

CHAPTER

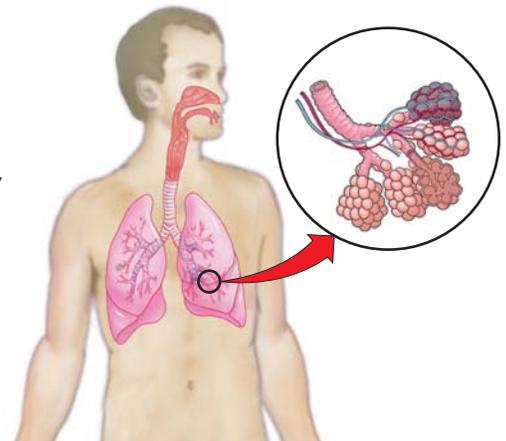
7

The Respiratory System

► OTORHINOLARYNGOLOGY
► PULMONOLOGY

After studying this chapter, you will be able to:

- 7.1 Name the parts of the respiratory system and discuss the function of each part
- 7.2 Define combining forms used in building words that relate to the respiratory system and its parts
- 7.3 Identify the meaning of related abbreviations
- 7.4 Name the common diagnoses, clinical procedures, and laboratory tests used in treating disorders of the respiratory system
- 7.5 List and define the major pathological conditions of the respiratory system
- 7.6 Explain the meaning of surgical terms related to the respiratory system
- 7.7 Recognize common pharmacological agents used in treating disorders of the respiratory system



Structure and Function

The **respiratory system** is the body's breathing, or *respiration*, system. It involves the exchange of oxygen and waste gases between the atmosphere and the body and its cells. **External respiration**, breathing or exchanging air between the body and the outside environment is accomplished within the structures of the respiratory system. In external respiration, air from the atmosphere is inhaled and, later, carbon dioxide is exhaled.

Another type of respiration, **internal respiration**, the bringing of oxygen to the cells and removing carbon dioxide from them, happens in the circulation of the blood throughout the body. The carbon dioxide is removed from the body during exhalation.

The respiratory system includes the **lungs**, the **respiratory tract** (passageways through which air moves in and out of the lungs), and the muscles that move air into and out of the lungs (Figures 7-1a and 7-1b). In the upper part of the trachea is the larynx, where most of the sound used in speech and singing is produced.

The Respiratory Tract

The respiratory tract is also known as the *airway*, the route through which air enters the lungs and the route via which air exits the body. **Inspiration** (breathing in or **inhalation**) brings air from the outside environment into the **nose** or mouth. The nose has three functions: to warm, filter,

FIGURE 7-1 (a) The respiratory system performs the process of inhaling air and exhaling carbon dioxide. (b) The diagram shows the pathways of inhaled air (containing oxygen) and exhaled air (containing carbon dioxide).

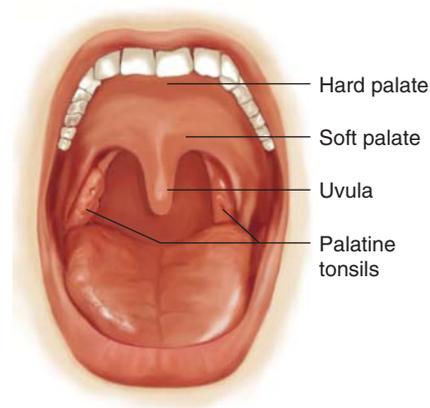
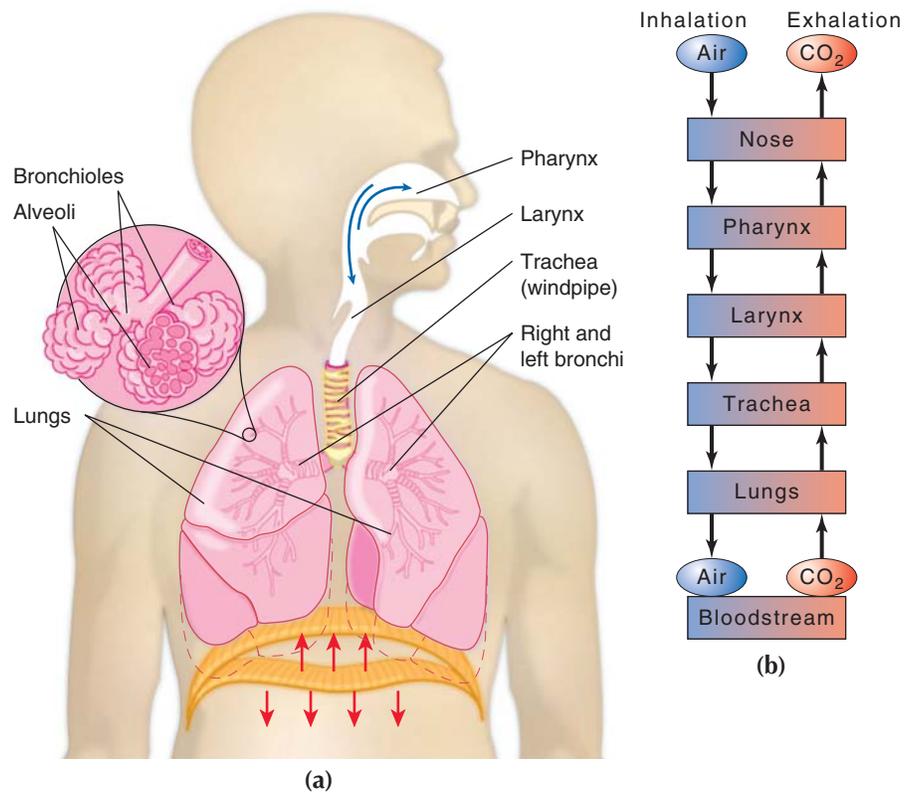


FIGURE 7-2 The inside of the mouth.

and moisten the air. The **nostrils** (also called **external nares**) are the two external openings at the base of the external portion of the nose. The external nose is supported by the nasal bones and is divided into two halves by the **nasal septum**, a strip of cartilage. After air enters the nose, it passes into the **nasal cavity** and the **paranasal sinuses**, where it is warmed by blood in the mucous membranes that line these areas. **Cilia** (hairs) in the nasal cavity filter out foreign bodies.

The air next reaches the **pharynx (throat)**, which is a passageway for both air and food. The pharynx is divided into three sections. The **nasopharynx** lies above the **soft palate**, which is a flexible muscular sheet that separates the nasopharynx from the rest of the pharynx. The nasopharynx contains the **pharyngeal tonsils**, more commonly known as the **adenoids**, which aid in the body's immune defense.

The next division of the pharynx is the **oropharynx**, the back portion of the mouth. It contains the **palatine tonsils**, lymphatic tissue that works as part of the immune system. The oropharynx is part of the mechanism of the mouth that triggers swallowing. Figure 7-2 shows the inside of the mouth.

