Anatomy and Pathophysiology for ICD-10

2014

Module 3

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Musculoskeletal System

Terminology

Bone marrow—Spongy, flexible tissue found inside some of the bones in the body containing immature cells that can develop into red blood cells to carry oxygen through the body, white blood cells to help fight infection, and platelets to help with blood clotting.

Cartilage—Type of connective tissue consisting of cells called chondrocytes, making up three different types of cartilage.

- **Hyaline cartilage**—Lines the bones in joint to help them articulate smoothly, contains mostly type II collagen fibers, and is the most common type of cartilage found in the body.
- **Elastic cartilage**—Provides the perfect balance of structure and flexibility and helps keep tubular structures of the body open. It is more flexible than other types of cartilage because of the elastin fibers it contains and can be found in the outer ear, the larynx, and the Eustachian tubes.
- **Fibrocartilage**—Contains more type I cartilage (which is tougher than type II) than hyaline cartilage making this the strongest and mist rigid type. It makes up the intervertebral discs, connects ten-dons and ligaments to bones, and appears in other high-stress areas.

Dislocation—The separation of two bones where they meet at a joint, usually caused by sudden impact to the joint.

External fixation—a method of immobilizing bones to allow for a fracture to heal by placing pins or screws into the bone on both sides of the fracture. The pins are then secured together outside the skin with clamps and rods known as the external frame.

Internal fixation—surgical implementation of implants for the purpose of repairing a bone such as bone screws, metal plates, pins, and rods.

Joint—The point where two or more bones make contact with one another.

Ligament—Fibrous, slightly stretchy connective tissues, which are composed of strands of collagen fibers that connects bones in the body.

Manipulation—Adjustment of faulty structural relationships by manual means, realignment of bone fracture ends to anatomical pre injury position.

Pathological—Caused by or involving disease.

Subluxation—Partial dislocation of a joint.

Tendon sheath—A layer of membrane around a tendon comprised of two layers called the synovial sheath and fibrous tendon sheath, which permits a tendon to move.

Traction—Mechanisms used for straightening broken bones or relieving pressure on the spine or skeletal system.

Vertebrae—One of the bony or cartilaginous segments composing the spinal column, the vertebral column is composed of 24 vertebrae stacked on top of each other from the bottom of the skull to the pelvis.

Introduction

The musculoskeletal system provides the body with a supportive framework that allows flexible movement and protection of the internal organs. This body system includes the muscle structure of the body as well as the skeletal structure. It is made up of muscles, bones, joints as well as ligaments, tendons, and cartilage.

Skeletal System

The bones of the body fall into four general categories: long bones, short bones, flat bones, and irregular bones. Long bones are longer than they are wide and work as levers. The bones of the upper and lower extremities (humerus, tibia, femur, ulna, metacarpals, etc.) are

of this type. Each long bone can be divided into three regions, namely the epiphysis, the metaphysis, and the diaphysis. The epiphysis is the rounded end of the bone. The metaphysis is the part adjacent to the epiphysis in the adult (growth plate has closed). It is the part adjacent to the physis in children (growth plate being open). The diaphysis is the cylindrical shaft of the bone.

Short bones are short, cube-shaped, and found in the wrists and ankles. Flat bones have broad surfaces for protection of organs and attachment of muscles (ex. ribs, cranial bones, bones of shoulder girdle). Irregular bones are all others that do not fall into the previous categories. They have varied shapes, sizes, and surfaces features and include the bones of the vertebrae and a few in the skull.

Bones are composed of different types of tissue:

- Compact or dense bones form the protective exterior portion of all bones.
- Cancellous tissue is the spongy-like tissue inside bones that is very porous with a lattice-like structure.
- Subchondral tissue is the smooth tissue at the ends of the bones, which is covered with cartilage.

Together, compact and cancellous tissues are called the periosteum. Underneath the hard outer shell of the periosteum there are tunnels and canals through which blood and lymphatic vessels run to carry nourishment for the bone. The skeletal system serves as the main storage site for minerals, and provides the marrow for the development and storage of blood cells. Muscle, ligaments, and tendons may attach to the periosteum.

