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Synovial Joint Structures

Synovial joints can be further classified by the movements they allow, including:

- **Ball-and-socket**: Head of a long bone ("ball") and depression of another bone ("socket") join. The shoulder (humeral head and glenoid depression of the scapula) and hip joints (femoral head and acetabulum of a coxa bone) are ball-and-socket articulations.

- **Condyloid**: Protrusion of one bone meets a depression of another to form this type of joint. Examples are the wrist (radius and carpals) and knuckles (metacarpal and proximal phalange).

- **Hinge**: Convex portion of a bone meets with the concave part of another to form a hinge joint. The elbow and knee are large hinge joints.

- **Pivot**: Rounded or pointed protrusion of one bone fits into a ring composed of bone or bone and ligaments of another bone. The articulation between the C1 and C2 vertebrae that allows the head to move back and forth is a pivot joint.

- **Planar**: Flat surfaces of two bones glide against one another. The joints between the short carpals (intercarpal joint) and tarsals (intertarsal joint) are planar.

- **Saddle**: One bone has a depression shaped somewhat like an equestrian saddle; the joint is formed by a second bone straddling that depression. An example of this type of articulation is where the trapezium meets the metacarpal of the thumb. This joint allows the unique opposition of the human thumb.

**DEFINITIONS**

**opposition**—Act of touching the thumb to the tips of each finger on the same hand.
Injuries

Injuries to the skeletal system are quite common as it is a rigid structure. The joints are also fairly susceptible to injury because part of their purpose is to maintain alignment, regardless of extraneous external forces.

Fractures, or breaks in the bone, are a common injury. There are roughly 6.8 million fractures reported in the United States annually.

The appropriate fracture code depends on the bone fractured, whether the fracture was pathological or traumatic, and whether it was open or closed. ICD-10-CM requires much more information than does ICD-9-CM.

For discussion purposes, ICD-9-CM and ICD-10-CM coding of a closed fracture of the greater tuberosity of the humerus will be compared. A difference in coding can be spotted immediately just by looking at the ICD-10-CM and ICD-9-CM alphabetic index. In ICD-10-CM, the fracture must be identified as traumatic or pathological before proceeding any further in code selection. In ICD-9-CM, the site of the fracture may be selected first, followed by whether it is pathological in nature. In ICD-9-CM, an injury is assumed to be traumatic unless further clarified. With the information provided, code 812.03 Fracture of humerus, upper end, closed, greater tuberosity, may be assigned in ICD-9-CM.

In ICD-10-CM, the above information is not sufficient for code assignment—there are two more considerations. First, is the fracture traumatic or pathological? Second, does the patient also have a diagnosis of osteoporosis? If the patient does have osteoporosis, according to ICD-10-CM coding guidelines, the fracture should automatically be reported as a pathological fracture of the humerus, regardless of whether it is specified as such. For demonstration purposes, assume the fracture is specified as traumatic, which leads us to category S42.25 Fracture of greater tuberosity of humerus.

Traumatic fractures must be further clarified with the following information:

- Is the bone displaced? If this is unspecified, ICD-10-CM Coding Guidelines direct the coder to assume the fracture is displaced.
- On which side of the body did the injury occur?

These two answers determine the sixth digit of the ICD-10-CM code. However, since fracture codes require a seventh character, even more information is needed. This alphabetic character is based on multiple factors as listed below:

- Is this the initial encounter for the fracture? If yes, is the fracture:
  - open
  - closed
- Is this a subsequent encounter? If yes:
  - Is the healing of the fracture routine or delayed?
  - Is there a nonunion or malunion?
  - Is there a sequela or late effects of the fracture?

Due to the extensive nature of code selection for a fracture in ICD-10-CM, there is a “one-to-many” match between the two coding classification systems as demonstrated in the table below.
Comprehensive Anatomy and Physiology for ICD-10-CM Coding

Note that in ICD-9-CM, if a fracture is specified as complicated by a malunion or nonunion, the fracture site is irrelevant as there are only two applicable codes: 733.81 Malunion of fracture, and 733.82 Nonunion of fracture. However, documentation of the site, laterality, and type of complication is imperative in ICD-10-CM, as the same traumatic fracture codes are used but with a seventh character identifying malunion or nonunion.

Additionally, to appropriately assign a seventh digit for malunion or nonunion of an open fracture, a coder must be aware of the differences between the types of open fractures as described below:

- Type I: The wound is less than 1 cm in length and clean.
- Type II: The wound is greater than 1 cm in length, clean, and there is minimal to no soft tissue injury.
- Type III: The wound is greater than 1 cm in length, and there is significant soft tissue injury. Type III fractures can be further classified as:
  - IIIA: There is enough local soft tissue to cover the wound and bone without the need for skin grafting.
  - IIIB: The injury to the soft tissue is significant enough that skin grafting is necessary to cover the bone.
  - IIIC: The injury is associated with an arterial injury that requires repair.