The bottom and third section of the pharynx is the **laryngopharynx** (also called the **hypopharynx**). It is at this point that the respiratory tract divides into the **esophagus**, the passageway for food, and the **larynx** or **voice box**, through which air passes to the **trachea** or **windpipe**.

Food is prevented from going into the larynx by the **epiglottis**, a movable flap of cartilage that covers the opening to the larynx (called the **glottis**) every time one swallows. Food then passes only into the esophagus. Occasionally, a person may swallow and inhale at the same time, allowing some food to be pulled (or **aspirated**) into the larynx. Usually, a strong cough forces out the food, but sometimes the food particle blocks the airway, and the food

MORE ABOUT . . .

Aspiration

Occasionally, food or saliva can be aspirated by inhaling, laughing, or talking with food, gum, or fluid in the mouth. An unconscious person who is lying on his or her back may aspirate some saliva or possibly blood as in a trauma. The body's automatic response to aspiration is violent coughing or choking in an attempt to expel the material. If total obstruction occurs, then the abdominal thrust maneuver (also known as the Heimlich maneuver) must be used.

must be dislodged with help from another person in a technique called the abdominal thrust maneuver (Figure 7-3). This technique is also called the *Heimlich maneuver*. It has saved many people from choking to death.

Air goes into the larynx, which serves both as a passageway to the trachea and as the area where the sounds of speech and singing are produced. The larynx contains **vocal cords**, strips of epithelial tissue that vibrate when muscular tension is applied (Figure 7-4). The size and thickness of the cords determine the pitch of sound. The male's thicker and longer vocal cords produce a lower pitch than do the shorter and thinner vocal cords of most women. Children's voices tend to be higher in pitch because of the smaller size of their vocal cords. Sound volume is regulated by the amount of air that passes over the vocal cords. The larynx is supported by various cartilaginous structures, one of which consists of two disks joined at an angle to form the **thyroid cartilage** or **Adam's apple** (larger in males than in females).

The **trachea** is a tube that connects the larynx to the right and left **bronchi** (plural of **bronchus**), tubular branches into which the larynx divides. The trachea is a cartilaginous and membranous tube. It contains about twenty horseshoe-shaped structures that provide support so that it will not collapse similar to the way a vacuum cleaner hose acts during use. The point at which the trachea divides is called the **mediastinum**, a general term for a median area, especially one with a **septum** or cartilaginous division. The median portion of the thoracic cavity, which contains the heart, esophagus, trachea, and thymus gland, is called the mediastinum. Both bronchi contain cartilage and mucous glands and are the passageways through which air



FIGURE 7-3 The abdominal thrust is used to save choking victims.

At the Heimlich Institute's Web site (www.heimlichinstitute.org), you can learn more about saving people and even pets who have something blocking their airway.

The Science Museum of Minnesota (www.smm.org/sound/activity/ssl14.htm) has a simple experiment to show you how vocal cords work as well as a video of vocal cords in action.

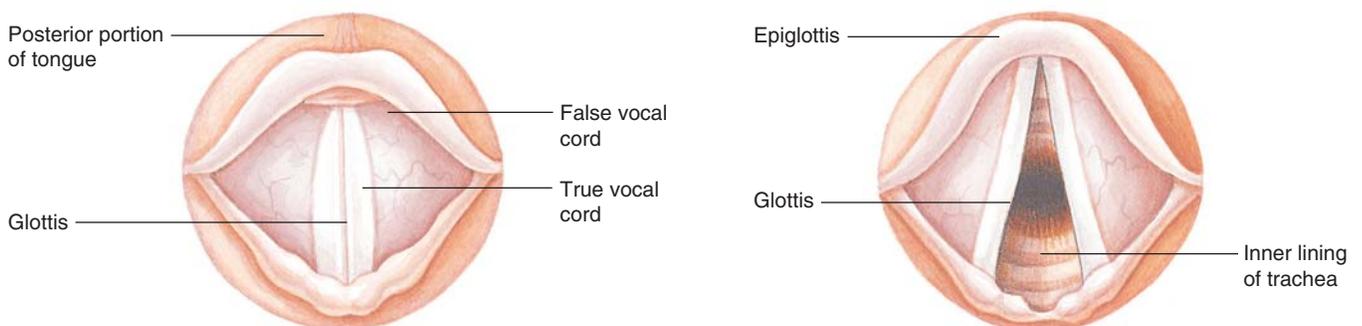
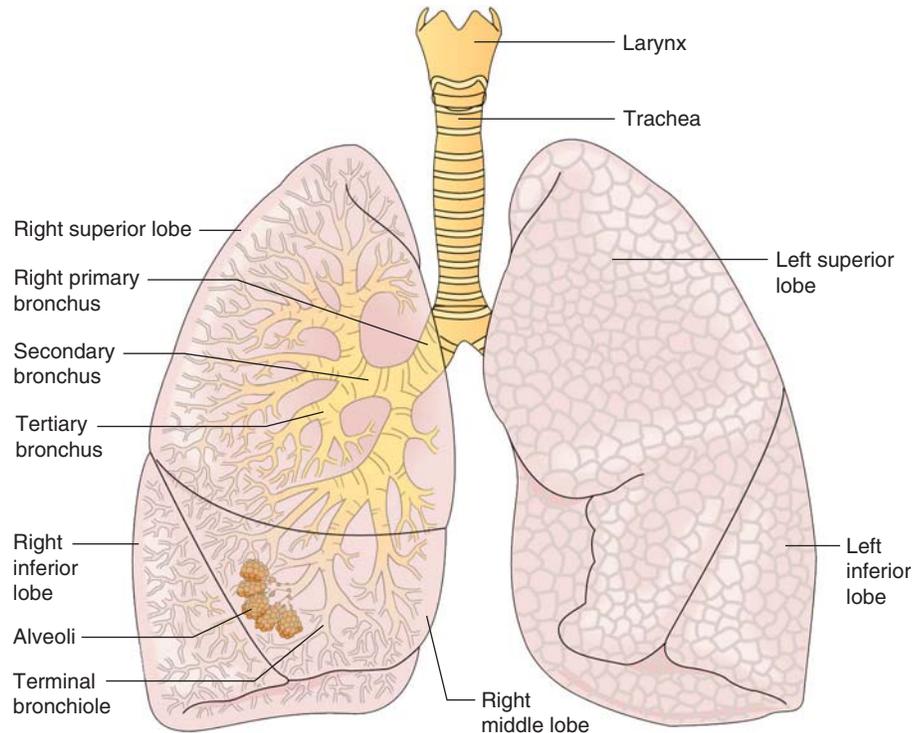


FIGURE 7-4 Vocal cords are the primary instruments of sound. The drawing on the left shows the position of the vocal cords when the voice is high in pitch and the picture on the right illustrates the vocal cords when the voice is low in pitch.

