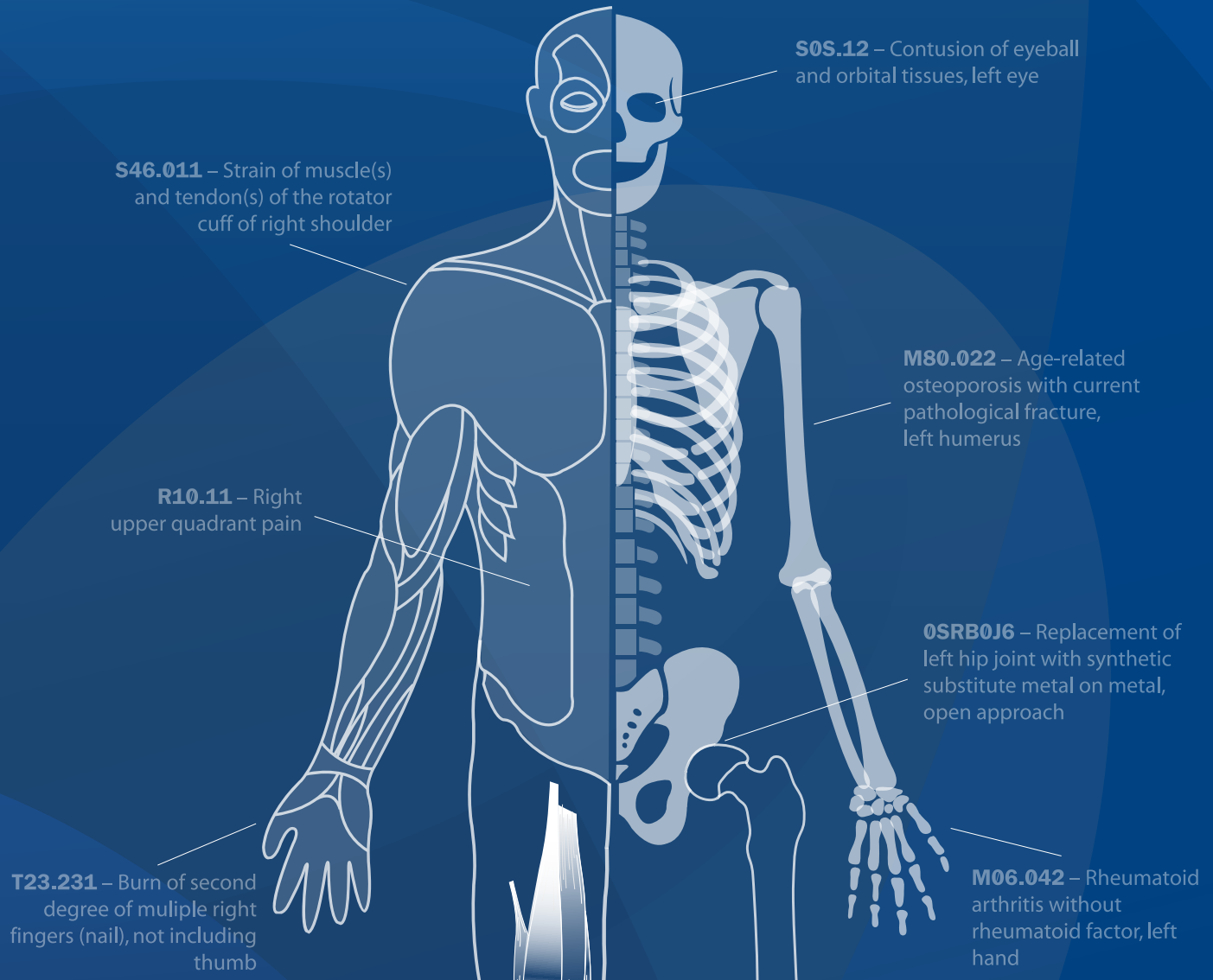


Advanced Anatomy and Physiology for **ICD-10-CM/PCS**

An essential resource for diagnostic and procedural coding



2011

INTRODUCTION

The *Advanced Anatomy and Physiology for ICD-10-CM/PCS* is designed to introduce medical coders to the new ICD-10-CM/PCS system, the differences between ICD-9-CM and ICD-10-CM, and additionally to provide a more advanced understanding of body systems, diseases/disease processes, and anatomy.

Each chapter in this book contains a systemized approach to learning. Course objectives begin each chapter followed by an overview of the given chapter topic. A thorough discussion provides the reader with the specifics of advanced coding in ICD-10-CM and how it relates to the ICD-9-CM system. Official Coding Guidelines for both coding systems are listed side-by-side to allow easy comparison of similarities and changes. Questions are provided to evoke thoughtful consideration of effective coding. Additionally, chapter-specific terminology are defined to foster greater learning. A quiz ends each chapter allowing the reader to test their knowledge. Quiz answers can be found on the following web site: www.contextodata.com/API10/

Refer to the end of this chapter for a detailed summary of the organization of this book.

Course Objectives

This course is designed to provide:

- A solid foundation in basic human anatomy and physiology
- A review of each body system with in-depth information on cells, tissues, and organs that comprise each body system
- In-depth information on the function of cells, tissues, organs, and body systems and the roles they play in maintaining homeostasis and health
- An overview of diseases and disease processes specific to each body system
- A discussion of the effects of diseases and disease processes on multiple body systems
- Information on multi-system diseases and disease processes
- Advanced medical terminology specific to each body system
- The relations between anatomy and physiology and code capture in diagnosis and procedure coding
- New anatomical and physiological documentation requirements for code capture in ICD-10-CM and ICD-10-PCS

Overview

Developing an understanding of anatomy and physiology from a coding perspective is one challenge coders face. Most anatomy and physiology courses begin with general information on structural organization and function beginning with an overview of the chemical level (atoms and molecules), cellular level, tissue level, organ level, and proceed to the body system level. Even after taking introductory anatomy and physiology courses, many coders have difficulty identifying the correct diagnosis or procedure code. This difficulty is due to a number of factors, not the least of which is the organization of the coding systems themselves.

