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ICD-10 Experts

Rhonda Buckholtz, CPC, CPMA, CPC-I, CGSC, CPEDC, CENTC, COBGC
VP, ICD-10 Training and Education

Shelly Cronin, CPC, CPMA, CPC-I, CANPC, CGSC, CGIC, CPPM
Director, ICD-10 Training

Betty Hovey, CPC, CPMA, CPC-I, CPC-H, CPB, CPCD
Director, ICD-10 Development and Training

Jackie Stack, CPC, CPB, CPC-I, CEMC, CFPC, CIMC, CPEDC
Director, ICD-10 Development and Training

Peggy Stilley, CPC, CPB, CPMA, CPC-I, COBGC
Director, ICD-10 Development and Training
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Terminology

Anoxia—The absence of oxygen in the gases, blood, or tissues in the body.

Apnea—Absence of spontaneous respiration.

Atelectasis—Condition which prevents lungs from expanding due to secretions blocking the bronchioles so air is unable to pass through.

Centrilobular—Pertaining to the center of a lobe.

Compensatory—Regenerative growth that takes place in an organ after it has been damaged, removed, or ceases to function.

Dysphonia—Voice disturbance causing hoarseness, weakness, or loss of voice.

Dyspnea—Difficult or labored breathing.

Empyema—Accumulation of pus in pleural cavity.

Hemoptysis—The process of coughing up blood or blood stained sputum from the bronchi, larynx, trachea, or lungs.

Mediastinum—Cavity between the lungs.

Nebulizer—Equipment used to dispense medication through mist (inhaled by the patient) to open up airways.

Hypertrophy—Excessive growth of an organ or part.

Interstitial lung disease—A group of disorders causing progressive scarring of lung tissue, which affects the ability to breathe and get oxygen into the bloodstream.

Panlobular—Affecting all parts of the lobe.

Spirometry—A test to record the volume of air in and exhaled and the length of time each breathe takes.

Thoracentesis—A procedure where a needle is inserted into the chest wall to obtain fluid for testing, drain excessive fluid from the pleural cavity, or to re-expand a collapsed lung.

Introduction

The respiratory system allows for the exchanges of gases (mostly oxygen and carbon dioxide) between the human body and the outside environment. The system is made up of the following organs: nose, sinuses, pharynx, larynx, trachea, bronchi, and lungs.

The lungs are the main organ in the system. The right lung has three lobes and the left lung has two lobes. The lungs contain a bronchial system which leads to the alveolar sacs. Air enters through the nostrils and passes through nasal hair (cilia), which acts as a filter. The inner nostrils are also lined with mucus that helps pick up particles and moisturizes incoming air. The nose is divided into halves by a bone called the septum. The sinuses are air-filled cavities within the facial bones. There are four sinuses: the frontal, which are positioned behind the forehead; the maxillary, which are positioned behind the cheeks; and the sphenoid and ethmoid sinuses which are located deeper in the skull behind the maxillary sinuses.

Cells of the Respiratory Tract

Respiratory epithelium is a type of epithelium found lining the respiratory tract, where it serves to moisten and protect the airways. It also functions as a barrier to potential pathogens and foreign particles, preventing infection and tissue injury by action of the mucociliary escalator. The cilia of the respiratory epithelium move secreted mucus containing trapped foreign particles toward the oropharynx, for either expectoration or swallowing to the stomach where the acidic pH helps to neutralize foreign material and micro-organisms. This system is collectively known as the mucociliary escalator and serves two functions: to keep the
lower respiratory tract sterile, and to prevent mucus accumulation in the lungs.

Seven types of cells will be discussed:

- Goblet cells
- Ciliated cells
- Basal cells
- Clara cells
- Type I alveolar cells
- Type II alveolar cells
- Alveolar macrophages

**Goblet cells**, so named because they are shaped like a wine goblet, are columnar epithelial cells that contain membrane-bound mucous granules and secrete mucin (which dissolves in water to form mucus), which helps maintain epithelial moisture and traps particulate material and pathogens moving through the airway. They use both apocrine and merocrine methods for secretion. They are found scattered among the epithelial lining of organs, such as the intestinal and respiratory tracts. They are found inside the trachea, bronchus, and larger bronchioles in respiratory tract, small intestines, the colon, and conjunctiva in the upper eyelid. They may be an indication of metaplasia, such as in Barrett’s esophagus.