FIGURE 7-5 The alveoli are at the end of the terminal bronchioles inside the lungs.



enters the right and left lungs. Air that is pushed out of the lungs travels up through the respiratory tract during **expiration** (breathing out or **exhalation**), where air is expelled into the environment.

The bronchi further divide into many smaller branches called **bronchioles**. Inside the lungs, the structures resemble tree branches, with smaller parts branching off. At the end of each bronchiole is a cluster of air sacs. Each air sac is called an **alveolus** (plural, **alveoli**). There are about 300 million alveoli in the lungs. The one-celled, thin-walled alveoli are surrounded by capillaries, with which they exchange gases. Figure 7-5 shows the alveoli inside of the lungs.

The Structure of the Lungs

The lungs take up most of the thoracic cavity (or **thorax**), reaching from the collarbone to the diaphragm. The outside of the lungs is a moist, double layer of membrane called the **pleura** (plural, **pleurae**). The outer layer, the **parietal pleura**, lines the thoracic cavity, the inside of the ribs. The inner layer, the **visceral pleura**, covers the surface of the lungs. The space between the two pleura is called the **pleural cavity**. This space is filled with fluid. This pleural fluid prevents contact between the lungs and the ribs to avoid the inflammation that would be caused by friction.

Each lung has an **apex**, or topmost section; a middle area called the **hilum** or **hilus**; and a lower section called the **base**. The hilum is the area where the bronchi, blood vessels, and nerves enter the lungs. The right, larger lung is divided into three lobes—a **superior lobe**, a **middle lobe**, and an **inferior lobe**. The left lung is divided into two lobes—a superior lobe and an inferior lobe (Figure 7-5). Humans can function with one or more lobes removed or even an entire lung removed, as is necessary in some cases of lung cancer.

MORE ABOUT . . .

Lung Capacity

Normal inspiration brings about 500 milliliters of air into the lungs. Normal expiration expels about the same amount from the lungs. Forced inspiration brings extra air (even up to six times the normal amount) into the lungs. Forced expiration can expel up to three times the normal amount of air from the lungs.

Some quantity of air always remains in the lungs so that newly inhaled air mixes with the remaining air. This helps to maintain the proper concentrations of oxygen and carbon dioxide in the lungs.

Breathing is the inhalation of oxygen into the lungs. Oxygen is then exchanged from the alveoli into the capillaries of the bloodstream and carbon dioxide is returned from the capillaries into the alveoli. Oxygen is then delivered to the body's other cells. This process is called internal respiration. This type of respiration is affected by how well the cardiovascular system supplies oxygenated blood. Carbon dioxide is expelled back up through the respiratory tract during expiration.

Muscles for Breathing

Inhalation and exhalation is accomplished by changing the capacity of the thoracic cavity. During inhalation, the thoracic cavity expands and the lungs fill with air. During exhalation, the cavity shrinks and the lungs expel air. Muscular contractions enlarge the volume of the thoracic cavity during inspiration and decrease the volume when they relax during expiration. The major muscles that contract are the **diaphragm** and the **intercostal muscles** (the muscles between the ribs). The diaphragm lowers itself when it contracts, allowing more space in the thoracic cavity, and the intercostal muscles pull the ribs upward and outward when they contract, also enlarging the thoracic cavity.

VOCABULARY REVIEW

In the previous section, you learned terms relating to the respiratory system. Before going on to the exercises, review the terms below and refer to the previous section if you have any questions. Pronunciations are provided for certain terms. Sometimes information about where the word came from is included after the term. The etymologies (word histories) are for your information only. You do not need to memorize them.

Term	Definition
Adam's apple	Thyroid cartilage, supportive structure of the larynx; larger in males than in females.
adenoids [ÄD-ě-nöydz] Greek <i>aden</i> , gland + <i>eidos</i> , resembling	Collection of lymphoid tissue in the nasopharynx; pharyngeal tonsils.
alveolus (pl., alveoli) [äl-VE-ō-lūs (äl-VE-ō-lī)] Latin, little sac	Air sac at the end of each bronchiole.

Term	Definition
apex [Ā-pĕks] Latin, summit	Topmost section of the lung.
base [bās] Latin <i>basis</i> , bottom	Bottom section of the lung.
bronchiole [BRÖNG-ē-ōl] bronchi-, bronchus + -ole, small	Fine subdivision of the bronchi made of smooth muscle and elastic fibers.
bronchus (pl., bronchi) [BRÖNG-kūs (BRÖNG-kī)] Latin, windpipe	One of the two airways from the trachea to the lungs.
cilia [SĪL-ē-ă] Latin, plural of <i>cilium</i> , hair	Hairlike extensions of a cell's surface that usually provide some protection by sweeping foreign particles away.
diaphragm [DĪ-ă-frām] Greek <i>diaphragma</i> , from <i>dia-</i> , through + <i>phrassein</i> , to enclose	Membranous muscle between the abdominal and thoracic cavities that contracts and relaxes during the respiratory cycle.
epiglottis [ĔP-ĭ-GLÖT-ĭs] Greek, from <i>epi-</i> , on + <i>glottis</i> , mouth of the windpipe	Cartilaginous flap that covers the larynx during swallowing to prevent food from entering the airway.
exhalation [ĕks-hă-LĀ-shŭn] Latin <i>exhalo</i> , to breathe out	Breathing out.
expiration [ĕks-pĭ-RĀ-shŭn] Latin <i>expiro</i> , to breathe out	Exhalation.
external nares [NĀR-ēz]	See nostrils.
external respiration	Exchange of air between the body and the outside environment.
glottis [GLÖT-ĭs]	Part of the larynx consisting of the vocal folds of mucous membrane and muscle.
hilum (also hilus) [HĪ-lŭm (HĪ-lŭs)] Latin, small bit	Midsection of the lung where the nerves and vessels enter and exit.
hypopharynx [HĪ-pō-FĀR-ĭngks] hypo-, below + pharynx	Laryngopharynx.
inferior lobe [ĭn-FĒ-rē-ōr lōb]	Bottom lobe of the lung.
inhalation [ĭn-hă-LĀ-shŭn] Latin <i>inhalo</i> , to breathe in	Breathing in.
inspiration [ĭn-spĭ-RĀ-shŭn] Latin <i>inspiro</i> , to breathe in	Inhalation.
intercostal muscles [ĭn-tĕr-KÖS-tăl MŪS-ĕlz] inter-, between + Latin <i>costa</i> , rib	Muscles between the ribs.
internal respiration	Exchange of oxygen and carbon dioxide between the cells.
laryngopharynx [lă-RĪNG-gō-făr-ĭngks] laryngo-, larynx + pharynx	Part of the pharynx below and behind the larynx.