Diagnostic and procedural coding systems are not organized in the same fashion as most anatomy and physiology texts. Instead, diagnostic coding systems are organized by the disease or disease process which may sometimes be found under a body system but may also be found under different designations such as neoplasms, infections, or signs and symptoms. CPT procedure codes are organized by type of service or procedure (e.g., evaluation and management, surgical, radiological, etc) and then depending on the section may be organized by body system (surgical section), physician specialty (medicine section), or more specific types of service (radiology section). ICD-9-CM Volume 3 was organized by the body system on which the procedure was performed, but because the available code numbers in some body systems were exhausted years ago, some new procedures on specific body systems are listed in the tabular sections under *Procedures and Interventions Not Elsewhere Classified* or *Miscellaneous Procedures*. ICD-10-PCS is organized in sections for the general type of procedure performed (e.g., Medical/Surgical, Obstetrics, Placement, Administration, etc.), then by body system, root operation, body part, approach, device, and qualifier.

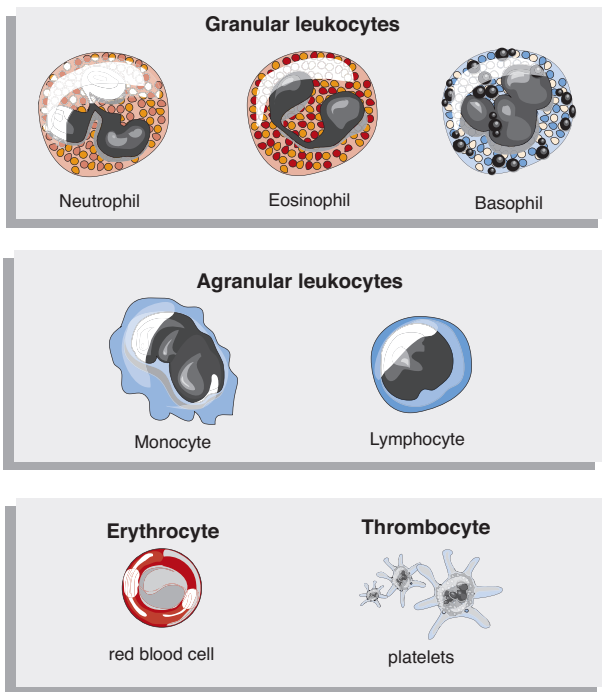
In this course, each body system will be covered in a separate chapter with the chapter objectives identified at the beginning. The chapters will first discuss pertinent information starting at the chemical level and then progress through each level to the body system level. Both structure and function will be discussed. Within each chapter, the diseases, disease processes, conditions, and symptoms related to the body system will be discussed.

Specific medical terminology required to identify diagnosis and procedure codes correctly will be reviewed. New documentation requirements needed to capture codes in ICD-10-CM and ICD-10-PCS will also be covered. Each chapter will end with a

building blocks for all blood cell types. Each type of blood cell goes through a maturation process of two or more stages as follows:

- Primitive reticular cell ->
 - Hemocytoblast ->
 - Rubriblast -> Prorubricyte -> Rubricyte -> Normoblast -> Reticulocyte -> Erythrocyte
 - Myeloblast ->
 - Basophil
 - Eosinophil
 - Neutrophil
 - Megakaryoblast -> Megakaryocyte -> Thrombocytes (platelets)
 - Lymphoblast -> Lymphocytes
 - Monoblast -> Monocytes

Blood cells



Erythrocytes

Erythrocytes, more commonly referred to as red blood cells, are shaped like a biconcave disc. They are simple in structure, lack a nucleus, and cannot reproduce or carry on complex metabolic activities. The interior of the cells is composed of cytoplasm, protein, lipids, and hemoglobin. Hemoglobin constitutes approximately 33 percent of the total cell volume. This is the red pigment that gives blood its red color.

The function of erythrocytes is to carry oxygen from the lungs to body tissues. The hemoglobin molecule is composed of a protein called globin and a pigment called heme that contains iron. Erythrocytes circulate through the lungs and the four iron atoms in the hemoglobin each combine with a

molecule of oxygen. The oxygen is then transported from the lungs to other tissues where the iron atoms release the oxygen which is diffused into interstitial fluid. The globin portion of hemoglobin then combines with a molecule of carbon dioxide which is transported from the tissue and released in the lungs.

Red blood cells have a short life span, becoming nonfunctional in about 120 days. This means that red blood cells must continually be produced. This process occurs in the bone marrow. Any disease of the bone marrow can affect the number of circulating red blood cells. Any time the number of functional red blood cells is reduced, or the hemoglobin content of the red blood cell is below normal, a condition called anemia results. Anemia has many causes including lack of iron intake in food, amino acid deficiencies, or vitamin B₁₂ deficiencies.

Leukocytes

Leukocytes, more commonly referred to as white blood cells, differ from red blood cells in a number of respects. These differences are as follows:

- The cell has a nucleus
- The cell does not contain hemoglobin
- There is more than one type of leukocyte
- Only granular leukocytes are produced in the bone marrow
- Agranular leukocytes are produced in lymphatic tissue
- There are three types of granular leukocytes – neutrophils, eosinophils, and basophils
- There are two types of agranular leukocytes – lymphocytes and monocytes
- Each type of leukocyte performs specific functions

The primary function of leukocytes is to fight infection and inflammation. Most leukocytes are able to move through small spaces between the cells that form blood vessels and through connective and epithelial tissues to reach the site of an injury or the site where a pathogenic microorganism has invaded the body causing an infection. This type of movement, called diapedesis, is the same type of movement exhibited by amoebas.

Some leukocytes are phagocytic which means that they can ingest bacteria and dispose of dead matter. Other leukocytes, specifically lymphocytes, fight infection by producing antibodies. Antibodies are proteins that inactivate antigens. Antigens are any type of protein that the body cannot synthesize or make on its own. This means that antigens are a type of foreign substance. Lymphocytes respond to antigens by making antibodies that deactivate the antigen so that it is incapable of harming the body. This is called an antigen-antibody response.