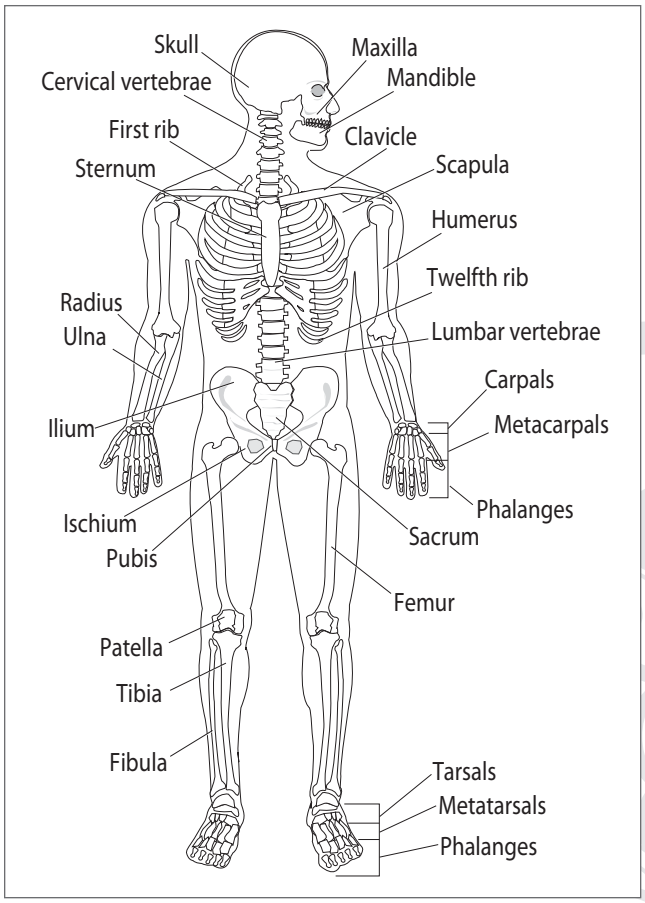
There are five main types of bone cells in bone tissue. Osteogenic cells respond to traumas such as fractures by giving rise to bone-forming cells and bone-destroying cells. Osteoblasts (bone-forming cells) produce and secrete unmineralized ground substance and are found in areas of high metabolism within the bone. Osteocytes are mature bone cells made from osteoblasts, which help to maintain bone as living tissue. These cells maintain healthy bone tissue by secreting enzymes and controlling the bone mineral content; they also control the calcium release from the bone tissue to the blood. Osteoclasts are large cells that break down bone tissue to absorb and remove unwanted waste. They are very important to bone growth, healing, and remodeling. The last types of cells are bone-lining cells. These are made from osteoblasts along the surface of most bones in an adult. Bone-lining cells are thought to regulate the movement of calcium and phosphate into and out of the bone.

Bone marrow can be found in almost any bone that holds cancellous tissue. Bone marrow is soft tissue found mainly inside the long bones, vertebrae, and pelvic bones of the body. It is made up of red marrow, which produces red and white blood cells and platelets, and yellow marrow, which contains fat and connective tissue and produces some white blood cells.

People are born with only red bone marrow. As a person matures, the red marrow in many of the bones is replaced by yellow marrow. By adulthood, only about half of the bone marrow is red. Red bone marrow is found mostly in the ribs, breastbone, shoulder blades, collarbones, hip bones, skull, and spine.

The bones go through a remodeling or turnover stage, which is the process of resorption, followed by replacement of bone with little change in shape and occurs throughout a person's life. The purpose of remodeling is to regulate calcium homeostasis, repair micro-damaged bones from everyday stress, as well as shape and sculpture the skeleton during growth. The process of bone resorption by the osteoclasts releases stored calcium into the systemic circulation and is an important process in regulating calcium balance. As a result, bone is added where needed and removed where not needed

Of the 206 bones in the body, 80 of them are axial bones, which include the head, facial, hyloid, auditory, trunk, ribs, and sternum. The word axial refers to the bones being located along the central axis of the body. The other 126 are appendicular bones, which include arms, shoulders, wrists, hands, legs, hips, ankles, and feet. The word appendicular refers to the bones related to movement that are "appended" to the axial structure.



The axial bones consist of the:

- Skull—which has 22 bones
  - Cranial bones (8), parietal (2), temporal (2), frontal (1), occipital (1), ethmoid (1), sphenoid (1), facial bones (14), maxilla (2), zygomatic (2), mandible (1), nasal (2), palatine (2), inferior nasal concha (2), lacrimal (2), vomer (1)
- Auditory Ossicles (6)
  - Malleus (2), incus (2), stapes (2)
- Hyoid bone (1)
- Vertebral Column (26)
  - Cervical vertebrae (7), thoracic vertebrae (12), lumbar vertebrae (5), sacrum (1), coccyx (1)
- Chest
  - Thoracic cage (25), sternum (1), ribs (24)

The appendicular bones are divided into six major regions:

- Pectoral Girdles (4)
  - Left and right clavicle (2), scapula (2)
- Arm and forearm (6)
  - Left and right humerus (2), ulna (2), radius (2)
- Hands (58)
  - Left and right carpal (wrist) (16), metacarpal (10), proximal phalanges (10), middle phalanges (8), distal phalanges (10), sesamoid (4)
- Pelvis (2)
  - Left and right ilium (2)
- Thigh and leg (8)
  - Femur (2), tibia (2), patella (2), fibula (2)
- Feet (56)
  - Tarsals (ankle) (14), metatarsals (10), proximal phalanges (10), middle phalanges (8), distal phalanges (10), sesamoid (4)

Unlike the axial skeleton, the appendicular skeleton is not fused, which allows for a much greater range of motion.

Ligaments and Joints

There are many types of joints throughout the body. The way the body moves depends on each joint individually. There are three types of joints: immovable, partly movable, and synovial. Immovable joints, like those connecting the cranial bones, have edges that interlock tightly. Partly movable joints allow some degree of flexibility and usually have cartilage between the bones such as the vertebrae. Synovial joints permit the greatest degree of flexibility and have the ends of the bones covered with connective tissue that is filled with synovial fluid, such as the hip.

Ball-and-socket joints provide the most range of movement. In these joints, the spherical head of one bone fits into the spherical cavity of another bone. In the shoulder joint, the humerus (bone of the upper arm) fits into the socket of the shoulder blade, shallowly and loosely, making this the most mobile joint in the human body. The hip joint works much the same way however, because the ball of the femur fits tightly into a deep

socket in the hip bone, the hip joint is much more stable than the shoulder.