**Ciliated cells** are columnar epithelial cells with specialized ciliary modifications. Ciliated cells are cells covered in tiny hair-like projections known as cilia. Cilia work by rhythmically moving back and forth in unison. These tiny projections allow the cell to move through liquid or mucus environments or to propel objects around themselves, such as food, dust, or bacteria.

Single-celled organisms and ciliated epithelial cells found in many types of animal tissues can be referred to as ciliated cells. Ciliated epithelial cells are, however, rarely found in plants. One possible evolutionary explanation for this might have to do with the loss of moisture. Cilia dramatically increase the surface area of a cell, increasing the chance for evaporation and the need for water. Cycads, a type of tropical tree, are one of the few plant genera that possess ciliated cells. The ciliated cells in the respiratory system are the primary cells affected by respiratory viruses, such as the cold or flu. These viruses work by killing the cell completely or by paralyzing the cilia. This causes mucus and bacteria to accumulate, leading to such secondary infections as sinusitis or bronchitis.

The **basal cells** are small, nearly cuboidal cells thought to have some ability to differentiate into other cell types found within the epithelium. Cell differentiation happens when a cell divides and becomes more specialized for various reasons, including tissue repair and disease control. For example, these basal cells respond to injury of the airway epithelium, migrating to cover a site denuded of differentiated epithelial cells, and subsequently differentiating to restore a healthy epithelial cell layer.

**Clara cells** are dome-shaped cells with short microvilli found in the small airways (bronchioles) of the lungs. Clara cells are found in the ciliated simple epithelium. These cells may secrete glycosaminoglycans to protect the bronchiole lining. One of the main functions of clara cells is to protect the bronchiolar epithelium. They do this by secreting a small variety of products, including clara cell secretory protein (CCSP) and a solution similar to the component of the lung surfactant. They are also responsible for detoxifying harmful substances inhaled into the lungs. Clara cells also multiply and differentiate into ciliated cells (most notably the type II pneumocytes) to regenerate the bronchiolar epithelium.

**Type I and Type II alveolar cells** comprise the main cell types of the alveolar epithelium. The type I cells are large, thin cells that are responsible for gas exchange in the alveoli and cover over 95 percent of the alveolar surface. Type I pneumocytes are unable to replicate and are susceptible to toxic insults. The type II cells are smaller and more numerous than the type I. They are the “caretakers” of the alveolar compartment. In the event of damage, Type II cells can proliferate and/or differentiate into type I cells to compensate. Type II alveolar cells produce surfactant that reduces the tendency of the alveoli to collapse. Surfactants are a group of phospholipids that reduce the alveolar surface tension. Release of surfactant in lamellar bodies occurs from an infant’s first breath onwards.
Organs of the Respiratory System—Function and Structure

The system is made up of the following organs:

- Nose
- Paranasal sinuses
- Pharynx
- Larynx
- Trachea
- Bronchi
- Lungs

The Nose and Turbinates

The nose is the organ of smell and is the gateway into the respiratory system. The visible part of the human nose is the protruding part of the face that bears the nostrils. The shape of the nose is determined by the ethmoid bone and the nasal septum, which consists mostly of cartilage and separates the nostrils.

The nose has an area of specialized cells which are responsible for smelling (part of the olfactory system). Another function of the nose is the conditioning of inhaled air, warming it, and making it more humid. Hairs inside the nose prevent large particles from entering the lungs. The nasal root is the top of the nose, forming an indentation at the suture where the nasal bones meet the frontal bone. The anterior nasal spine is the thin projection of bone at the midline on the lower nasal margin, holding the cartilaginous center of the nose.

The nasal conchae, or turbinates, are long, narrow, and curled bones shaped like elongated sea shells and protrude into the nasal passages. They are responsible for forcing inhaled air to flow in a steady, regular pattern around the cilia and tissue. The three pairs of turbinates are located laterally in the nasal cavities and are composed of ciliated respiratory epithelium. Each pair is composed of one turbinate in either side of the nasal cavity and is divided by the septum.