1. Diseases of Blood/ Immune System

Diseases, Disorders, Injuries, and Other Conditions of the Blood, Blood Forming Organs, and Immune Mechanism

This section looks at a variety of diseases, disorders, injuries, and other conditions involving the blood and blood forming organs, and certain conditions of the immune mechanism. The information presented in the anatomy and physiology section is expanded here to provide a better understanding regarding the cells, tissues, and organs that are affected and how these conditions alter their function. Specific information is provided for more commonly encountered conditions involving the blood, blood forming organs, and the immune mechanism.

Following the discussion of the various diseases, disease processes, disorders, injuries, etc., some diagnostic statements are provided with examples of coding in both ICD-9-CM and ICD-10-CM. The coding practice is followed by questions to help reinforce the student's knowledge of anatomy, physiology, and coding concepts. Answers to the coding questions can be found by reviewing the text or referring to the ICD-9-CM and/ or ICD-10-CM coding books.

Infectious/Parasitic Diseases

Infections and parasitic diseases of the blood alone are rare. One parasite that directly affects red blood cells is malaria. Typically, infections or pathogenic organisms originating at one site spread via the blood stream to other sites or become a generalized systemic infection that involves the blood. Sepsis is the term for a generalized systemic infection that meets certain criteria.

Sepsis

Sepsis, sometimes referred to as septicemia or bacteremia, is actually a complication of an infection at a site outside the blood stream. However, because the bacteria or other pathogenic organism is carried through the blood stream to other sites, it is discussed here under blood, blood forming organs, and disorders of the immune system.

Sepsis is diagnosed based on certain signs and symptoms associated with systemic inflammatory response syndrome (SIRS), which include:

- Elevated heart rate (tachycardia) > 90 beats per minute at rest
- Elevated (> 100.4 F or 38 C) or lowered (< 96.8 F or 36 C) body temperature
- Increased respiratory rate (> 20 breaths per minute) or decreased PaCO₂ (partial pressure carbon dioxide in arterial blood) (< 32 mm Hg)
- Elevated (>12,000), lowered (<4,000), or abnormal (> 10% bands) white blood cell count. (Bands are an immature type of white blood cell.)

The following table compares ICD-9-CM to ICD-10-CM for the above-noted conditions.

ICD-9-CM – Chapter 4: Septicemia, Systemic Inflammatory Response Syndrome (SIRS), Sepsis, Severe Sepsis, and Septic Shock	ICD-10-CM – Chapter 3: Sepsis, Severe Sepsis, and Septic Shock
1. SIRS, Septicemia, and Sepsis	
<p>a. The terms septicemia and sepsis are often used interchangeably by providers; however, they are not considered synonymous terms. The following descriptions are provided for reference but do not preclude querying the provider for clarification about terms used in the documentation:</p> <ul style="list-style-type: none"> i. Septicemia generally refers to a systemic disease associated with the presence of pathological microorganisms or toxins in the blood, which can include bacteria, viruses, fungi or other organisms. ii. Systemic inflammatory response syndrome (SIRS) generally refers to the systemic response to infection, trauma/ burns, or other insult (such as cancer) with symptoms including fever, tachycardia, tachypnea, and leukocytosis. iii. Sepsis generally refers to SIRS due to infection. iv. Severe sepsis generally refers to sepsis with associated acute organ dysfunction. 	
<p>b. The coding of SIRS, sepsis and severe sepsis requires a minimum of 2 codes: a code for the underlying cause (such as infection or trauma) and a code from subcategory 995.9 Systemic inflammatory response syndrome (SIRS).</p>	<p>1) Coding of Sepsis and Severe Sepsis</p> <p>a. Sepsis</p> <p>For a diagnosis of sepsis, assign the appropriate code for the underlying systemic infection. If the type of infection or causal organism is not further specified, assign code A41.9, Sepsis, unspecified.</p> <p>A code from subcategory R65.2, Severe sepsis, should not be assigned unless severe sepsis or an associated acute organ dysfunction is documented.</p>

1. Diseases of Blood/ Immune System

norepinephrine. While a lack of these hormones does not produce significant adverse effects, an overproduction results in prolonged or continuous sympathetic nerve response.

Epinephrine, the primary hormone secreted by the medulla, has the following effects on the body:

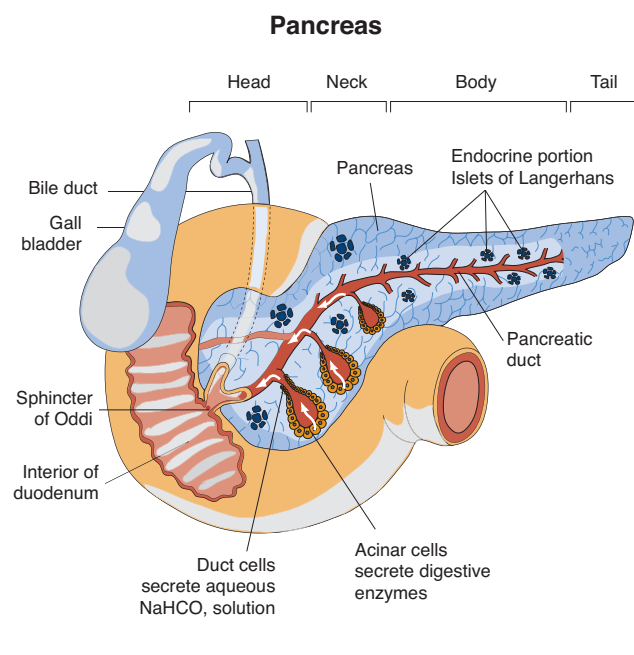
- Increases blood pressure by increasing heart rate and constricting blood vessels
- Increases respiratory rate
- Dilates respiratory passages
- Decreases digestive processes
- Increases efficiency of muscle contraction
- Increases blood sugar levels
- Stimulates cellular metabolism

Pancreas

The pancreas is a long, relatively flat organ located behind and slightly below the stomach. It extends from the region of the duodenum to the spleen. The pancreas is both an endocrine and an exocrine gland. The exocrine portion secretes digestive enzymes that are carried through the pancreatic duct to the duodenum. Exocrine functions are more fully addressed in the digestive system chapter. The endocrine portion of the pancreas is composed of clusters of cells called Islets of Langerhans. There are two types of cells in the pancreatic islets:

- Alpha cells that make up 25 percent of the islet cells and secrete glucagon hormone
- Beta cells that make up 75 percent of the islet cells and secrete insulin hormone

Glucagon and insulin work together to regulate blood sugar level.