Hinge joints allow movement in only one direction, and are considered the simplest type of joint. Hinge joints can be found in the elbows, and the joints of the fingers and toes. There is also a hinge joint in the knee that is unusual because it can swivel on its axis, allowing the foot to turn from side to side. This causes the knee to constantly roll and glide while walking.

Gliding joints permit a wide range of mostly sideways movements—as well as movements in one direction—a pivot joint near the top of the spine allows the head to swivel and bend. Other pivot joints, in the forearm and lower leg, allow the wrist and ankle to twist.

A saddle joint is more versatile than either a hinge joint or a gliding joint. It allows movement in two directions. The saddle joint gives the human thumb the ability to cross over the palm of the hand.

The spine is a column of bone and cartilage that extends from the base of the skull to the pelvis. It encloses and protects the spinal cord and supports the trunk of the body and the head. The spine is made up of approximately thirty-three bones called vertebrae. Each pair of vertebrae is connected by a joint, which stabilizes the vertebral column and allows it to move. Between each pair of vertebrae is a disk-shaped pad of fibrous cartilage with a jelly-like core, which is called the intervertebral disk—or usually just the disk. These disks cushion the vertebrae during movement. The entire spine encloses and protects the spinal cord, which is a column of nerve tracts running from every area of the body to the brain. The vertebrae are bound together by two long, thick ligaments running the entire length of the spine and by smaller ligaments between each pair of vertebrae. The anterior longitudinal ligament consists of strong, dense fibers, located inside the bodies of the vertebrae. They span nearly the whole length of the spine, beginning with the second vertebrae (or axis), and extending to the sacrum. The ligament is thicker in the middle (or thoracic region). Some of the shorter fibers are separated by circular openings, which allow for the passage of blood vessels. Several groups of muscles are also attached to the vertebrae, and these control movements of the spine as well as to support it.

Muscular System

The human body contains more than 650 individual muscles attached to the skeleton, which helps to keep bones in place and provides the pulling power for us to move around. They make up nearly half the total weight of the human body. The majority of these muscles stretch across joints to link one bone with another, and work in groups, in response to nerve impulses. The name of a skeletal muscle may come from its location, action, size, shape, attachment points, number of divisions, or direction of its fiber. The main job of the muscular system is to provide movement for the body.

There are three different types of muscle tissues: skeletal, cardiac, and smooth. Each has the ability to contract, which then allows body movements and functions. Skeletal muscle fibers consist of threadlike structures called myofibrils that run lengthwise through the fiber. They are composed of thick and thin filaments, staked into compartments called sarcomeres. Muscle tissue consists of fibers that contain proteins called actin (create thin filaments) and myosin (create thick filaments).

There are two types of muscles in the system and they are the involuntary muscles, and the voluntary muscles. The muscle in which we can control by ourselves are called the voluntary muscles and the ones that work by themselves are the involuntary muscles. The heart, or the cardiac muscle, is an example of an involuntary muscle.

Skeletal muscle is a system of pairs that relax and contract to move a joint. For example, when front leg muscles contract, the knee extends (straightens) while back leg muscles relax. Conversely, to flex (bend) the knee, back leg muscles contract while front leg muscles relax. Muscle contraction that moves a body part away from the midline of the body is called abduction, while muscle contractions that move a body part toward the midline of the body is called adduction. Most skeletal muscles are attached to bones by tendons. Tendons are strong sheets of connective tissue, and are identical to ligaments. Tendons and ligaments are different in their function only. Tendons attach muscle to bone and ligaments attach bone to bone. Physical exercise strengthens the attachment of tendons to bones.

Skeletal muscle also aids in heat generation. During muscle contractions, muscle cells expend a lot of energy,

which is converted to heat. Glands in the skin produce sweat to regulate the temperature of the skin and prevent the body from overheating. When the body is chilly, shivering causes quick muscle contractions that generate heat.

Major skeletal muscles include:

- Anterior
  - Sternocleidomastoid (enables the head to flex—tilt sideways and to rotate)
  - Pectoralis major (enables various arm movements)
  - Biceps brachii (enables the forearm to flex and rotate outwardly)
  - Rectus abdominus (enables the trunk to flex forward)
  - Abdominal oblique (enables the trunk to flex and to rotate on the pelvis)
  - Brachioradialis (enables forearm to flex on the arm)
  - Rectoris femoris (enables the knee to extend, and the thigh to flex on the pelvis)
  - Sartorius (enables the thigh to flex and to rotate outwardly and allows the leg to flex)
  - Vastus lateralis (mainly allows the knee to extend and provides stabilization of the knee)
  - Tibialis anterior (enables the foot to flex on the leg)
- Superior
  - Trapezius (enables shoulder movements and assists in the extension of the head)
  - Deltoid (enables the arm to move away from the body)
  - Triceps brachii (enables straightening of the arm—from the elbow joint)
  - Latissimus dorsi (enables the arm to extend and rotate inwardly)
  - Gluteus medius (enables the leg to move away from the body)
  - Gluteus maximus (enables hip extension—moving the leg to the rear of the body)
  - Semimembrabosus (knee flexion, knee internal rotation, hip extension, hip internal rotation)
  - Biceps femoris (hip extension and external rotation)
  - Gastrocnemius (ankle plantar flexion, knee flexion, foot eversion)
  - Achilles tendon (connects the tendons of the calf muscles to the heel bones)

Muscle tone is the continuous and passive partial contraction of the muscles. Unconscious nerve impulses maintain the muscles in a partially contracted state. If a sudden pull or stretch occurs, the body responds by automatically increasing the muscle's tension, a reflex which guards against danger as well as helping to maintain balance. Both the extensor and flexor muscles, under normal innervation, maintain a constant tone while "at rest" that maintains a normal posture. Muscle tone around joints assist in maintaining joint stability.