The inferior turbinates are the largest and can be as long as the index finger. They are responsible for the majority of airflow direction, humidification, heating, and filtering of air inhaled through the nose. The middle turbinates are smaller and are about as long as the little finger. They project downwards over the openings of the ethmoid and maxillary sinuses. They act as buffers to protect the sinuses from coming in direct contact with pressurized nasal airflow. Most inhaled airflow travels between these two turbinates. The superior turbinates are smaller structures that are connected to the middle turbinates by nerve endings. They protect the olfactory bulb.

The turbinates are required for functional respiration. They are enriched with airflow pressure and temperature sensing nerve receptors, allowing for tremendous erectile capabilities of nasal congestion and decongestion, in response to the climatic conditions and changing needs of the body. The turbinates are also responsible for filtration, heating, and humidification of air inhaled through the nose. As air passes over the turbinate tissues it is heated to body temperature, humidified, and filtered.
The Paranasal Sinuses
The paranasal sinuses are air-filled spaces within the bones of the skull and face. Sinus is a Latin word meaning fold or pocket. They are divided into four groups: maxillary, frontal, ethmoid, and sphenoid. They are named according to the bones within which they lie. The paranasal sinuses are lined with ciliated respiratory epithelium.

- **Maxillary sinuses** (also called maxillary antra): The largest of the paranasal sinuses are located under the eyes in the maxillary bone and are pyramidal in shape. This sinus has an alveolar recess, bound by the alveolar process, a zygomatic recess, bound by the zygoma (cheekbone), and an infraorbital recess, bound by the inferior orbital surface. The sinus is lined with mucoperiosteum. The size of the sinus varies from person to person, and even on the two sides of the same skull.
- **Frontal sinuses**: These sinuses are located in the frontal bone, superior to the eyes. They are absent at birth and become fully developed by puberty. Approximately 5 percent of people never develop frontal sinuses. They are rarely symmetrical and the septum between them is frequently deviated. The mucous membrane in this sinus is innervated by the supraorbital nerve, which carries nerve fibers for mucous secretion from the facial nerve and is supplied by the supraorbital artery and anterior ethmoidal artery.
- **Ethmoidal sinuses** (also called the ethmoidal air cells): These sinuses are formed from several discrete air cells within the ethmoid bone between the nose and the eyes. The ethmoidal air cells consist of numerous thin-walled cavities in the ethmoidal labyrinth. They lie between the upper parts of the nasal cavities and the orbits, separated by thin bony laminae. The ethmoidal sinuses are classified as anterior, middle, and posterior. The anterior drains into the middle meatus of the nose by way of the infundibulum. The middle drains into the middle meatus of the nose on or above the bulla ethmoidalis, and the posterior drains into the superior meatus above the middle nasal concha. Sometimes one or more of the posterior opens into the sphenoidal sinus. The ethmoidal air cells receive sensory fibers from the anterior and posterior ethmoidal nerves, and the orbital branches of the pterygopalatine ganglion, which carry nerve fibers for mucous secretion from the facial nerve.
- **Sphenoidal sinuses**: These sinuses are located in the sphenoid bone at the center of the skull base under the pituitary gland. They are rarely symmetrical and vary in size and shape (about the size of a grape). Each sinus opens into the roof of the nasal cavity. They drain into the back portion of the nose through an ostium (small opening). The mucous membrane receives sensory innervation by the posterior ethmoidal nerves and fibers of the facial nerve that synapse at the pterygopalatine ganglion.

The Pharynx
The pharynx is the part of the throat situated immediately posterior to the mouth and nasal cavity, and superior to the esophagus, larynx, and trachea. It is divided into three distinct anatomic sections: the nasopharynx, the oropharynx, and the hypopharynx. The pharynx is part of the digestive system and also the respiratory system; it is also important in vocalization.

The nasopharynx is the most important part in digestive and the respiratory system. The nasopharynx is the most cephalad portion of the pharynx. It extends from the base of the skull to the upper surface of the soft palate. It includes the space between the internal nares and the soft palate and lies superior to the oral cavity. The pharyngeal tonsils, more commonly referred to as the adenoids, are lymphoid tissue structures located in the posterior wall of the nasopharynx.

The oropharynx lies behind the oral cavity, extending from the uvula to the level of the hyoid bone. It opens anteriorly into the mouth. The anterior wall consists of the base of the tongue and the epiglottic vallecula; the lateral wall is made up of the tonsil, tonsillar fossa, and tonsillar pillars; the superior wall consists of the inferior surface of the soft palate and the uvula. Because both food and air pass through the pharynx, a flap of connective tissue called the epiglottis closes over the glottis when food is swallowed to prevent aspiration.