Glucagon

The primary function of glucagon is to increase blood glucose level by accelerating the conversion of liver glycogen into glucose. Glucagon secretion is directly controlled by blood sugar level and the process of regulating blood sugar is as follows:

1. When blood sugar level falls below normal, chemical sensors in the alpha cells stimulate them to secrete glucagon.
2. Glucagon is taken up by the blood and travels to target cells in the liver.
3. The liver releases glucagon stores and converts the glucagon to glucose.
4. Glucose is released into the blood and blood sugar level rises.
5. When blood sugar level reaches normal, the chemical sensors in the alpha cells stop stimulating them and glucagon secretion stops.

Insulin

The primary function of insulin is to decrease blood sugar. Insulin secretion is directly controlled by blood sugar level, but other hormones including human growth hormone, adrenocorticotropic hormone, and epinephrine can indirectly affect insulin production. Insulin secretion, like glucagon secretion, is directly controlled by blood sugar level and works as follows:

1. When blood sugar level rises above normal, chemical sensors in the beta cells stimulate them to secrete insulin.
2. Insulin is taken up by the blood and target cells located primarily in the liver and muscles are then stimulated to take up glucose.
3. Glucose is transported by the blood to the target cells.
4. Insulin accelerates the conversion of glucose into glycogen in the target cells.

Ovaries/Testes

Gonadocorticoids are secreted by the ovaries and testes. In females, there are two types of hormones secreted by the ovaries, estrogens and progesterone. In males, androgens are the principle hormone type secreted by the testes.

Ovaries

Estrogens and progesterone are steroids that are responsible for the development and maintenance of female sexual characteristics. Hormones produced by the ovary work with the gonadotropic hormones of the pituitary. Primary functions of estrogen and progesterone include:

- Growth and development of female reproductive organs and breasts
- Distribution of fat in the hips, legs, and breasts
- Regulation of the menstrual cycle
- Preparation of the uterus for pregnancy
- Maintenance of pregnancy
- Preparation of the mammary glands for lactation

Section 2.3f Questions

What instructions related to coding of neoplasms for MEN syndrome is listed under code 258.0 in ICD-9-CM? Does ICD-10-CM contain the same instruction under E31.2?

Is it necessary to code the benign neoplasms associated with the Werner's syndrome?

Why is a code for malignant neoplasm used with the code for MEN IIa?

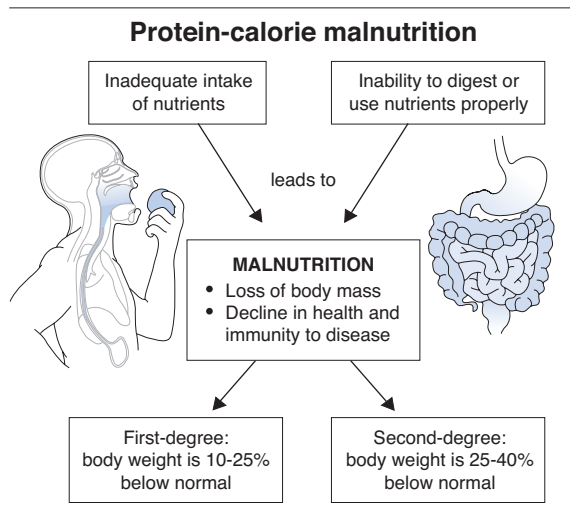
Section 2.4 – Nutritional Disorders

Conditions listed under nutritional disorders include:

- Malnutrition
- Vitamin, mineral, and other nutritional deficiencies
- Overweight and obesity
- Disorders related to complications of hyperalimentation

Malnutrition

Malnutrition is caused by an insufficient amount of protein and calorie intake in the diet. It may be mild, moderate, or severe. In countries where there is widespread famine, kwashiorkor or marasmus, which are severe life-threatening forms of malnutrition, may affect large numbers of individuals.



Vitamin, Mineral and Other Nutritional Deficiencies

A deficiency of any essential vitamin or mineral has an adverse effect on health. The specific adverse effect is dependent on which vitamin or mineral is deficient. Vitamin A deficiency has an adverse effect on the eyes and eyesight; Vitamin C deficiency causes scurvy; and Vitamin D deficiency causes rickets. Mineral

deficiencies also cause adverse effects. For example, calcium deficiency can lead to osteoporosis.

There are also a group of fatty acids, called essential fatty acids, which are needed for the body to accomplish a number of physiologic processes. For example, fatty acids are needed to maintain the integrity of cell membranes and body tissues. Symptoms of an essential fatty acid deficiency include scaly dermatitis, hair loss, and thrombocytopenia.

Complications of Hyperalimentation

Hyperalimentation is a procedure that involves providing nutrients and vitamins intravenously to patients who cannot absorb a sufficient amount of essential nutrients and vitamins through the gastrointestinal tract or to malnourished or extremely ill patients who cannot take food by mouth over a prolonged period of time.

Long-term hyperalimentation can cause complications, the most common being hypervitaminosis, also referred to as vitamin toxicity. Hypervitaminosis means that there is too much of the vitamin present in the body. Vitamins most often associated with toxicity include Vitamins A, B6, or D.

Hyperalimentation also refers to a state of ingesting or consuming quantities of food greater than the appropriate or optimal amount, either through overeating or the administration of too much parenteral nutrition. This causes obesity or being overweight.