Diseases and Disorders

Fractures

A fracture is a break or crack in the bone. A fracture occurs when the physical force exerted on the bone is stronger than the bone itself. Through the aging process, bones become more brittle and the risk of a fracture increases from falls that would not necessarily affect a younger person. Broken bones are very common in childhood, though children's fractures are generally less complicated than fractures in adults.

Several types of fractures exist:

- Displaced fractures occur when the bone snaps into two or more parts.
- Non-displaced fractures are where the cracks either part or all the way through, but does not disrupt its proper alignment.
- Closed fracture, also known as a simple fracture, is where the bone is broken, but the skin is still intact.
- Open fracture, also known as a compound fracture, is where the bone breaks and protrudes through the skin.
- Greenstick fracture is where the bone is not completely separated, it is also known as an incomplete fracture.
- Transverse fracture is a straight break line across the bone.
- Spiral fracture is where the break spirals around the bone, which is common in a twisting injury.

- Oblique fracture is a diagonal break across the bone.
- Compression fracture is where the bone is crushed, such as a collapse in the vertebrae.

The severity of a fracture depends upon its location and the amount of damage done to the bone and tissue surrounding it. Serious fractures can potentially have dangerous complications if not treated promptly, such as damage to blood vessels or nerves and infection of the bone (osteomyelitis) or surrounding tissue. Recovery time varies depending on the age and health of the patient and the type of fracture. A minor fracture in a child may heal within a few weeks; a serious fracture in an older person may take months to heal.

Collarbone Fracture

Source: AAPC

Pathologic Fractures

A pathologic fracture is a broken bone caused by disease leading to weakness of the bone. This process is most commonly due to osteoporosis, but may also be due to other pathologies such as: cancer, infection, inherited bone disorders, or a bone cyst.

There are three subcategories for pathological fractures in ICD-10-CM. There is an additional subcategory for Osteoporosis with current pathological fracture and that will be discussed in the Osteoporosis section.

Pathological fracture, not elsewhere classified	M84.4
Pathological fracture in neoplastic disease	M84.5
Pathological fracture in other disease	M84.6

ICD-10-CM further instructs the user to code also underlying neoplasm for category M84.5, and code also underlying condition for subcategory M84.6. Pathological fracture codes require a seventh character extension to reach the highest level of specificity.

Pathological fracture, right ankle	M84.471-
Pathological fracture, left ankle	M84.472-
Pathological fracture, unspecified ankle	M84.473-
Pathological fracture, right foot	M84.474-
Pathological fracture, left foot	M84.475-
Pathological fracture, unspecified foot	M84.476-
Pathological fracture, right toe(s)	M84.477-
Pathological fracture, left toe(s)	M84.478-
Pathological fracture, unspecified toe(s)	M84.479-

To code for a pathological fracture in ICD-10-CM, the following is necessary:

- Anatomic site
- Laterality
- Underlying condition
- Episode of care (assigned as the seventh character extension)
    - A = initial encounter for fracture
    - D = subsequent encounter for fracture with routine healing
    - G = subsequent encounter for fracture with delayed healing
    - K = subsequent encounter for fracture with nonunion
    - P = subsequent encounter for fracture with malunion
    - S = sequel

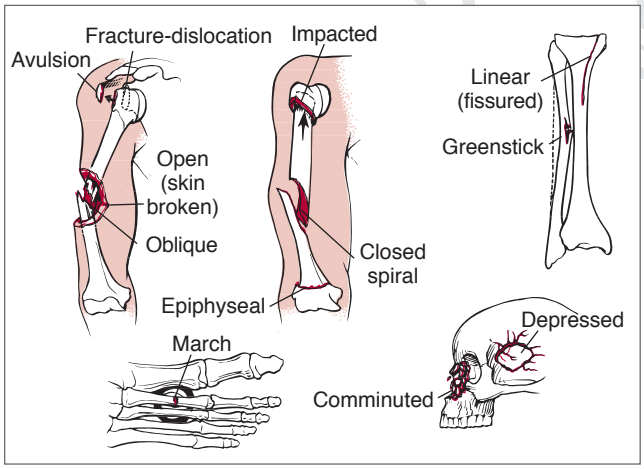
The appropriate ICD-10-CM code for a pathological fracture of the left foot, initial encounter would be M84.475A. It is important to remember that codes, which do not have enough digits/characters to add the

appropriate seventh charter, require placeholders so that the seventh digit extension falls to the seventh character.

- Example:
  - Code M84.48—Pathological fracture, other site, requires a seventh character to make it a complete code; however there are only five characters currently. The appropriate code for the initial episode of care would be M84.48XA. The "X" must be added as a placeholder in order to have the "A" fall into the seventh character field. The seventh character extender must always remain at the 7th character.

Dislocations

Dislocations are joint injuries that occur when two bones are out of place at the joint. They are often caused by a fall or a blow and sometimes from playing a contact sport. When a dislocation occurs, the joint can't be moved. Dislocations can occur in the ankles, knees, shoulders, hips, and elbows as well as in the finger and toe joints. Dislocated joints often are swollen, very painful, and visibly out of place.