The hypopharynx (or laryngopharynx) is the caudal part of the pharynx and is the part of the throat that connects to the esophagus. It lies inferior to the epiglottis and extends to the location where this common pathway
diverges into the respiratory (larynx) and digestive (esophagus) pathways. The esophagus conducts food and fluids to the stomach; air enters the larynx anteriorly. During swallowing, air passage temporarily stops so food can pass through. Corresponding roughly to the area located between the 4th and 6th cervical vertebrae, the superior boundary of the hypopharynx is at the level of the hyoid bone. The hypopharynx includes three major sites: the pyriform sinus, postcricoid area, and the posterior pharyngeal wall. Like the oropharynx above it, the hypopharynx serves as a passageway for food and air and is lined with a stratified squamous epithelium. It is innervated by the pharyngeal plexus.

The Larynx

The larynx (also called the voice box), is involved in protecting the trachea and sound production. It manipulates pitch and volume. The larynx houses the vocal folds, which are an essential component of phonation. The vocal folds are situated just below where the tract of the pharynx splits into the trachea and the esophagus. Sound is generated in the larynx, where pitch and volume are manipulated. The strength of expiration from the lungs also contributes to loudness.

Fine manipulation of the larynx is used to generate a source sound with a particular fundamental frequency, or pitch. This source sound is altered as it travels through the vocal tract, configured differently based on the position of the tongue, lips, mouth, and pharynx. The process of altering a source sound as it passes through the filter of the vocal tract creates the many different vowel and consonant sounds of the world’s languages as well as tone, certain realizations of stress and other types of linguistic rhythm. The larynx also has a similar function as the lungs in creating pressure differences required for sound production.

During swallowing, the backward motion of the tongue forces the epiglottis over the glottis’ opening to prevent swallowed material from entering the larynx which leads to the lungs. The larynx is also pulled upwards to assist this process. Stimulation of the larynx by ingested matter produces a strong cough reflex to protect the lungs.

The Trachea

The trachea (also called the windpipe) is a bony tube located in the front of the neck that connects the nose and mouth to the lungs, allowing the passage of air. It is comprised of cartilage and ligaments and is lined with pseudostratified ciliated columnar epithelium cells with goblet cells which produce mucus. This mucus lines the cells of the trachea to trap inhaled foreign particles which the cilia then waft upwards towards the larynx and then the pharynx where it can either be swallowed into the stomach or expelled as phlegm.

The trachea begins at the lower part of the larynx and continues to the lungs, where it branches into the bronchi. It is the largest airway in the respiratory system. The esophagus lies posteriorly to the trachea. The trachea is composed of 16 to 20 C-shaped rings of cartilage connected by ligaments. This structure helps it push objects out of the airway if something becomes lodged. The trachea then branches into the bronchi at the level of the fifth thoracic vertebra.

The Bronchi

A bronchus is a passage of airway in the respiratory tract that conducts air into the lungs. No gas exchange takes place in this part of the lungs. Each bronchus has a wall consisting of three layers. The outermost is made of dense fibrous tissue, reinforced with cartilage. The middle layer is a network of smooth muscle. The innermost layer consists of ciliated mucous membrane.

The trachea divides into two main bronchi (also called mainstem bronchi), the left and the right, at the level of the sternal angle at the anatomical point known as the carina. The right main bronchus is wider, shorter, and more vertical than the left main bronchus. The right main bronchus subdivides into three lobar bronchi while the left main bronchus divides into two. The lobar bronchi divide into tertiary bronchi, also known as segmental bronchi, each of which supplies a bronchopulmonary segment. A bronchopulmonary segment is a division of a lung that is separated from the rest of the lung by a connective tissue septum. This property allows a bronchopulmonary segment to be surgically removed without affecting other segments. The segmental bronchi divide into many primary bronchioles which divide into terminal bronchioles, each of which then gives rise to several respiratory bronchioles, which go on to divide
into 2 to 11 alveolar ducts. There are five or six alveolar sacs associated with each alveolar duct. The alveolus is the basic anatomical unit of gas exchange in the lung.