Section 2.4 Coding Practice

Condition	ICD-9-CM	ICD-10-CM
Moderate protein-calorie malnutrition	263.0	E44.0
Vitamin A deficiency with night blindness	264.5	E50.5
Osteomalacia (adult)	268.2	M83.9
Hypervitaminosis A	278.2	E67.0

Section 2.4 Questions

In ICD-9-CM, osteomalacia that is not otherwise specified is listed under Vitamin D deficiency. Where is this code listed in ICD-10-CM?

Look at category M83 in ICD-10-CM. What other conditions are listed here under this category? Using the ICD-9-CM alphabetic index, see if any of the conditions listed under M83 in ICD-10-CM can be found in ICD-9-CM.

Integration

The sensory input is then converted into nerve impulses which are electrical signals that are transmitted to the central nervous system. These nerve impulses create sensations, produce thoughts, or add to memory. Conscious and unconscious decisions are then made in the central nervous system, which is the integrative function of the nervous system.

Motor

Once the central nervous system has integrated the sensory input, the nervous system initiates a response by sending signals to tissues, organs, or glands which elicit a response such as muscle contraction or gland secretion. Tissues, organs, and glands are called effectors because they cause an effect in response to directions received from the central nervous system. This response is referred to as motor output or motor function.

Nerve Impulses

Nerve cells respond to stimuli and convert them into nerve impulses. This is called irritability. Once the stimuli are converted into a nerve impulse, the nerve cells have the ability to transmit that impulse to another nerve cell or to another tissue. This is called conductivity.

Irritability

Any stimulus that is strong enough to initiate transmission of a nerve impulse is referred to as a threshold impulse. A stimulus that is too weak to initiate a response is called a subthreshold stimulus. However, a series of subthreshold stimuli that are applied quickly to a neuron can have a cumulative effect that may initiate a nerve impulse. This is called summation of inadequate stimuli.

The speed with which an impulse is transmitted depends on the size, type, and condition of the nerve fiber. Myelinated fibers with larger diameters transmit nerve impulses faster than mid-sized and small fibers or unmyelinated fibers. Sensory and motor fibers that detect and respond to potentially dangerous situations in the outside environment are generally larger in diameter than those that control or respond to less critical stimuli.

Conductivity

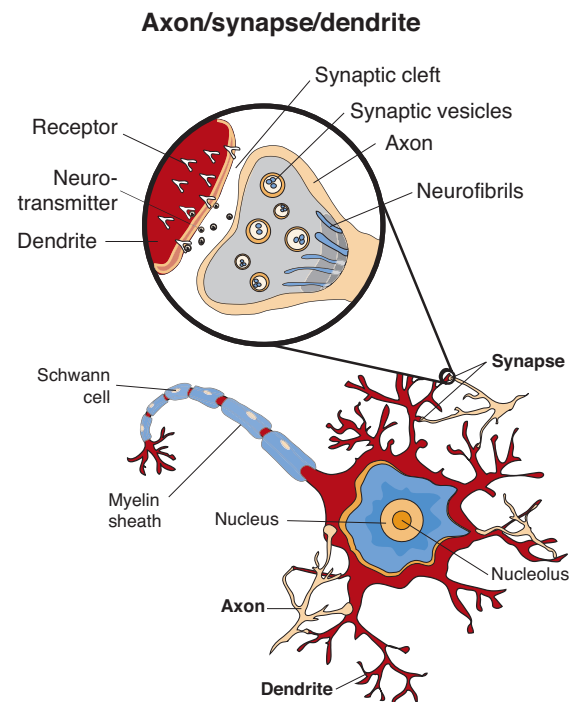
Conductivity is the ability of the nerve cell to transmit an impulse to another nerve cell or another tissue via a conduction pathway. The reflex arc is the most basic type of conduction pathway. There are five basic components to a reflex arc that are required to transmit an impulse.

1. A receptor consisting of the distal end of a dendrite of a sensory neuron responds to a stimulus in the internal or external environment and produces a nerve impulse.
2. The impulse is passed by the receptor to the CNS.
3. The incoming impulse is directed to a center usually within the CNS where it is blocked, transmitted, or rerouted. This

is usually accomplished with an association neuron that lies between the sensory neuron and the motor neuron.

4. The motor neuron transmits the impulse to the tissue, organ, or gland that must respond to the stimulus.
5. The tissue, organ, or gland, called an effector, responds to the stimulus.

The axons of neurons in a reflex arc do not ever touch the dendrites of the adjacent neuron in the nerve conduction pathway. The impulse must travel across a minute gap called a synapse. In addition, impulses can travel in only one direction from axon to synapse to dendrite.



Nervous Tissue Injury

Unlike other tissues, nervous tissue has a very limited ability to regenerate. Specifically, if the cell body of a neuron is destroyed, the neuron cannot regenerate nor can other neurons reproduce and replace the damaged neuron. However, the human body is able to repair damaged nerve cells in which the cell body is intact and the axon has a neurilemma. Nerve cells in the peripheral nervous system generally have axons with a neurilemma while those in the brain and spinal cord do not. This means that a nerve injury of the hand has a good chance of healing while an injury of the brain or spinal cord is more often permanent.

Section 3.19 – Mental and Behavioral Disorders

Mental and behavioral disorders have a dedicated chapter in ICD-10-CM. However, because mental and behavioral disorders are clearly related to, or are an integral part of nervous system function, mental and behavioral disorders are discussed here in the nervous system section of this course. There are several broad classifications of mental and behavioral disorders including:

Disorders Due to Physiological Condition – Mental disorders in this section are all caused by some type of physiological condition such as cerebral disease, brain injury, or some other type of cerebral dysfunction. Many codes in this section require that the underlying physiological condition be coded first.

Disorders Due to Psychoactive Substance Use and Dependence – Codes in this section include alcohol, drug, and inhalant use, abuse, and dependence; nicotine dependence; and other psychoactive substance related disorders. Note that nicotine use is not coded from this section but is instead reported with a code from Chapter 21 as a factor influencing health status.