Term	Definition
larynx [LĂR-ĭngks] Greek, larynx	Organ of voice production in the respiratory tract, between the pharynx and the trachea; voice box.
lung [lŭng] Old English <i>lungen</i>	One of two organs of respiration (left lung and right lung) in the thoracic cavity, where oxygenation of blood takes place.
mediastinum [MĒ-dē-ăs-TĪ-nŭm]	Median portion of the thoracic cavity; septum between two areas of an organ or cavity.
middle lobe	Middle section of the right lung.
nasal cavity [NĂ-zăl KĂV-ĭ-tē]	Opening in the external nose where air enters the body.
nasal septum [SĔP-tŭm]	Cartilaginous division of the external nose.
nasopharynx [NĂ-zō-FĂR-ĭngks] naso-, nose + pharynx	Portion of the throat above the soft palate.
nose [nōz] Old English <i>nosu</i>	External structure supported by nasal bones and containing nasal cavity.
nostrils [NŌS-trĭlz]	External openings at the base of the nose; also called external nares.
oropharynx [ŌR-ō-FĂR-ĭngks] oro-, mouth + pharynx	Back portion of the mouth, a division of the pharynx.
palatine tonsils [PĂL-ă-tĭn TŌN-sĭlz] Latin <i>palatinus</i> , pertaining to the palate	Lymphatic tissue that works as part of the immune system.
paranasal sinuses [păr-ă-NĂ-săl SĪ-nŭs-ēz] para-, beside + nasal	Area of the nasal cavity where external air is warmed by blood in the mucous membrane lining.
parietal pleura [pă-RĪ-ē-tăl PLŪR-ă]	Outer layer of the pleura.
pharyngeal tonsils [fă-RĪN-jē-ăl TŌN-sĭlz]	Adenoids.
pharynx [FĂR-ĭngks] Greek, pharynx	Passageway at back of mouth for air and food; throat.
pleura (pl., pleurae) [PLŪR-ă (PLŪR-ē)] Greek, rib	Double layer of membrane making up the outside of the lungs.
pleural cavity [PLŪR-ăl KĂV-ĭ-tē]	Space between the two pleura.
respiratory [RĔS-pĭ-ră-tŏr-ē, rĕ-SPĪR-ă-tŏr-ē] system	The body's system for breathing.
respiratory tract	Passageways through which air moves into and out of the lungs.
septum [SĔP-tŭm]	Cartilaginous division, as in the nose or mediastinum.
soft palate [sŏft PĂL-ăt]	Flexible muscular sheet that separates the nasopharynx from the rest of the pharynx.
superior lobe	Topmost lobe of each lung.

Term	Definition
thorax [THŌ-rāks] Greek, breastplate	Chest cavity.
throat [thrōt]	See pharynx.
thyroid cartilage [THĪ-rōyd KĀR-tī-lĭj]	See Adam's apple.
trachea [TRĀ-kē-ă]	Airway from the larynx into the bronchi; windpipe.
visceral pleura [VĪS-ĉr-ăl PLŪR-ă]	Inner layer of the pleura.
vocal cords	Strips of epithelial tissue that vibrate and play a major role in the production of sound.
voice box	See larynx.
windpipe	See trachea.

CASE STUDY

Breathing Emergencies

The emergency department at Midvale Central Hospital often sees patients who complain of breathing problems. The physicians on duty are trained to listen to sounds with a stethoscope to determine the immediate needs of the patient. Many of the patients at Midvale are elderly. Respiratory problems are the number-one reason for seeking emergency help.

Critical Thinking

1. How might an elderly person's weakened muscles affect respiration?

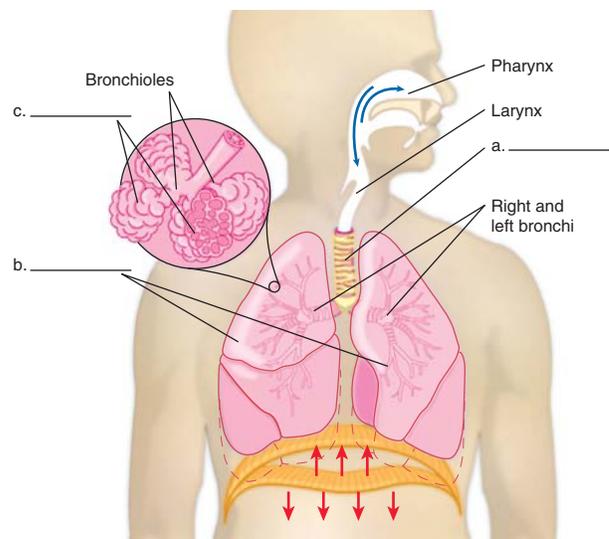
2. Midvale is a retirement community in the South. About six times a year, the state department of environmental protection issues pollution or smog warnings, with suggestions that children, the elderly, and those with chronic illnesses stay indoors, preferably with air conditioning. Polluted air diminishes what gas necessary for respiration?

STRUCTURE AND FUNCTION EXERCISES

Complete the Picture

3. Label the parts of the respiratory system on the following diagram.

- a. _____
- b. _____
- c. _____



Check Your Knowledge

Complete the sentences below by filling in the blanks.

4. Exchanging air between the body and the outside environment is called _____.
5. Foreign bodies entering the respiratory tract are filtered through _____.
6. The nose is divided into two halves by the _____.
7. Food is prevented from going into the larynx by the _____.
8. A simple technique that has saved many people from death is the _____.
9. At the end of each bronchiole is a small cluster of _____ called _____.
10. The right lung has _____ lobes.
11. The left lung has _____ lobes.
12. A muscle that lowers itself to allow more space when one is breathing in is called a(n) _____.
13. The muscles between the ribs that also aid in breathing are called _____ muscles.

Circle T for true or F for false.

14. The respiratory tract is the major area involved in internal respiration. T F
15. The throat is a passageway for both air and food. T F
16. The pharynx contains the vocal cords. T F
17. Each bronchus enters one lung. T F
18. The pleura are moist layers of membrane surrounding the lungs. T F
19. Humans must have both lungs to live. T F
20. Only the right lung has a middle lobe. T F
21. The hilum is the topmost portion of the lung. T F
22. The larynx is another name for the windpipe. T F
23. The soft palate is at the bottom of the mouth. T F

Spell It Correctly

Write the correct spelling in the blank to the right of any misspelled words. If the word is already correctly spelled, write C.

- | | |
|------------------------|-----------------------|
| 24. nasopharyngx _____ | 29. epiglottus _____ |
| 25. trachae _____ | 30. pharinx _____ |
| 26. resperation _____ | 31. mediastinum _____ |
| 27. alveoli _____ | 32. tonsills _____ |
| 28. diagphram _____ | 33. bronchis _____ |

Know the Respiratory System

Match the respiratory term with its meaning.