Treatment is based on which joint is dislocated, and the severity of the injury. It might include manipulations to reposition the bones, medicine, a splint or sling, and rehabilitation. When properly repositioned, a joint will usually function and move normally again in a few weeks. Joints that become dislocated and later heal are more likely to become dislocated again.

Strains/Sprains/Tears

A sprain is an injury to a ligament, the tough, fibrous tissue that connects bones to other bone. Ligament injuries involve a stretching or a tearing of this tissue. The most commonly injured ligaments are in the ankle, knee, and wrist. Being stretched too far from their normal position often injures ligaments.

A strain is an injury to either a muscle or a tendon, the tissue that connects muscles to bones. Depending on the severity of the injury, a strain may be a simple overstretch of the muscle or tendon, or it can result in a partial or complete tear.

Muscle damage can be in the form of tearing (part or all) of the muscle fibers and the tendons attached to the muscle. The tearing of the muscle can also damage small blood vessels, causing local bleeding (bruising) and pain (caused by irritation of the nerve endings in the area).

To code for dislocations in ICD-10-CM the following is necessary:

- Anatomic site
- Laterality
- Type of injury
  - Dislocation
  - Subluxation
  - Sprain
- Episode of care (assigned as the seventh digit extension)
  - A = initial encounter
  - D = subsequent encounter
  - S = sequela

Dislocation and sprain of joints and ligaments of head	S03.
Dislocation and sprain of joints and ligaments at neck level	S13.
Dislocation and sprain of joints and ligaments of thorax	S23.
Dislocation and sprain of joints and ligaments of lumbar spine and pelvis	S33.
Dislocation and sprain of joints and ligaments of shoulder girdle	S43.

Dislocation and sprain of joints and ligaments of the elbow	S53.
Dislocation and sprain of joints and ligaments at wrist and hand level	S63.
Dislocation and sprain of joints and ligaments of hip	S73.
Dislocation and sprain of joints and ligaments of knee	S83.
Dislocation and sprain of joints and ligaments at ankle, foot and toe level	S93.

Subcategories provide a higher level of specificity in each of the above categories, for example:

S43.0—Subluxation and dislocation of shoulder joint is further classified as:

Unspecified subluxation and dislocation of shoulder joint	S43.00
Anterior subluxation and dislocation of humerus	S43.01
Posterior subluxation and dislocation of humerus	S43.02
Inferior subluxation and dislocation of humerus	S43.03
Other subluxation and dislocation of shoulder joint	S43.08

Each of these areas are further classified to indicate laterality and to distinguish between subluxation and dislocation:

Anterior subluxation of right humerus	S43.011
Anterior subluxation of left humerus	S43.012
Anterior subluxation of unspecified humerus	S43.013
Anterior dislocation of right humerus	S43.014
Anterior dislocation of left humerus	S43.015
Anterior dislocation of unspecified humerus	S43.016

Example:

The correct code for a subsequent encounter for a patient with an anterior subluxation of the left humerus would be S43.012D.

Fractures

The ICD-10-CM codes used to report fractures are found throughout Section 19, Injury, Poisoning and Certain Other Consequences of External Causes, depending on the site of the fracture.

To code a fracture in ICD-10-CM the following is necessary:

- Anatomic site
- Laterality
- Fracture type
  - Displaced or nondisplaced
  - Open or closed
    - Open fractures will be coded based on the Gustilo open fracture classification, which are grouped into three main categories designated as Type I, Type II and Type III. Type III is further subdivided into Type IIIA, Type IIIB, and Type IIIC. These will be discussed below.
- Episode of care (assigned as a seventh digit extension)
  - A = initial encounter for closed fracture
  - B = initial encounter for open fracture
  - D = subsequent encounter for fracture with routine healing
  - G = subsequent encounter for fracture with delayed healing
  - K = subsequent encounter for fracture with nonunion
  - P = subsequent encounter for fracture with malunion
  - S = sequela (late effect)
- Epiphysis fractures (also know as Salter Harris fractures) are grouped by body site and by Salter-Harris classification as Type I, II, III, IV, or other.

Displaced fracture of the acromial process, right shoulder, initial encounter for a closed fracture	S42.121A
Displaced fracture of the acromial process, left shoulder, initial encounter for a closed fracture	S42.122A

Displaced fracture of the acromial process, unspecified shoulder, initial encounter for a closed fracture	S42.123A
Nondisplaced fracture of the acromial process, right shoulder, initial encounter for a closed fracture	S42.124A
Nondisplaced fracture of the acromial process, left shoulder, initial encounter for a closed fracture	S42.125A
Nondisplaced fracture of the acromial process, unspecified shoulder, initial encounter for a closed fracture	S42.126A

Displaced fracture of coracoid process, right shoulder, subsequent encounter for routine healing	S42.131D
Displaced fracture of coracoid process, left shoulder, subsequent encounter for routine healing	S42.132D
Displaced fracture of coracoid process, unspecified shoulder, subsequent encounter for routine healing	S42.133D
Nondisplaced fracture of coracoid process, right shoulder, subsequent encounter for routine healing	S42.134D
Nondisplaced fracture of coracoid process, left shoulder, subsequent encounter for routine healing	S42.135D
Nondisplaced fracture of coracoid process, unspecified shoulder, subsequent encounter for fracture with malunion	S42.136P

Displaced comminuted fracture of shaft of humerus, right arm, initial encounter for open fracture	S42.351B
Displaced comminuted fracture of shaft of humerus, left arm, initial encounter for open fracture	S42.352B
Displaced comminuted fracture of shaft of humerus, unspecified arm, sequela	S42.353S
Nondisplaced comminuted fracture of shaft of humerus, right arm, subsequent encounter for fracture with delayed healing	S42.354G
Nondisplaced comminuted fracture of shaft of humerus, left arm, subsequent encounter for fracture with nonunion	S42.355K
Nondisplaced comminuted fracture of shaft of humerus, unspecified arm, subsequent encounter for fracture with malunion	S42.356P

According to the ICD-10-CM guidelines, a fracture not identified as displaced or nondisplaced should be coded as displaced.