Psychotic Disorders – Some of the more common types of psychotic disorders include schizophrenia, bipolar disorder, and major depressive disorders.

Non-Psychotic Disorders – Anxiety and dissociative and stress-related mental disorders are types of non-psychotic disorders.

Other Disorders – Other disorders and conditions reported with codes from Chapter 5 include: eating disorders, sleep disorders, sexual dysfunction not due to a substance or physiological condition, personality disorders, mental retardation, some developmental disorders, and behavioral and emotional disorders of childhood and adolescence.

Coding Practice 3.19

Condition	ICD-9-CM	ICD-10-CM
Late onset Alzheimer's disease with dementia and combative behavior	331.0, 294.11	G30.1, F02.81
Parkinson's disease with dementia	331.82, 294.10	G31.83, F02.80
Post concussion syndrome following concussion three weeks ago with loss of consciousness less than 30 minutes.	310.2	S06.0x1S, F07.81
Acute alcohol intoxication with blood alcohol level 22 mg/100 ml	305.00	F10.920, Y90.1
Recurrent major depression of moderate severity	296.32	F33.1
Chronic posttraumatic stress syndrome	309.81	F43.12
Developmental dyslexia	315.02	F81.0

Questions 3.19

Are codes 294.10 and F02.80 ever reported as the primary (first listed) diagnosis code?

Why are two codes required to report post-concussion syndrome in ICD-10-CM but not in ICD-9-CM?

Why is code Y90.1 used in conjunction with F10.920 in the example above?

Terminology

Arachnoid – One of the three membranes that protect the brain and spinal cord. The arachnoid is the middle membrane and is composed of delicate fibrous tissue.

Autonomic nervous system – The part of the nervous system that controls the smooth muscle, cardiac muscle, and glands. It functions automatically and involuntarily being regulated by several centers in the brain, including the cerebral cortex, hypothalamus, and the medulla oblongata. The autonomic system consists entirely of motor fibers that transmit impulses from the CNS to smooth muscle, cardiac muscle, and glandular epithelium and affects visceral functions.

Central nervous system (CNS) – One of two primary divisions of the nervous system, the CNS is composed of two organs, the brain and spinal cord.

Dura mater – One of three membranes that protect the brain and spinal cord. The dura mater is the outer membrane and is composed of a tough fibrous tissue.

Encephalon – The brain.

Extradural – Lying outside of the dura mater.

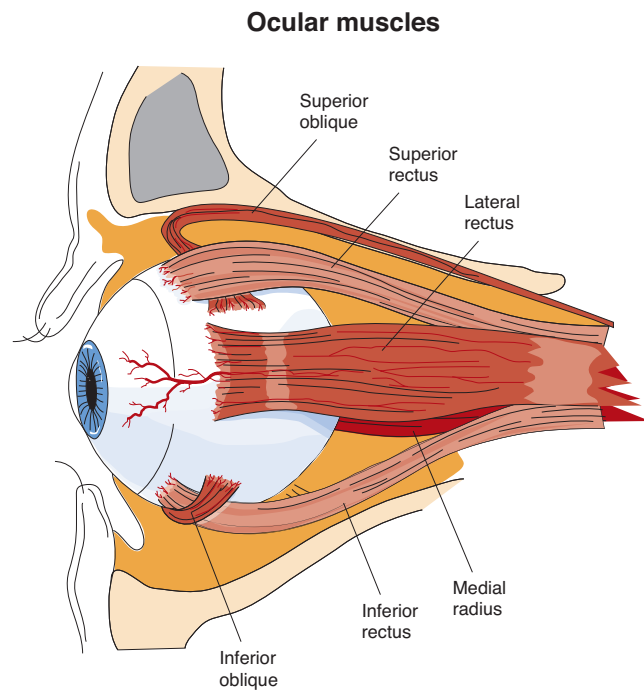
Extracranial – Lying outside the cranial cavity or skull.

Ganglion – A group of nerve cell bodies; a term usually used to refer to a group of nerve cell bodies located in the peripheral nervous system.

Intracranial – Lying within the cranial cavity or skull.

Intraspinal – Lying within the vertebral canal.

Meninges – The three membranes that cover the brain and spinal cord which include an outer membrane called the dura mater, a middle membrane called the arachnoid, and an inner membrane called the pia mater.



The extraocular muscles are contained within the orbit and with the exception of the inferior oblique form a cone around the eye. The apex of the cone is located at the posterior aspect of the orbit with the base of the cone being formed at the attachment of each muscle at the midline of the globe. The apex of the cone is formed by a tendinous ring-like structure called the annulus of Zinn. The optic nerve and ophthalmic artery and vein exit the eye through the annulus of Zinn.

The superior and inferior oblique muscles differ in configuration from other eye muscles. The superior oblique, although part of the cone, must pass through another ring-like tendon called the trochlea at the nasal portion of the orbit before attaching to the posterior aspect (apex) of the cone. The trochlea acts as a pulley for the superior oblique muscle. The inferior oblique does not form part of the cone. It arises from the lacrimal fossa in the nasal portion bony orbit and attaches to the inferior aspect of the eye.

Movement of the eyes is complex because in order to look in a specific direction the muscles of one eye must coordinate with the other. For example in order to look up and to the right, the lateral rectus and superior rectus of the right eye must coordinate with the medial rectus and superior rectus of the left eye. Any lack of coordination or weakness of a specific extraocular muscle can prevent the eyes from moving together which causes vision impairment.

Comparison of ICD-9-CM and ICD-10-CM Eye and Adnexa Coding Guidelines

In ICD-10-CM, a new chapter, Chapter 7, has been added specifically for diseases of the eye and adnexa. In ICD-9-CM, diseases of the eye and adnexa are included in a single chapter, Chapter 6, Diseases of the Nervous System and Sense Organs.