The Lungs

The lungs are located within the chest cavity inside the rib cage. The surface area of the lungs is roughly the size of a tennis court. They are made of spongy, elastic tissue that stretches and constricts as a person breathes. The bronchial system is made of smooth muscle and cartilage, allowing the airways to constrict and expand. The lungs and airways bring in fresh, oxygen-enriched air and get rid of waste carbon dioxide made by your cells. This exchange happens across the alveolar capillary membranes. There are millions of alveoli in an adult lung. They also help in regulating the concentration of hydrogen ion (pH) in your blood.

Breathing is largely driven by the muscular diaphragm at the bottom of the thorax. Contraction of the diaphragm pulls the bottom of the cavity in which the lung is enclosed downward, increasing volume and thus decreasing pressure, causing air to flow into the airways. Air enters through the oral and nasal cavities; it flows through the pharynx, then the larynx and into the trachea, which branches out into the main bronchi and then subsequent divisions. During normal breathing, expiration is passive and no muscles are contracted (the diaphragm relaxes). The rib cage itself is also able to expand and contract to some degree, through the action of other respiratory and accessory respiratory muscles. As a result, air is transported into or expelled out of the lungs.

Vital capacity is the maximum volume of air that a person can exhale after maximum inhalation; it can be measured with a spirometer. In combination with other physiological measurements, the vital capacity can help make a diagnosis of underlying lung disease.

Diseases and Disorders

This section will address the diseases that are part of the official ICD-10-CM guidelines for the respiratory system found in chapter 10, Diseases of the Respiratory System.

Sinusitis

Acute sinusitis is caused from the nasal passages becoming inflamed and irritated from a variety of factors. They can be caused from environmental factors, such as pollen, mold, dust, or they can be caused from bacterial or fungal infections. Symptoms may include facial pain, difficulty breathing through the nose, or a headache. When coding for this condition in ICD-10-CM, it is important to know what area the sinus condition is affecting.

ICD-10-CM for Sinusitis

The ICD-10-CM code range for sinusitis is J01.00–J01.91. To code for sinusitis in ICD-10-CM, the following is necessary:

- Location of inflammation
- Acute or chronic condition
- If it is a recurrent condition

Following are samples for codes for sinusitis:
Acute maxillary sinusitis, unspecified | J01.00
Acute recurrent maxillary sinusitis | J01.01
Acute frontal sinusitis, unspecified | J01.10
Acute recurrent frontal sinusitis | J01.11
Acute ethmoidal sinusitis, unspecified | J01.20
Acute recurrent ethmoidal sinusitis | J01.21
Acute sphenoidal sinusitis, unspecified | J01.30
Acute recurrent sphenoidal sinusitis | J01.31
Acute pansinusitis, unspecified | J01.40
Acute recurrent pansinusitis | J01.41
Other acute sinusitis | J01.80
Other acute recurrent sinusitis | J01.81
Acute sinusitis, unspecified | J01.90
Acute recurrent sinusitis, unspecified | J01.91

The ICD-10-CM code range for chronic sinusitis is J32.0–J32.9.

Chronic maxillary sinusitis | J32.0
Chronic frontal sinusitis | J32.1
Chronic ethmoidal sinusitis | J32.2
Chronic sphenoidal sinusitis | J32.3
Chronic pansinusitis | J32.4
Other chronic sinusitis | J32.8
Chronic sinusitis, unspecified | J32.9

COPD
Chronic obstructive pulmonary disease (COPD) is one of the most common lung diseases. It may also be called chronic obstructive lung disease (COLD), chronic obstructive airway disease (COAD), chronic airflow limitation (CAL), and chronic obstructive respiratory disease (CORD). It refers to chronic bronchitis and emphysema paired together as co-existing diseases.

Lung damage and inflammation in the large airways results in chronic bronchitis. Chronic bronchitis is defined in clinical terms as a cough with sputum production on most days for three months of a year, for two consecutive years. In the airways of the lung an increased number and increased size of the goblet cells and mucous glands of the airway occurs. This results in more mucus than usual in the airways, contributing to narrowing of the airways and causing a cough with sputum. Microscopically, there is infiltration of the airway walls with inflammatory cells, which is followed by scarring and remodeling that thickens the walls and also results in narrowing of the airways. As chronic bronchitis progresses, there is an abnormal change in the tissue lining the inside of the airway and further thickening and scarring of the airway wall. The consequence of these changes is a limitation of airflow.