Open Fractures

Gustilo open fracture classification—Classification of open fractures into three major categories to indicate the mechanism of the injury, soft tissue damage, and the degree of skeletal involvement.

- **Type I**—The wound is less that 1 cm with minimal soft tissue injury, wound bed is clean, and fracture is usually a simple transverse, short oblique fracture, or with minimal comminution.
- **Type II**—The wound is greater than 1 cm with moderate soft tissue injury, fracture is usually a simple transverse, short oblique fracture, or with minimal comminution.
- **Type III**—Fractures that involve extensive damage to the soft tissues, including muscle, skin, and neurovascular structures, often accompanied by a high velocity injury or a severe crushing component. Some examples of these are open segmental wounds, gunshot wounds, neurovascular injury, farm injuries with soil contamination, traumatic amputations, open fractures greater than eight hours old, and mass casualties such as war and tornado victims.

- **Subtype IIIA**—Adequate soft tissue coverage despite soft tissue laceration or flaps or high energy trauma irrespective of the size of the wound, and includes segmental or severely comminuted fractures.
- **Subtype IIIB**—Extensive soft tissue loss with periosteal stripping and bony exposure usually associated with massive contamination.
- **Subtype IIIC**—Major arterial injury requiring repair for limb salvation.

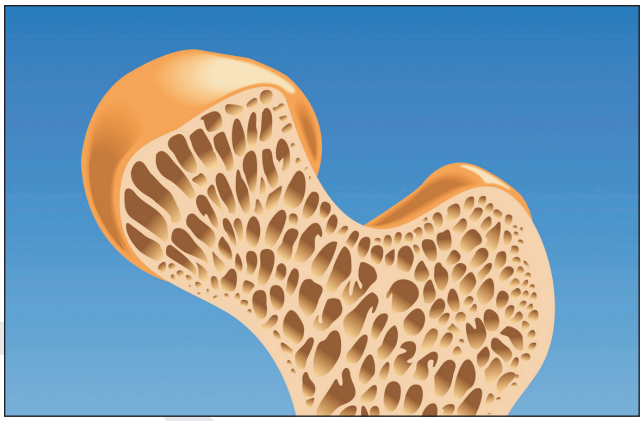
Osteoporosis

Osteoporosis is the thinning of bone tissue and loss of bone density over time, and the body fails to form enough new bone when the body reabsorbs old bone. It is the most common type of bone disease as studies indicate that about one in five American women over the age of 50 is affected by osteoporosis. About half of these women will have a fracture of the hip, wrist, or vertebra (bones of the spine).

Calcium and phosphate are two minerals that are essential for normal bone formation. Throughout youth, your body uses these minerals to produce bones. If you do not get enough calcium, or if your body does not absorb enough calcium from the diet, bone production and bone tissues may suffer.

As you age, calcium and phosphate may be reabsorbed back into the body from the bones, which makes the bone tissue weaker. This can result in brittle, fragile bones that are more prone to fractures, even without injury.

The leading causes of osteoporosis are a drop in estrogen in women at the time of menopause and a drop in testosterone in men. Other causes include confinement to a bed, chronic rheumatoid arthritis, chronic kidney disease, eating disorders, or certain corticosteroid steroids.



Source: AAPC

The ICD-10-CM code range for Disorders of bone density and structure is M80–M85.

Osteoporosis with current pathological fracture	M80.
Osteoporosis without current pathological fracture	M81.
Adult osteomalacia	M83.
Disorder of continuity of bone	M84.
Other disorders of bone density and structure	M85.

To code osteoporosis in ICD-10-CM the following is necessary:

- Type of osteoporosis
- With pathological fracture
  - Site of fracture must be identified
- Without pathological fracture
- Episode of care (assigned as a seventh digit extension)
  - A = initial encounter for fracture
  - D = subsequent encounter for fracture with routine healing
  - G = subsequent encounter for fracture with delayed healing
  - K = subsequent encounter for fracture with nonunion
  - P = subsequent encounter for fracture with malunion
  - S = sequela (late effect)

Age-related osteoporosis with current pathological fracture, right shoulder, initial episode of care	M80.011A
Age-related osteoporosis with current pathological fracture, left shoulder, subsequent encounter for fracture with nonunion	M80.012K
Age-related osteoporosis with current pathological fracture, unspecified shoulder, sequela	M80.019S

Other osteoporosis with current pathological fracture, right shoulder, initial episode of care	M80.811A
Other osteoporosis with current pathological fracture, left shoulder, subsequent encounter for fracture with nonunion	M80.812K
Other osteoporosis with current pathological fracture, unspecified shoulder, sequela	M80.819S

In the above table, laterality is shown as well as examples of the seventh digit extension options. The documentation in the clinical record will be the guide for the selection of the most appropriate character.