In the general guidelines there is an instruction related to the use of combination codes. While combination codes do exist in ICD-9-CM, these types of codes have been expanded to include additional coding scenarios related to eye and adnexa coding. For example, in ICD-10-CM, only one code is required to identify diabetic retinopathy, with or without macular edema (E08.3-) while in ICD-9-CM, there are three codes: one for the diabetes (250.5x), one for the diabetic retinopathy (362.01-362.06), and one diabetic macular edema (362.07).

Note: There are no Guidelines in either ICD-9-CM or ICD-10-CM specific to reporting diseases of the eye and adnexa.

ICD-10-CM Documentation Elements of Eye and Adnexa

Key documentation elements for the eye and adnexa include the following:

- Laterality, meaning the side of the body affected, must be documented as right, left, or bilateral for most diseases and conditions located in this section.

Diseases, Disorders, Injuries and Other Conditions of Eye and Adnexa

This section of the chapter looks at a variety of diseases, disorders, injuries, and other conditions involving the eye and adnexa. The information presented in the anatomy and physiology section is expanded here to provide a better understanding regarding the part of the eye or adnexa affected and how these conditions affect function. Specific information is provided for more commonly encountered conditions involving the eye and adnexa.

Following the discussion of the various diseases, disease processes, disorders, injuries, and conditions, some diagnostic statements are provided with examples of coding in both ICD-9-CM and ICD-10-CM. The coding practice is followed by questions to help reinforce the student's knowledge of anatomy, physiology, and coding concepts. Answers to the coding questions can be found by reviewing the text or referring to ICD-9-CM and/or ICD-10-CM coding books.

Answers to all coding practice questions are also provided at the end of the chapter.

Category of visual impairment		Visual acuity with best possible correction	
Low (WHO) Vision	1	6/18 3/10 (0.3) 20/70	6/60 1/10 (0.1) 20/200
	2	6/60 1/10 (0.1) 20/200	3/60 1/20 (0.05) 20/400
Blindness (WHO)	3	3/60 1/20 (0.05) 20/400	1/60 (finger counting at 1 meter) 1/50 (0.02) 5/300 (20/1200)
	4	1/60 (finger counting at 1 meter) 1/50 (0.02) 5/300	Light perception
	5	No light perception	
	9	Undetermined or unspecified	

Coding Practice 4.12

Condition	ICD-9-CM	ICD-10-CM
Bilateral blindness, no light perception, right and left eyes	369.01	H54.0
Left eye blindness, no light perception, right eye, 20/200	369.10	H54.12

Questions 4.12

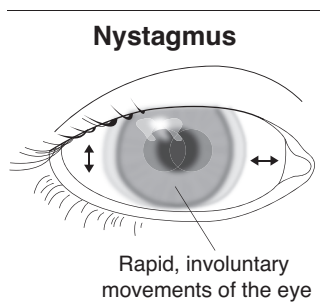
How has identification of visual impairment changed from ICD-9-CM to ICD-10-CM? How has this affected coding in ICD-10-CM?

Section 4.13 – Other Disorders

There are two categories in the other disorders block of codes, nystagmus and other irregular eye movements and intraoperative and postoperative complications.

Nystagmus

Nystagmus is abnormal eye movement that usually results in blurred vision. There are a variety of types of nystagmus and the type of abnormal eye movement depends on the underlying cause.



Horizontal nystagmus is a jerking movement that goes side to side. This condition is often associated with poor vision although by itself is not the cause.

Vertical nystagmus refers to up and down movement of the eye and typically indicates a problem with the central nervous system.

Childhood nystagmus is typically associated with eye defects, such as retinal disorders, although most are familial and not a symptom of a disease process. In adults, nystagmus can be a symptom of an underlying disease, such as multiple sclerosis or head trauma.

Intraoperative and Postoperative Complications

There are a number of intraoperative and postoperative complications can affect the eye and ocular adnexa. As with all types of surgery there is always a possibility of intraoperative or postoperative hemorrhage or hematoma of the eye and surrounding structures and accidental puncture or laceration. Keratopathy and lens fragments are postoperative complications specific to cataract surgery. Chorioretinal scarring is a complication specific to surgery for retinal detachment.

Keratopathy Following Cataract Surgery

This complication may also be referred to as bullous aphakic keratopathy if the lens has been removed but not replaced with an intraocular lens implant or bullous pseudophakic keratopathy if an intraocular lens implant is present. In some individuals surgical trauma from the cataract extraction damages the corneal endothelium causing corneal edema and subepithelial bulla formation on the surface of the cornea. Bulla are fluid filled blisters. When the endothelial cells are damaged, the remaining cells rearrange themselves to cover the posterior corneal surface. The remaining endothelial cells become irregularly shaped and enlarged. The endothelium becomes unable to act as a pump to the cornea and the stroma begins to swell. The cornea thickens and folds are seen in the Descemet membrane.

Lens Fragments Following Cataract Surgery

If all lens material is not retrieved during cataract surgery, it is retained and may cause other complications, such as corneal edema or uveitis.

Chorioretinal Scarring Following Detachment Surgery

Chorioretinal scarring is a condition that is associated with surgical repair retinal detachment although it has other causes not related to surgical procedures such as infection and inflammation of the retina. Chorioretinal scarring is of concern because it can cause vision deficits.