Lung damage and inflammation of the air sacs, or alveoli, results in emphysema. Emphysema is an enlargement of the air spaces distal to the terminal bronchioles, with destruction of their walls. The destruction of air space walls reduces the surface area available for the exchange of oxygen and carbon dioxide during breathing. It also reduces the elasticity of the lung itself, which results in a loss of support for the airways that are embedded in the lung. These airways are more likely to collapse causing further limitation to airflow.

Efforts made to breathe by patients suffering from emphysema during exhalation, causes a pink color in their faces, hence the term commonly used to refer to them, “pink puffers”. Patients with advanced COPD that have primarily chronic bronchitis rather than emphysema will have a bluish color of the skin and lips, hence the term commonly used to refer to them, “blue bloaters.”

ICD-10-CM for COPD
The ICD-10-CM code range for COPD is J44.0-J44.9. To code COPD in ICD-10-CM the following is necessary:

- Does acute lower respiratory infection exist?
- Does acute exacerbation exist?

Following are the codes for COPD:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J44.0</td>
<td>Chronic obstructive pulmonary disease with acute lower respiratory infection</td>
</tr>
<tr>
<td>J44.1</td>
<td>Chronic obstructive pulmonary disease with (acute) exacerbation</td>
</tr>
<tr>
<td>J44.9</td>
<td>Chronic obstructive pulmonary disease, unspecified</td>
</tr>
</tbody>
</table>
According to the guidelines, an acute exacerbation is a worsening or a decompensation of a chronic condition. An acute exacerbation is not equivalent to an infection superimposed on a chronic condition, though an exacerbation may be triggered by an infection.

If an acute lower respiratory infection is present (J44.0), then an additional code should be used to identify the infection, if known. The code set also states that asthma should be coded in addition to these codes, if applicable. Other codes that may be reported are for history of tobacco use (Z87.891), exposure to environmental tobacco smoke (Z77.22), and tobacco use (Z72.0).

Following are codes for emphysema:

| Unilateral pulmonary emphysema [MacLeod’s syndrome] | J43.0 |
| Panlobular emphysema | J43.1 |
| Centrilobular emphysema | J43.2 |
| Other emphysema | J43.8 |
| Emphysema, unspecified | J43.9 |
| Interstitial emphysema | J98.2 |
| Compensatory emphysema | J98.3 |

Additional guidelines for J43 in ICD-10-CM state to use an additional code to identify:

- Exposure to environmental tobacco smoke (Z77.22)
- History of tobacco use (Z87.891)
- Occupational exposure to environmental tobacco smoke (Z57.31)
- Tobacco dependence (F17-)
- Tobacco use (Z72.0)

**Asthma**

Asthma is a common chronic inflammatory disease of the airways characterized by variable and recurring symptoms, reversible airflow obstruction, and bronchospasm. Asthma is clinically classified according to the frequency of symptoms, forced expiratory volume in 1 second (FEV₁), and peak expiratory flow rate. Asthma may also be classified as atopic (extrinsic) in which symptoms are precipitated by allergens, or non-atopic (intrinsic) in which symptoms are not precipitated by allergens.

Although asthma is a chronic obstructive condition, it is not considered as a part of chronic obstructive pulmonary disease that was addressed previously. Unlike these diseases, the airway obstruction in asthma is usually reversible. If left untreated, though, the chronic inflammation of the lungs during asthma can become an irreversible obstruction due to airway remodeling, which involves fibrosis, hypertrophy of smooth muscle, and desquamation caused by extensive inflammatory infiltrate moving into the epithelium and smooth muscle. In contrast to emphysema, asthma affects the bronchi, not the alveoli.

Asthma is classified based on severity of the disease, as either mild intermittent, mild, moderate, or severe persistent. In a mild exacerbation the peak expiratory flow rate (PEFR) is ≥200 L/min or ≥50 percent of the predicted best. Moderate is defined as between 80 and 200 L/min or 25 percent and 50 percent of the predicted best while severe is defined as ≤80 L/min or ≤25 percent of the predicted best. It also has been classified in the following manners:

**Exercise-induced asthma** occurs during exercise. For many people, exercise-induced asthma is worse when the air is cold and dry. Exercise induced asthma can be treated with the use of a short-acting beta2 agonist.