- | | |
|---------------------|---|
| 34. ____ cilia | a. exchange of oxygen and carbon dioxide between the cells. |
| 35. ____ diaphragm | b. inspiration, breathing in |
| 36. ____ epiglottis | c. expiration, breathing out |
| 37. ____ exhalation | d. chest cavity |

38. ____ external nares
 39. ____ inhalation
 40. ____ internal respiration
 41. ____ pharynx
 42. ____ larynx
 43. ____ thorax
 44. ____ external respiration
- e. throat
 f. hairlike extension of a cells surface
 g. muscle between the abdominal and thoracic cavity
 h. voicebox
 i. nostrils
 j. exchange of air between the body and the outside environment.
 k. flap that covers the larynx during swallowing.

Combining Forms and Abbreviations

The lists below include combining forms and abbreviations that relate specifically to the respiratory system. Pronunciations are provided for the examples. Some of the abbreviations will be discussed later in the chapter.

COMBINING FORM	MEANING	EXAMPLE
adenoid(o)	adenoid, gland	<i>adenoidectomy</i> [ĂD-ĕ-nŏy-DĚK-tŏ-mĕ], operation for removal of adenoid growths
alveol(o)	alveolus	<i>alveolitis</i> [ĂL-vĕ-ŏ-LĪ-tĭs], inflammation of the alveoli
bronch(o), bronchi(o)	bronchus	<i>bronchitis</i> [brŏng-KĪ-tĭs], inflammation of the lining of the bronchial tubes
bronchiol(o)	bronchiole	<i>bronchiolitis</i> [brŏng-kĕ-ŏ-LĪ-tĭs], inflammation of the bronchioles
capn(o)	carbon dioxide	<i>capnogram</i> [KĂP-nŏ-grăM], a continuous recording of the carbon dioxide in expired air
epiglott(o)	epiglottis	<i>epiglottitis</i> [ĔP-ĭ-GLŎT-ĭ-tĭs], inflammation of the epiglottis
laryng(o)	larynx	<i>laryngoscope</i> [lă-RĪNG-gŏ-skŏp], device used to examine the larynx through the mouth
lob(o)	lobe of the lung	<i>lobectomy</i> [lŏ-BĚK-tŏ-mĕ], removal of a lobe
mediastin(o)	mediastinum	<i>mediastinitis</i> [MĔ-dĕ-ăs-tĭ-NĪ-tĭs], inflammation of the tissue of the mediastinum
nas(o)	nose	<i>nasogastric</i> [nā-zŏ-GĂS-tĭk], of the nasal passages and the stomach
or(o)	mouth	<i>oropharynx</i> [ŎR-ŏ-FĂR-ĭngks], the part of the pharynx that lies behind the mouth
ox(o), oxi-, oxy	oxygen	<i>oximeter</i> [ŏk-SĪM-ĕ-tĕr], instrument for measuring oxygen saturation of blood
pharyng(o)	pharynx	<i>pharyngitis</i> [fă-r-ĭn-JĪ-tĭs], inflammation in the pharynx

COMBINING FORM	MEANING	EXAMPLE
phon(o)	voice, sound	<i>phonometer</i> [fō-NŌM-ĕ-tĕr], instrument for measuring sounds
phren(o)	diaphragm	<i>phrenitis</i> [frĕn-Ī-tĭs], inflammation in the diaphragm
pleur(o)	pleura	<i>pleuritis</i> [plū-RĪ-tĭs], inflammation of the pleura
pneum(o), pneumon(o)	air, lung	<i>pneumolith</i> [NŪ-mō-lĭth], calculus in the lungs; <i>pneumonitis</i> [nū-mō-NĪ-tĭs], inflammation of the lungs
rhin(o)	nose	<i>rhinitis</i> [rĭ-NĪ-tĭs], inflammation of the nose
spir(o)	breathing	<i>spirometer</i> [spĭ-RŌM-ĕ-tĕr], instrument used to measure respiratory gases
steth(o)	chest	<i>stethoscope</i> [STĒTH-ō-skōp], instrument for listening to sounds in the chest
thorac(o)	thorax, chest	<i>thoracotomy</i> [thōr-ă-KŌT-ō-mĕ], incision into the chest wall
tonsill(o)	tonsils	<i>tonsillectomy</i> [TŌN-sĭ-LĚK-tō-mĕ], removal of one entire tonsil or of both tonsils
trache(o)	trachea	<i>tracheoscopy</i> [tră-kĕ-ŌS-kō-pĕ], inspection of the interior of the trachea

ABBREVIATION	MEANING	ABBREVIATION	MEANING
ABG	arterial blood gases, a diagnostic test	DPT	diphtheria, pertussis, tetanus (combined vaccination)
AFB	acid-fast bacillus (causes tuberculosis)	ENT	ear, nose, and throat
A&P	auscultation and percussion	ET tube	endotracheal intubation tube
AP	anteroposterior	FEF	forced expiratory flow
ARD	acute respiratory disease	FEV	forced expiratory volume
ARDS	adult respiratory distress syndrome	FVC	forced vital capacity
ARF	acute respiratory failure	HBOT	hyperbaric oxygen therapy
BS	breath sounds	IMV	intermittent mandatory ventilation
COLD	chronic obstructive lung disease	IPPB	intermittent positive pressure breathing
COPD	chronic obstructive pulmonary disease	IRDS	infant respiratory distress syndrome
CPR	cardiopulmonary resuscitation	IRV	inspiratory reserve volume

ABBREVIATION	MEANING	ABBREVIATION	MEANING
CTA	clear to auscultation	LLL	left lower lobe [of the lungs]
CXR	chest x-ray	LUL	left upper lobe [of the lungs]
DOE	dyspnea on exertion	MBC	maximal breathing capacity
MDI	metered dose inhaler	SARS	severe acute respiratory syndrome
PA	posteroanterior	SIDS	sudden infant death syndrome
PCP	pneumocystis carinii pneumonia (a type of pneumonia to which AIDS patients are susceptible)	SOB	shortness of breath
PEEP	positive end expiratory pressure	T&A	tonsillectomy and adenoidectomy
PFT	pulmonary function tests	TB	tuberculosis
PND	paroxysmal nocturnal dyspnea; postnasal drip	TLC	total lung capacity
RD	respiratory disease	TPR	temperature, pulse, and respiration
RDS	respiratory distress syndrome	URI	upper respiratory infection
RLL	right lower lobe [of the lungs]	VC	vital capacity
RUL	right upper lobe [of the lungs]	V/Q scan	ventilation/perfusion scan

CASE STUDY

Coping with COPD

The emergency room nurse admitted Mr. DiGiorno, a patient from a nursing home. He was having difficulty breathing and complained of chest pains. The nurse checked his record and found that he has been positive for COPD for five years. This patient has had four hospital admissions in the last six months. He is overweight, smokes, and is sedentary. He takes medications for his COPD.