The differences in coding for malunion and nonunion are captured in the table below. Please note that due to extensive mapping, the table is a sample of the ICD-10-CM codes that represent the various concepts.
Sometimes the normal curvatures in the spine become deformed. There are three types of these deformities:

- **Scoliosis**, a lateral curvature of the spine
- **Kyphosis**, an abnormal posterior convex curvature of the spine
- **Lordosis**, an exaggerated inward curvature of the lower back

### ICD-9-CM vs ICD-10-CM

<table>
<thead>
<tr>
<th>ICD-9-CM</th>
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<td>Idiopathic aseptic necrosis of right foot</td>
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<td>M87.876</td>
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<tr>
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<td>Other osteonecrosis, unspecified foot</td>
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**See the one-to-many relationship of key ICD-9-CM codes to ICD-10-CM codes.**

**Focuses on pathology and includes detailed illustrations that help users to visualize conditions and key factors in ICD-10-CM coding.**
For the most part, ICD-10-CM mimics ICD-9-CM when it comes to coding kyphosis and lordosis, having equivalent one-to-one mapping or, if there is a one-to-many match, the classification is simply divided by spinal region (i.e., cervical, thoracic, or lumbar). However, there are a few distinct differences surrounding the crosswalk for scoliosis and kyphoscoliosis, category 734.3 in ICD-9-CM. In order to appropriately assign a code for (kypho-) scoliosis in ICD-10-CM, the coder must understand the different physiologies of the disease.

There are four major types of scoliosis:

- Congenital
- Neuromuscular, which is due to spinal muscle weakness or nerve damage
- Degenerative
- Idiopathic, which has an unknown cause and is the most common form of the disease. It can be divided by the age of the patient:
  - infantile: birth to 3 months
  - juvenile: 3 months to 9 years
  - adolescent: 10 to 18 years

ICD-9-CM does distinguish between infantile and other types of idiopathic scoliosis, as well as whether the infantile disease is progressive or resolving. In ICD-10-CM, however, the distinction between the age classifications is further specified, and juvenile and adolescent idiopathic scoliosis are also given their own categories, but the detail of whether the disease is progressing or resolving is lost in ICD-10-CM.

In addition to codes clarifying idiopathic scoliosis, codes have been added in ICD-10-CM for neuromuscular and other secondary forms of scoliosis, such as that caused by disc herniation.

**Coding for (Kypho-) Scoliosis**

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<td>M41.112 Juvenile idiopathic scoliosis, cervical region</td>
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<td>M41.114 Juvenile idiopathic scoliosis, thoracic region</td>
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<td>M41.115 Juvenile idiopathic scoliosis, thoracolumbar region</td>
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<tr>
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<td>M41.116 Juvenile idiopathic scoliosis, lumbar region</td>
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<tr>
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<td>M41.117 Juvenile idiopathic scoliosis, lumbosacral region</td>
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<td>M41.119 Juvenile idiopathic scoliosis, site unspecified</td>
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<tr>
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<td>M41.122 Adolescent idiopathic scoliosis, cervical region</td>
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<td>M41.123 Adolescent idiopathic scoliosis, cervicothoracic region</td>
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(Continued on next page)
20. The three types of spinal curvature abnormalities are:
   a. ________________
   b. ________________
   c. ________________

KNOWLEDGE REVIEW ANSWERS: SKELETAL SYSTEMS AND ARTICULATIONS

1. True or false. The mandible is the only bone in the face that moves. **True**
   
   **Rationale:** The face consists of 13 stationary bones and one that is mobile. The mandible (jawbone) is the only facial bone that moves, and it is also the largest and strongest bone of the face.

2. The bony spine is also called the vertebral column, named after the 24 individual bones that it comprises.
   
   **Rationale:** The vertebral column is the support for the head and trunk of the body, as well as protection for the spinal cord. It is composed of 26 individual bones. Of these bones, 24 are vertebrae that are separated by cartilage called intervertebral discs.

3. There are how many vertebrae in each section of spine?
   a. 7 cervical
   b. 12 thoracic
   c. 5 lumbar
   
   **Rationale:** The vertebrae can be divided into three groups: 7 cervical (C1-C7; C1 is also known as atlas, C2 as axis), 12 thoracic (T1-T12), 5 lumbar (L1-L5).

4. The clavicle and scapula form the shoulder girdle.
   
   **Rationale:** The shoulder girdle consists of two bones on each side, the clavicle, or collar bone, and the scapula, or shoulder blade. The clavicle is found on the anterior side of the shoulder and the scapula on the posterior.

5. What is the lowest portion of the coxal bones called? **ischium**
   
   **Rationale:** This area is identified in the illustration of the pelvis.

6. The acetabulum is where the head of the femur sits to form the hip joint.
   
   **Rationale:** Where the three parts of the pelvic bone fuse together is referred to as the acetabulum. It is a deep-seated pocket that accepts the rounded upper epiphysis of the thigh bone, or femoral head, to form the hip joint.

7. True or false. Both the thumb and big toe have more phalanges than the other toes. **False**
   
   **Rationale:** There are three phalanges in all fingers, except thumbs, which have only two. Similarly, all of the toes have three phalanges—proximal, middle, and distal—with the exception of the great toe, or hallux.