According to the official ICD-10-CM guidelines, osteoporosis is a systemic condition, meaning that all bones of the musculoskeletal system are affected. Site is not a component of the codes under category M81, osteoporosis without current pathological fracture. The site codes under category M80, osteoporosis with current pathological fracture, identify the site of the fracture, not the osteoporosis.

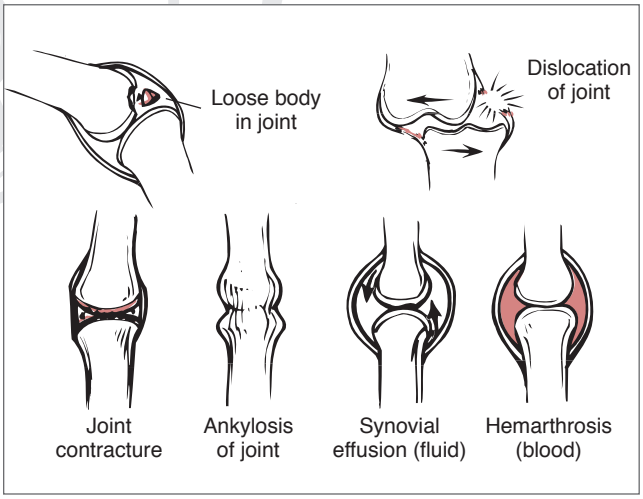
Tendonitis

Tendonitis is the inflammation of a tendon, which occurs when a tendon becomes inflamed. When the tendons are inflamed, the action of pulling the muscles becomes irritating. If the normal smooth gliding motion of the tendon is impaired, the tendon becomes inflamed and movement becomes painful. There are hundreds of tendons scattered throughout the body however, only a small number of them cause problems, due to poor blood supply in them, which leads to tissue damage and poor healing response.

Tendonitis is most often an overuse injury. Often people begin a new activity or exercise that causes the tendon to become irritated. Tendon problems are most common in the 40-60 year-old age range. Tendons are not as elastic and forgiving as in younger individuals, yet bodies are still exerting with the same force.

Occasionally, there is an anatomical cause for tendonitis. If the tendon does not have a smooth path to glide along, it will be more likely to become irritated and inflamed. In these unusual situations, surgical treatment may be necessary to realign the tendon.

The ICD-10-CM codes for tendonitis are found in multiple sections depending on where it is located.



To code tendonitis in ICD-10-CM, the following is necessary:

- Laterality

Patellar tendonitis, unspecified knee	M76.50
Patellar tendonitis, right knee	M76.51
Patellar tendonitis, left knee	M76.52

Achilles tendonitis, unspecified leg	M76.60
Achilles tendonitis, right leg	M76.61
Achilles tendonitis, left leg	M76.62

Peroneal tendonitis, unspecified leg	M76.70
Peroneal tendonitis, right leg	M76.71
Peroneal tendonitis, left leg	M76.72

In the above table, the laterality issue is shown. Note the fifth digits in each set of codes. The fifth digit of 0 denotes the unspecified side of the affected area, the fifth digit of 1 denotes the right side, and the fifth digit of 2 denotes the left side.

Bursitis

Bursitis is inflammation of the fluid-filled sac (bursa) of synovial fluid, located near joints where tendons and muscles pass over bony projections; the condition may be acute or chronic. Healthy bursae create a smooth, almost frictionless functional gliding surface making normal movement painless. When bursitis occurs, however, movement relying in the area becomes difficult and painful. Bursitis can be caused by chronic overuse, trauma, rheumatoid arthritis, gout, or infection. Sometimes the cause cannot be determined, and most commonly occurs in the shoulder, knee, elbow, and hip. Other areas that may be affected include the Achilles tendon and the foot.

The ICD-10-CM codes for bursitis are found in sections M70.–M71.

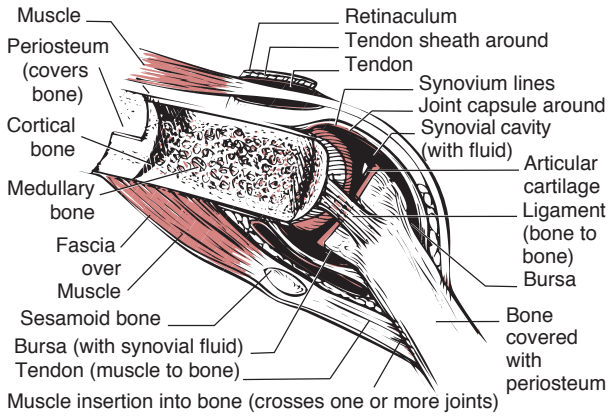
To code for bursitis in ICD-10-CM, the following is necessary:

- Type of bursitis
- Laterality

Bursitis, unspecified hand	M70.10
Bursitis, right hand	M70.11
Bursitis, left hand	M70.12

Rheumatoid bursitis, right hand	M06.241
Rheumatoid bursitis, left hand	M06.242
Rheumatoid bursitis, unspecified hand	M06.249

Other infective bursitis, right hand	M71.141
Other infective bursitis, left hand	M71.142
Other infective bursitis, unspecified hand	M71.149