Critical Thinking

45. What is COPD? What lifestyle factors might play a role in Mr. DiGiorno's disease?
46. Mr. DiGiorno's chest pains may indicate cardiovascular disease. How might this affect internal respiration?

COMBINING FORMS AND ABBREVIATIONS EXERCISES

Build Your Medical Vocabulary

Complete the words by putting a combining form in the blank.

47. Removal of the adenoids: _____ ectomy.
48. Surgical puncture of the thoracic cavity: _____ centesis.
49. Opening into the trachea: _____ otomy.
50. Inflammation of the tonsils: _____ itis.
51. Inflammation of the pericardium and surrounding mediastinal tissue: _____ pericarditis.

52. Suture of the lung: _____rrhaphy.
53. Relating to the nose and mouth: _____nasal.
54. Inflammation of the pharynx: _____itis.
55. Disease of the vocal cords affecting speech: _____pathy.
56. Record of carbon dioxide in expired air: _____gram.
57. Bronchial inflammation: _____itis.
58. Inflammation of tissue surrounding the bronchi: peri_____itis.
59. Relating to the pericardium and pleural cavity: pericardio _____.
60. Incision into a lobe: _____otomy.
61. Measurement of oxygen in blood: _____metry.
62. Compound of oxygen and a chloride: _____chloride.
63. Swelling in the bronchial area: _____edema.
64. Destruction of an alveolus: _____clasia.
65. Chest pain: _____algia.
66. Incision into the sinus: _____tomy.

Match the Root

Match the respiratory combining forms in the list on the right with the definitions in the list on the left.

- | | |
|---|--------------|
| 67. ____ pain arising in air sacs in the lungs | a. broncho |
| 68. ____ instrument to study vocal folds | b. capno |
| 69. ____ record of heart sounds | c. lob |
| 70. ____ nasal obstruction | d. alveol(o) |
| 71. ____ contraction of the bronchus | e. pharyngo |
| 72. ____ abnormally dilated windpipe | f. laryngo |
| 73. ____ repair of the pharynx | g. phono |
| 74. ____ fissure of the chest wall | h. thoraco |
| 75. ____ inflammation of a lobe | i. rhino |
| 76. ____ instrument for graphing carbon dioxide | j. tracheo |

Know the Abbreviation

Give the abbreviation for each of the following.

77. Left lower lobe(of the lung) _____
78. Left upper lobe(of the lung) _____
79. acute respiratory disease _____
80. auscultation and percussion _____
81. metered dose inhaler _____
82. severe acute respiratory syndrome _____
83. shortness of breath _____
84. sudden infant death syndrome _____
85. Upper respiratory infection _____

Give the meaning for the following abbreviations.

86. ARF _____
87. BS _____
88. COLD _____
89. CPR _____
90. CXR _____
91. ABG _____
92. DPT _____
93. ENT _____
94. HBOT _____
95. RD _____
96. RDS _____
97. T & A _____
98. TB _____
99. TPR _____

Finding the Meaning

For each of the following terms, guess at the meaning by looking at the word parts. If you need help, consult your allied health dictionary. Then give the meaning of each word part.

100. laryngotracheobronchitis _____
101. tracheotomy _____
102. tracheostomy _____
103. rhinitis _____
104. hypoxia _____
105. otorhinolaryngologist _____
106. bronchostenosis _____
107. pleurocentesis _____
108. alveolitis _____
109. bronchomalacia _____
110. sinusitis _____

Diagnostic, Procedural, and Laboratory Terms

Disorders of the respiratory system can be diagnosed in several ways. First, a physician usually listens to the lungs with a stethoscope, a process called **auscultation** (Figure 7-6). Next, the respiratory rate is determined by counting the number of respirations per minute. One inhalation and one exhalation

equal a single respiration. Adult respirations normally range from 15 to 20 per minute. The physician may use **percussion**, tapping over the lung area, to see if the lungs are clear (a hollow sound) or filled with fluid (a dull sound). Sputum can be observed for its color. Pus in sputum usually causes a greenish or yellowish color and indicates infection. Blood in the sputum may indicate tuberculosis.

Pulmonary function tests measure the mechanics of breathing. Breathing may be tested by a **peak flow meter**. Asthmatics often use this type of measuring device to check breathing capacity; they can then take medicine if an attack seems imminent. A **spirometer** is a pulmonary function testing machine that measures the lungs' volume and capacity (*spirometry*). This machine measures the *forced vital capacity* (FVC), or highest breathing capacity, of the lungs when the patient takes the deepest breath possible. Other breathing measurements such as *forced expiratory volume* (FEV) show capacity at different parts of the respiration cycle.

Tuberculosis is a disease that usually affects the respiratory system. Tests for tuberculosis were discussed in Chapter 4, The Integumentary System, because reactions on the surface of the skin indicate a positive result for a tuberculosis test.

Visual images of the chest and parts of the respiratory system play an important role in diagnosing respiratory ailments. Chest x-rays, MRIs, and lung scans can detect abnormalities, such as masses and restricted blood flow within the lungs. A **bronchography** provides a radiological picture of the trachea and bronchi. A thoracic CT scan shows a cross-sectional view of the chest that can reveal tissue masses. A *pulmonary angiography* is an x-ray of the blood vessels of the lungs taken after dye is injected into a blood vessel. A *lung scan* or *V/Q perfusion scan* is a recording of radioactive material, injected or inhaled, to show air flow and blood supply in the lungs.

Parts of the respiratory system can also be observed by *endoscopy*, insertion of an **endoscope** (a viewing tube) into a body cavity. A **bronchoscope** is used for *bronchoscopy*, which is performed to examine airways or retrieve specimens, such as fluid retrieved in **bronchial alveolar lavage** or material for biopsy that is retrieved by **bronchial brushing** (a brush inserted through the bronchoscope). In **nasopharyngoscopy**, a flexible endoscope is used to examine nasal passages and the pharynx. **Laryngoscopy** is the procedure for examining the mouth and larynx, and **mediastinoscopy** for examining the mediastinum area and all the organs within it. Such diagnostic testing can reveal structural abnormalities, tumors, and irritations.

Laboratory Tests

Throat cultures are commonly used to diagnose streptococcal infections. A swab is passed over a portion of the throat, and the swab is then put in contact with a culture. If a strep infection is present, the culture will show certain bacteria. A **sputum sample** or **culture** may be taken and cultured to identify any disease-causing organisms. **Arterial blood gases (ABGs)** measure the levels of pressure of oxygen (O₂) and carbon dioxide (CO₂) in arterial blood. These measurements help diagnose heart and lung functions. A **sweat test** measures the amount of salt in sweat and is used to confirm cystic fibrosis.