**Occupational asthma** is asthma that is caused or worsened by breathing in a workplace irritant such as chemical fumes, gases, or dust. Animal proteins, enzymes, flour, natural rubber latex, and certain reactive chemicals are commonly associated with work-related asthma.

**Allergy-induced asthma.** Some people have asthma symptoms that are triggered by particular allergens, such as pet dander, cockroaches, or pollen.

An acute asthma exacerbation is commonly referred to as an asthmatic attack. The classic symptoms are shortness of breath, wheezing, and chest tightness. While these are the primary symptoms of asthma, some people present primarily with coughing, and in severe cases, air motion may be significantly impaired such that no wheezing is heard. Signs of an asthma attack include the use of accessory muscles of respiration, a paradoxical pulse (a pulse that is weaker during inhalation and stronger during exhalation), over-inflation of the chest, and a blue color of the skin and nails may occur from lack of
oxygen. Status asthmaticus is an acute exacerbation of asthma that does not respond to standard treatments of bronchodilators and steroids.

**ICD-10-CM for Asthma**

The ICD-10-CM code range for asthma is J45.2–J45.99. To code asthma in ICD-10-CM, the following is necessary:

- Severity of disease (mild intermittent, moderate persistent, etc.)
- Does acute exacerbation exist?
- Does status asthmaticus exist?

Following is a sample of codes for asthma:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild intermittent asthma, uncomplicated</td>
<td>J45.20</td>
</tr>
<tr>
<td>Mild intermittent asthma with (acute) exacerbation</td>
<td>J45.21</td>
</tr>
<tr>
<td>Mild intermittent asthma with status asthmaticus</td>
<td>J45.22</td>
</tr>
<tr>
<td>Mild persistent asthma, uncomplicated</td>
<td>J45.30</td>
</tr>
<tr>
<td>Mild persistent asthma with (acute) exacerbation</td>
<td>J45.31</td>
</tr>
<tr>
<td>Unspecified asthma with (acute) exacerbation</td>
<td>J45.901</td>
</tr>
<tr>
<td>Unspecified asthma with status asthmaticus</td>
<td>J45.902</td>
</tr>
<tr>
<td>Unspecified asthma, uncomplicated</td>
<td>J45.909</td>
</tr>
</tbody>
</table>

Other conditions may be necessary to report in addition to the asthma codes. For example, tobacco dependence (F17.-) or exposure to tobacco smoke in the perinatal period (P96.81).

**Respiratory Failure**

Respiratory failure is a condition in which the lungs are unable to perform their basic function of gas exchange, which is the process of transferring the oxygen from inhaled air into the blood where it is converted to carbon dioxide. The lungs then transfer the carbon dioxide from the blood into exhaled air. Respiratory failure can be acute (short term) or chronic (long term). Acute respiratory failure usually develops quickly and requires emergent care, while the chronic type develops more slowly and lasts for a longer period of time. Respiratory failure differs from acute respiratory distress syndrome in that ARDS usually develops in people who are very ill with another disease or who have suffered a trauma or injury.

![Respiratory Failure Image](source:AAPC)
To code for respiratory failure in ICD-10-CM, the following is necessary:

- Nature of the condition (acute or chronic)

Following is a sample of codes for respiratory failure:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute respiratory failure</td>
<td>J96.0</td>
</tr>
<tr>
<td>Chronic respiratory failure</td>
<td>J96.1</td>
</tr>
<tr>
<td>Acute and chronic respiratory failure</td>
<td>J96.2</td>
</tr>
<tr>
<td>Acute respiratory distress syndrome</td>
<td>J80.</td>
</tr>
</tbody>
</table>

**Pneumonia**

Pneumonia is an inflammatory condition of the lung. Pneumonia can result from a variety of causes, including infection with bacteria, viruses, fungi, or parasites, and chemical or physical injury to the lungs. Its cause may also be officially described as unknown when infectious causes have been excluded.

Pneumonias can be classified in several ways. The primary system of classification is the combined clinical classification. This combines factors such as age, risk factors for certain microorganisms, the presence of underlying lung disease or systemic disease, and whether the person has recently been hospitalized. Other classifications include according to the anatomic changes that can be found in the lungs during autopsies, based on the microbial cause, and a radiological classification.