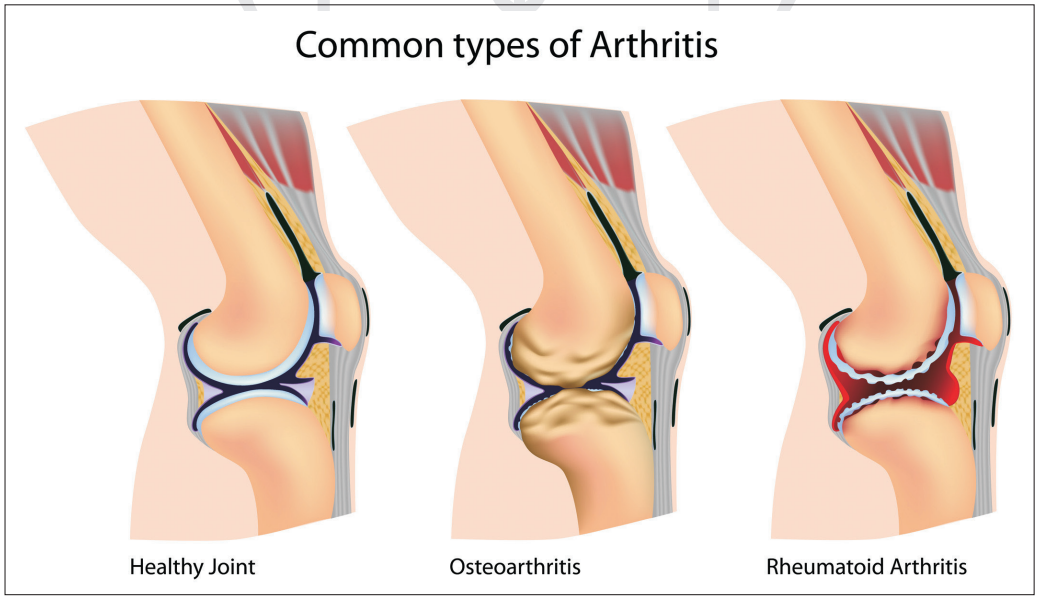
In the above table, the laterality issue is shown. Note that the fifth digits indicate different sides than the codes that require six digits. When the code is made up of five digits, the fifth digit of 0 denotes an unspecified side, the fifth digit of 1 denotes the right side, and the fifth digit of 2 denotes the left side. However, when six digits are required in a code, the sixth digit of 1 denotes the right side, the fifth digit of 2 denotes the left side, and the fifth digit of 9 denotes an unspecified side.

Arthritis

Arthritis is a group of conditions involving damage to the joints of the body. There are over 100 different forms of arthritis. The most common type is osteoarthritis,

also known as degenerative joint disease, which can result from trauma to the joint, infection of the joint, or age. The most common symptom of arthritis is pain in the joint or joints, which is oftentimes constant. Osteoarthritis can affect both the larger and smaller joints of the body, including the hands, feet, back, hip, or knee. Osteoarthritis begins in the cartilage and eventually leads to the two opposing bones eroding into each other, acquired from daily wear and tear of the joint. The pain it causes can be debilitating and prevent one from doing any type of activity. It affects the elderly and cannot be cured, but can be prevented from worsening through weight loss, and muscle strengthening. In the very advanced stages, surgery may be required to include joint replacement.

Rheumatoid arthritis is another common type of arthritis. It is a disorder in which the body's own immune system begins to attack body tissues. The attack is not only limited to the joint but to many other parts of the body. In rheumatoid arthritis, most damage occurs to the joint lining and cartilage, which eventually results in erosion of two opposing bones. Rheumatoid arthritis affects joints in the fingers, wrists, knees, and elbows. The disease can lead to severe deformity within a few years if not treated. Rheumatoid arthritis occurs mostly in people aged 20 and above. In children, the disorder can present with a skin rash, fever, pain, disability, and limitations in daily activities. It is unknown why rheumatoid arthritis occurs, and all treatment is directed at relieving the symptoms. If diagnosed at an early age, aggressive treatment can lead to providing a good quality of life for patients. There is no cure for rheumatoid arthritis.



Source: AAPC

The ICD-10-CM codes for osteoarthritis are found in sections M15.–M19.

To code for arthritis in ICD-10-CM, the following is necessary:

- Type of osteoarthritis (primary, secondary, or traumatic)
- Laterality

Bilateral primary osteoarthritis of knee	M17.0
Unilateral primary osteoarthritis, unspecified knee	M17.10
Unilateral primary osteoarthritis, right knee	M17.11
Unilateral primary osteoarthritis, left knee	M17.12

Bilateral post-traumatic osteoarthritis of knee	M17.2
Unilateral post-traumatic osteoarthritis, unspecified knee	M17.30
Unilateral post-traumatic osteoarthritis, right knee	M17.31
Unilateral post-traumatic osteoarthritis, left knee	M17.32

Other bilateral secondary osteoarthritis of knee	M17.4
Other unilateral secondary osteoarthritis of knee	M17.5

However, when six characters are required in a code, the sixth character of 1 denotes the right side, the sixth character of 2 denotes the left side, and the sixth character of 9 denotes an unspecified side.

Sources

Comprehensive Medical Terminology (Fourth Edition) by Betty Davis Jones.

Stedman's Medical Dictionary, 28th edition

Bates' Pocket Guide to Physical Examination and History Taking, Third Edition (Lynn S. Bickley-Lippincott)