Auscultation is from a Latin verb, *ausculto*, to listen to.



FIGURE 7-6 Auscultation is a part of a normal examination.

The FDA has a food safety site at (<http://vm.cfsan.fda.gov>) where you can learn more about infections.

MORE ABOUT . . .

Streptococcal Infections

Throat cultures are commonly given to children with sore throats. The presence of a streptococcal infection is usually treated with antibiotics because the presence of such an infection can cause health problems (such as heart and kidney damage) if left unchecked.

VOCABULARY REVIEW

In the previous section, you learned terms relating to diagnosis, clinical procedures, and laboratory tests. Before going on to the exercises, review the terms below and refer to the previous section if you have any questions. Pronunciations are provided for certain terms. Sometimes information about where the word came from is included after the term. The etymologies (word histories) are for your information only. You do not need to memorize them.

Term	Definition
arterial [ār-TĒR-ē-ăl] blood gases	Laboratory test that measures the levels of oxygen and carbon dioxide in arterial blood.
auscultation [ăws-kŭl-TĀ-shŭn]	Listening to internal sounds with a stethoscope.
bronchial alveolar lavage [BRŌNG-kē-ăl ăl-VĒ-ō-lăr lă-VĀZH]	Retrieval of fluid for examination through a bronchoscope.
bronchial brushing	Retrieval of material for biopsy by insertion of a brush through a bronchoscope.
bronchography [brŏng-KŌG-ră-fē] broncho-, bronchus + -graphy, a recording	Radiological picture of the trachea and bronchi.
bronchoscope [BRŌNG-kō-skōp] broncho- + -scope, device for viewing	Device used to examine airways.
endoscope [ĔN-dō-skōp] endo-, within + -scope	Tube used to view a body cavity.
laryngoscopy [LĀR-ĭng-GŌS-kō-pē] laryngo-, larynx + -scopy, a viewing	Visual examination of the mouth and larynx using an endoscope.
mediastinoscopy [MĒ-dē-ăs-tĭ-NŌS-kō-pē] mediastino-, mediastinum + -scopy	Visual examination of the mediastinum and all the organs within it using an endoscope.
nasopharyngoscopy [NĀ-zō-fă-rĭng-GŌS-kō-pē] naso-, nose + pharyngo-, pharynx + -scopy	Examination of the nasal passages and the pharynx using an endoscope.
peak flow meter	Device for measuring breathing capacity.
percussion [pĕr-KŪSH-ŭn]	Tapping on the surface of the body to see if lungs are clear.
pulmonary function tests	Tests that measure the mechanics of breathing.

Term	Definition
spirometer [spī-RŌM-ĕ-tĕr] spiro-, breathing + -meter	Testing machine that measures the lungs' volume and capacity.
sputum [SPŪ-tŭm] sample or culture	Culture of material that is expectorated (or brought back up as mucus).
sweat test	Test for cystic fibrosis that measures the amount of salt in sweat.
throat culture	Test for streptococcal or other infections in which a swab taken on the surface of the throat is placed in a culture to see if certain bacteria grow.

CASE STUDY

Laboratory Testing

Mr. DiGiorno was admitted to Midvale Hospital from the emergency room. His radiological/laboratory data read as follows:

A chest x-ray showed a pneumonic infiltrate in the left lower lobe with some parapneumonic effusion. Follow-up chest x-rays showed progression of infiltrate and then slight clearing. Serial ECGs (ECGs given one after another in succession) showed the development of T-wave inversions anterolaterally compatible with ischemia or a pericardial process. The WBC was

10,000; HCT, 37; platelets, 425,000; PT and PTT were normal. Blood gases showed a pH of 7.43, PCO₂ 37, PO₂ 71. Sputum culture could not be obtained.

Critical Thinking

111. Why do you think blood gas tests were ordered for Mr. DiGiorno?
112. What part of his blood was measured at 10,000?

DIAGNOSTIC, PROCEDURAL, AND LABORATORY TERMS EXERCISES

Check Your Knowledge

Complete the sentences below by filling in the blanks.

113. The mechanics of breathing are measured by _____ tests.
114. A test that can confirm the presence of cystic fibrosis is called a(n) _____.
115. A tube for viewing a body cavity is called a(n) _____.
116. The highest breathing capacity is called the _____ capacity.
117. A stethoscope is necessary for _____, listening to the lungs.
118. Streptococcal infections can be detected in a _____.
119. Tapping the skin over the lung area to check whether the lungs are clear is called _____.
120. Asthmatics often use a _____ to check breathing capacity.
121. Disease-causing organisms in sputum can be identified in a(n) _____.
122. A device that measures the lung volume and capacity is called a(n) _____.

Root Out the Meaning

Add the appropriate combining form from the list in this chapter.

123. _____scopy means viewing of the pharynx.
124. _____gram means a measure of carbon dioxide in expired air.
125. _____ectomy means removal of the larynx.
126. _____itis means inflammation of a lobe.
127. _____plegia means paralysis of the larynx.

Pathological Terms

The respiratory system is the site for many inflammations, disorders, and infections. This system must contend with foreign material coming into the body from outside, as well as internal problems that may affect any of its parts. Each of its parts may become inflamed. Table 7-1 shows various respiratory inflammations, their symptoms, and some treatments.

Normal breathing (**eupnea**) may become affected by diseases or conditions and change to one of the following breathing difficulties:

- **Bradypnea**, slow breathing
- **Tachypnea**, fast breathing
- **Hypopnea**, shallow breathing
- **Hyperpnea**, abnormally deep breathing
- **Dyspnea**, difficult breathing
- **Apnea**, absence of breathing
- **Orthopnea**, difficulty in breathing, especially while lying down. Physicians determine the degree of orthopnea by the number of pillows required to allow the patient to breathe easily (i.e., two-pillow orthopnea).

Other irregular breathing patterns may indicate various conditions. **Cheyne-Stokes respiration**, for example, is an irregular breathing pattern with a period of apnea followed by deep, labored breathing that becomes shallow, then apneic. Irregular sounds usually indicate specific disorders—**crackles** or **rales** are popping sounds heard in lung collapse and other conditions, such as congestive heart failure and pneumonia. **Wheezes** or **rhonchi** occur during attacks of asthma or emphysema; **stridor** is a high-pitched crowing sound; and **dysphonia** is hoarseness, often associated with laryngitis. **Singultus** or hiccuping (hiccoughing), spasmodic contractions of the diaphragm, can become uncomfortable if not stopped. **Hyperventilation**, excessive breathing in and out, may be caused by anxiety or overexertion. **Hypoventilation**, abnormally low movement of air in and out of the lungs, may cause excessive buildup of carbon dioxide in the lungs, or **hypercapnia**. **Hypoxemia** is a deficient amount of oxygen in the blood, and **hypoxia** is a deficient amount of oxygen in tissue.