Traditionally, pneumonia has been classified by clinical characteristics, dividing them into “acute” (less than three weeks duration) and “chronic” pneumonias. Chronic pneumonias tend to be either non-infectious, or mycobacterial, fungal, or mixed bacterial infections caused by airway obstruction. Acute pneumonias are further divided into bacterial bronchopneumonias (such as *Streptococcus pneumoniae*), atypical pneumonias, and aspiration pneumonia syndromes.

The combined clinical classification attempts to identify a person’s risk factors when he or she first comes to medical attention. There are two broad categories of pneumonia in this scheme: community-acquired pneumonia (CAP) and hospital-acquired (nosocomial) pneumonia. A recently introduced type of health care-associated pneumonia (in patients living outside the hospital who have recently been in close contact with the health care system) lies between these two categories.

Pneumonia can be caused by microorganisms, irritants, and unknown causes. When pneumonias are grouped this way, infectious causes are the most common type. The symptoms of infectious pneumonia are caused by the invasion of the lungs by microorganisms and by the immune system’s response to the infection. Although more than 100 strains of microorganism can cause pneumonia, only a few are responsible for most cases. The most common causes of pneumonia are viruses and bacteria. Less common causes of infectious pneumonia are fungi and parasites.

Most ICD-10-CM codes for pneumonia are located in the J12.0–J18.9 code range. To code pneumonia in ICD-10-CM the following is necessary:

- Is the pneumonia viral or bacterial?
- Organism, if known

Following is a sample of codes for pneumonia:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenoviral pneumonia</td>
<td>J12.0</td>
</tr>
<tr>
<td>Pneumonia due to Klebsiella pneumoniae</td>
<td>J15.0</td>
</tr>
<tr>
<td>Pneumonia due to Methicillin susceptible <em>Staphylococcus aureus</em></td>
<td>J15.211</td>
</tr>
<tr>
<td>Pneumonia due to Methicillin resistant <em>Staphylococcus aureus</em></td>
<td>J15.212</td>
</tr>
<tr>
<td>Pneumonia, unspecified organism</td>
<td>J18.9</td>
</tr>
</tbody>
</table>

The codes for pneumonia may be second listed codes. For example, under the J12, J13, J14, J15, and J16 rubrics, it states, “Code first any associated lung abscess (J85.1).

**Influenza**

Influenza, commonly referred to as the flu, is an infectious disease caused by a number of different viruses. The most common symptoms of the disease are chills, fever, sore throat, muscle pains, severe headache, coughing, weakness/fatigue, and general discomfort. There are two main types of influenza. Type A (which includes H1N1) and Type B.
Influenza A virus are the most virulent human pathogens among the two influenza types and cause the most severe cases. It can be subdivided into different serotypes based on the antibody response to the virus. These include H1N1, H2N2, and H3N2.

Influenza B virus almost exclusively infects humans and is less common than influenza A. The only other animals known to be susceptible to influenza B infection are the seal and the ferret. This type of influenza mutates at a rate two–three times slower than type A, so it is less genetically diverse, with only one influenza B serotype. Due to this lack of antigenic diversity and limited host range, pandemics of influenza B do not occur.

Most ICD-10-CM codes for influenza are located in the J09.01-J10.89 code range. To code pneumonia in ICD-10-CM the following is necessary:

- Virus?
- Manifestations?

Following are the codes for influenza:

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza due to identified novel influenza A virus with pneumonia</td>
<td>J09.X1</td>
</tr>
<tr>
<td>Influenza due to identified novel influenza A virus with other respiratory manifestations</td>
<td>J09.X2</td>
</tr>
<tr>
<td>Influenza due to identified novel influenza A virus with gastrointestinal manifestations</td>
<td>J09.X3</td>
</tr>
<tr>
<td>Influenza due to identified novel influenza A virus with other manifestations</td>
<td>J09.X9</td>
</tr>
<tr>
<td>Influenza due to other influenza virus with respiratory manifestations</td>
<td>J10.1</td>
</tr>
<tr>
<td>Influenza gastroenteritis</td>
<td>J10.81</td>
</tr>
<tr>
<td>Influenza due to other influenza virus with other manifestations</td>
<td>J10.89</td>
</tr>
</tbody>
</table>

Multiple codes may be necessary to report a case of influenza. In some cases the influenza code listed above will be first listed and in some cases it will not. The guidelines under the code sets should be followed for proper order.