Comparison of ICD-9-CM and ICD-10-CM Circulatory System Coding Guidelines

Significant changes in ICD-10-CM include:

- Diseases of the circulatory system are contained in Chapter 9 of ICD-10-CM. In ICD-9-CM, these diseases and corresponding codes were in Chapter 7
- Intraoperative and postoperative cerebrovascular accident codes are now included in Chapter 9 of ICD-10-CM. In ICD-9-CM, these codes were in *Chapter 17 – Injury and Poisoning*
- Introduction of combination codes for atherosclerotic heart disease with angina pectoris
- Myocardial infarction
 - Healing time for an acute myocardial infarction has changed to four weeks (28 days) in ICD-10-CM from the 8 week time frame used in ICD-9-CM
 - New code category for a subsequent (new) acute myocardial infarction occurring within the 4 week time frame of healing from the initial acute myocardial infarction
 - Change in subsequent episode of care designation. Subsequent episode of care in ICD-10-CM is no longer used for re-evaluation, observation, or treatment of an acute myocardial infarction treated on a previous admission. The subsequent episode of care is limited to a subsequent (new) acute myocardial infarction during the 4 week healing period of the initial myocardial infarction
 - Old myocardial infarction is classified under chronic ischemic heart disease in ICD-10-CM
- Hypertension
 - Hypertension table has been eliminated in ICD-10-CM
 - Hypertension is no longer classified as benign, malignant, or unspecified type in ICD-10-CM. The same code is used for benign and malignant hypertension

ICD-9-CM – Chapter 7: Diseases of Circulatory System (390-459)	ICD-10-CM – Chapter 9: Diseases of Circulatory System (100-199)
<p>a. Hypertension</p> <p>Hypertension Table</p> <p>The Hypertension Table, found under the main term, “Hypertension”, in the Alphabetic Index, contains a complete listing of all conditions due to or associated with hypertension and classifies them according to malignant, benign, and unspecified.</p>	<p>a. Hypertension.</p>

ICD-9-CM – Chapter 7: Diseases of Circulatory System (390-459)	ICD-10-CM – Chapter 9: Diseases of Circulatory System (100-199)
<p>1. Hypertension, Essential, or NOS</p> <p>Assign hypertension (arterial) (essential) (primary) (systemic) (NOS) to category code 401 with the appropriate fourth digit to indicate malignant (.0), benign (.1), or unspecified (.9). Do not use either .0 malignant or .1 benign unless medical record documentation supports such a designation.</p>	
<p>2. Hypertension with Heart Disease</p> <p>Heart conditions (425.8, 429.0-429.3, 429.8, 429.9) are assigned to a code from category 402 when a causal relationship is stated (due to hypertension) or implied (hypertensive). Use an additional code from category 428 to identify the type of heart failure in those patients with heart failure. More than one code from category 428 may be assigned if the patient has systolic or diastolic failure and congestive heart failure.</p> <p>The same heart conditions (425.8, 429.0-429.3, 429.8, 429.9) with hypertension, but without a stated casual relationship, are coded separately. Sequence according to the circumstances of the admission/encounter.</p>	<p>1) Hypertension with Heart Disease</p> <p>Heart conditions classified to I50.- or I51.4-I51.9, are assigned to, a code from category I11, Hypertensive heart disease, when a causal relationship is stated (due to hypertension) or implied (hypertensive). Use an additional code from category I50, Heart failure, to identify the type of heart failure in those patients with heart failure.</p> <p>The same heart conditions (I50.-, I51.4-I51.9) with hypertension, but without a stated causal relationship, are coded separately. Sequence according to the circumstances of the admission/encounter.</p>

- Abnormal electrocardiogram (ECG)
- Abnormal electrophysiological intracardiac study (EPS)
- Abnormal phonocardiogram
- Abnormal vectorcardiogram

Coding Practice 6.11

Condition	ICD-9-CM	ICD-10-CM
Atypical chest pain	786.59	R07.89
Precordial chest pain	786.51	R07.2
Ischemic chest pain	413.9	I20.9
Abnormal ECG	794.31	R94.31

Questions 6.11

Why is ischemic chest pain reported with a code from the circulatory system chapter while atypical and precordial chest pain are reported with a code from the signs and symptoms section of ICD-10-CM?

Would a diagnosis of long QT syndrome be reported with the code for abnormal ECG in ICD-10-CM?

Section 6.12 – Injuries

Injuries to the circulatory system are defined as those conditions that are due to some type of trauma. Some circulatory system conditions, such as a subarachnoid hemorrhage, may be of traumatic or nontraumatic origin. Documentation is of paramount importance in determining whether to select a code from the chapter for nervous system diseases or from the chapter for injuries, poisoning, and certain other consequences of external causes.

One significant difference between ICD-9-CM and ICD-10-CM is the addition of a seventh character extension for episode of care for injuries, poisonings, and other external causes. Episode of care must be specified as:

- A Initial encounter
- D Subsequent encounter
- S Sequela

Injuries of the circulatory system include:

- Laceration or traumatic transection of a blood vessel
- Traumatic rupture of a blood vessel
- Hemopericardium
- Traumatic contusion or laceration of the heart

Poisonings from drugs, chemicals, or other substances include toxic and adverse effects of drugs as well as a new underdosing category. The correct poisoning code is initially identified in the

Table of Drugs and Chemicals and then verified in the Tabular list. Poisonings, toxic and adverse effects, and underdosing usually require the use of multiple codes to identify the drug or chemical as well as the specific cardiac or circulatory manifestations associated with the poisoning.

Other consequences of external causes cover a wide variety of conditions. Examples of conditions related to the circulatory system include:

- Traumatic air or fat embolism
- Cardiac or circulatory complications related to medical or surgical procedures
- Complications related to cardiac and vascular prosthetic devices, implants, and grafts

Air Embolism. An embolism due to the introduction of air or gas into the circulatory system that is usually a complication of a medical or surgical intervention.

Fat Embolism. An embolism composed of fat droplets that develops as a complication of some type of trauma.

Codes in this chapter may also require the use of external cause codes to provide data for how the injury occurred, the intent (unintentional/accidental versus intentional/suicide/assault), the place of occurrence, and the activity being performed.

Coding Practice 6.12

Condition	ICD-9-CM	ICD-10-CM
Contusion of heart with hemopericardium sustained by driver of an automobile when the car skidded out of control and collided with cement barrier, acute phase of injury	861.01, 860.2, E812.0, E849.5, E030	S26.01xA, V47.52xA, Y92.410
Cardiology consultation for fat embolism secondary to traumatic right femoral shaft fracture	958.1, 821.01	T79.1xxA, S72.301A
Initial evaluation of stenosis of coronary artery due to the presence of cardiac stent	996.74	T82.858A

Questions 6.12

Why is the fat embolism sequenced first in the example above?

What specific information is provided by code T82.858A that is not provided by 996.74?
