature regulation	Psoriasis, Melanoma
Musculoskeletal	Bones, Muscles, Joints	Movement, Support	Osteoarthritis, Fractures
Cardiovascular	Heart, Blood vessels	Circulation, Transport	Hypertension, CAD
Respiratory	Lungs, Airways	Gas exchange	COPD, Pneumonia
Nervous	Brain, Spinal cord, Nerves	Control, Coordination	Stroke, MS
Digestive	GI tract, Liver, Pancreas	Nutrient processing	IBD, Cirrhosis
Endocrine	Hormone-producing glands	Regulation	Diabetes, Thyroid disorders

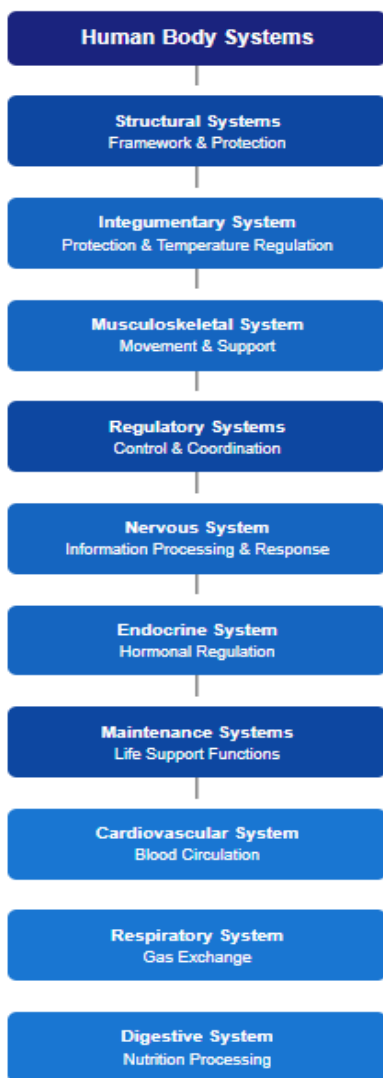
Function

This system provides the body's first line of defense against external threats while regulating temperature and fluid balance. Additional functions include vitamin D synthesis, sensory reception, and protection against ultraviolet radiation. The system's extensive nerve supply enables precise sensory perception of touch, pressure, temperature, and pain.

Clinical Significance

Common conditions affecting this system include infections (cellulitis, dermatitis), inflammatory conditions (psoriasis, eczema), and neoplasms (melanoma, basal cell carcinoma). Understanding the system's structure aids in

accurate coding of depth-dependent conditions and procedures.



Musculoskeletal system

Skeletal Component

The skeletal system consists of 206 bones in adults, providing structural support, protection for vital organs, and sites for muscle attachment. Bones are classified as long, short, flat, or irregular, each type serving specific functions. The skeletal system also includes joints, cartilage, and associated connective tissues.

Muscular Component

Skeletal muscles, comprising approximately 40% of body weight, enable movement through coordinated contraction and relaxation. Muscles attach to bones via tendons, creating lever systems that facilitate precise movement. The system includes over 600 skeletal muscles, each serving specific functions in movement and posture maintenance.

Function

Beyond movement, this system stores minerals, produces blood cells within bone marrow, and protects internal organs. The muscular component generates heat through contraction, contributing to temperature regulation. The system's mechanical properties enable both gross motor movements and fine motor control.

Clinical Significance

Common conditions include degenerative disorders (osteoarthritis, osteoporosis), inflammatory conditions (rheumatoid arthritis), traumatic injuries (fractures, sprains), and neoplasms affecting bones or muscles.

Cardiovascular System

Cardiac Component

The heart, a four-chambered muscular organ, functions as two synchronized pumps. The right side

receives deoxygenated blood and pumps it to the lungs, while the left side receives oxygenated blood and pumps it to the systemic circulation.

Vascular Component

Blood vessels form an extensive network including arteries (carrying blood away from the heart), veins (returning blood to the heart), and capillaries (enabling substance exchange with tissues). The system contains approximately 60,000 miles of blood vessels.

Function

This system transports oxygen, nutrients, hormones, and waste products throughout the body. It plays crucial roles in temperature regulation, pH balance maintenance, and immune system function. The system's pressure-driven flow ensures continuous tissue perfusion.

Clinical Significance

Common conditions include hypertension, coronary artery disease, heart failure, and various arrhythmias. Understanding cardiovascular physiology proves essential for coding both acute conditions (myocardial infarction) and chronic processes (atherosclerosis).

Respiratory system

Upper Respiratory Tract

Comprises the nose, pharynx, and larynx, responsible for air conditioning, filtering, and voice production. These structures prepare inspired air for lower respiratory tract passage.

Lower Respiratory Tract

Includes the trachea, bronchi, bronchioles, and alveoli. The bronchial tree progressively branches, terminating in alveoli where gas exchange occurs. Approximately 300 million alveoli provide extensive surface area for gas

exchange.

Function

Primary functions include oxygen delivery to blood and carbon dioxide removal. Additional functions include pH regulation, voice production, and filtering of environmental particulates. The system maintains precise control over respiratory rate and depth through complex feedback mechanisms.

Clinical Significance

Common conditions include chronic obstructive pulmonary disease (COPD), asthma, pneumonia, and various respiratory infections. Understanding respiratory physiology aids in coding both acute and chronic respiratory conditions.

Nervous System

Central Nervous System

Consists of the brain and spinal cord, serving as the primary control center for body functions. The brain contains approximately 86 billion neurons, enabling complex information processing and coordination.

Peripheral Nervous System

Includes cranial and spinal nerves connecting the central nervous system with peripheral structures. This system divides into somatic (voluntary) and autonomic (involuntary) components.

Function

Controls and coordinates body functions through electrical and chemical signaling. Functions include sensory processing, motor control, cognitive functions, and autonomic regulation.

Clinical Significance

Common conditions include strokes, seizure

END OF PREVIEW

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