Upper respiratory infection is a term that covers an infection of some or all of the upper respiratory tract. Other disorders of the tract include **croup**, acute respiratory syndrome in children and infants, **diphtheria**, acute infection of the throat and upper respiratory tract caused by *Corynebacterium*

TABLE 7-1 Respiratory Inflammations

Inflammation	Symptoms	Treatment
adenoiditis , inflammation of the adenoids	swelling, redness	medication; sometimes surgical removal
bronchitis , inflammation of the bronchi	fever, coughing, expectoration	medications, rest
chronic bronchitis , bronchitis that recurs chronically; may be caused by allergies, infections, and pollution	same as for bronchitis	same as for bronchitis
epiglottitis , inflammation of the epiglottis; also known as <i>supraglottitis</i>	drooling, distress, and dysphagia; may lead to upper airway obstruction; can be a result of infection or trauma	medication
laryngitis , inflammation of the larynx	sore throat, hoarseness, cough, and dysphagia	medication, treatment or avoidance when caused by allergies, rest
laryngotracheobronchitis	sore throat, cough, hoarseness, dysphagia; may also be cause of croup	same as laryngitis
nasopharyngitis , inflammation of the nose and pharynx	runny nose, discomfort	medication
pansinusitis , inflammation of all the sinuses	may be purulent (pus-producing) or nonpurulent; runny nose, discomfort	medication
pharyngitis (sore throat), inflammation of the pharynx	fever, throat pain, dryness	medication, rest
pleuritis or pleurisy , inflammation of the pleura	dry cough, localized chest pain	medication, rest
pneumonitis , inflammation of the lung	fever, dyspnea, coughing	medication, rest, removal from environmental cause if appropriate
rhinitis , inflammation of the nose	runny nose, dryness	medication, removal of any allergic cause
sinusitis , inflammation of the sinuses	same as pansinusitis	same as pansinusitis
tonsillitis , inflammation of the tonsils	swelling, chills, fever, throat pain	medication; in some chronic or severe cases, surgical removal
tracheitis , inflammation of the trachea	a sore, burning sensation when breathing	rest, medication, if severe

diphtheriae bacteria, as well as **SARS (severe acute respiratory distress)**, a contagious disease, sometimes fatal, caused by a coronavirus.

Nosebleed or **epistaxis** results from a trauma to, or a spontaneous rupture of, blood vessels in the nose; **rhinorrhea** is nasal discharge usually caused by an inflammation or infection; and **whooping cough** or **pertussis** is a severe infection of the pharynx, larynx, and trachea caused by the *Bordetella pertussis* bacteria. Diphtheria and pertussis have virtually disappeared in the United States since the regular administration of DPT (diphtheria, pertussis, tetanus) vaccines to most infants. However, pertussis has begun to make a comeback as some children are not receiving that part of the vaccine.

MORE ABOUT . . .

SARS

SARS first appeared in Asia in 2003 and was fairly quickly contained by a worldwide cooperative response. Travel to and from countries where SARS first appeared was either restricted or people were checked before and after travel. In general, people with the disease were quarantined. SARS begins with a high fever (temperature greater than 100.4°F [$>38.0^{\circ}\text{C}$]). Other symptoms may include headache and body aches. After 2 to 7 days, SARS patients may develop a dry cough. Most patients develop pneumonia. It is hoped that a vaccine can be developed before the next outbreak.

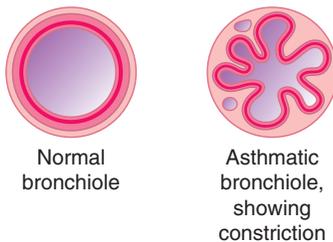


FIGURE 7-7 Asthma causes a narrowing of the bronchi.

The American Academy of Allergy, Asthma, and Immunology (www.aaaai.org) has up-to-date information about asthma. Also, AANMA (Allergy and Asthma Network: Mothers of Asthmatics) provides helpful guidance about living with asthma.

Learn about the risks of lung cancer by going to the Web site www.lungcancer.org.

The Centers for Disease Control has a Division of Tuberculosis Elimination that maintains a Web site (www.cdc.gov/nchstp/tb/) with information about control of this disease.

Chronic obstructive pulmonary disease (COPD) is a term for any disease with chronic obstruction of the bronchial tubes and lungs. Chronic bronchitis and emphysema are two COPD disease processes. In addition to bronchitis, the bronchial tubes can be the site of **asthma**, a condition of bronchial airway obstruction (Figure 7-7) causing an irritable airway prone to spasm; this spasm is called *bronchospasm*. The underlying cause is allergic inflammation of lung tissue. Asthma can be very serious and is even fatal in rare cases. However, it is usually controllable with the use of inhalers, called *bronchodilators*, and steroids. **Paroxysmal** (sudden spasmodic) movement can occur in asthma as well as in other respiratory conditions.

Hemoptysis is a lung or bronchial hemorrhage that results in the spitting of blood. **Cystic fibrosis**, chronic airway obstruction caused by disease of the exocrine glands, also affects the bronchial tubes. The predominant characteristic of cystic fibrosis is the secretion of abnormally thick mucus in various places in the body, causing chronic bronchitis, emphysema, and recurrent pneumonia, along with other ailments.

Carcinomas, frequently caused by smoking, can also be found in the respiratory system. Lung cancer is one of the leading causes of death in the United States but advances are being made in early detection and treatment.

Some disorders in newborns, such as *hyaline membrane disease* or *respiratory distress syndrome (RDS)*, occur most frequently in premature babies and are often the result of underdeveloped lungs. *Adult respiratory distress syndrome (ARDS)* may have a number of causes, especially injury to the lung.

Lung disorders may occur in the alveoli: for example, **atelectasis**, a collapsed lung or part of a lung; **emphysema**, hyperinflation of the air sacs often caused by smoking; and **pneumonia**, acute infection of the alveoli. Pneumonia is a term for a number of infections. Such infections typically affect bedridden and frail people whose internal respiration is compromised. Table 7-2 details several types of pneumonia.

Tuberculosis is a highly infectious disease caused by rod-shaped bacteria (**bacilli**), which invade the lungs and cause small swellings and inflammation. Many forms of tuberculosis have become drug resistant. Tuberculosis is spread through airborne particles from someone with active disease. It usually settles in the lungs but can settle in other areas of the body. A **pulmonary abscess** is a large collection of pus in the lungs, and **pulmonary edema** is a buildup of fluid in the air sacs and bronchioles, usually caused by failure of the heart to pump enough blood to and from the lungs.

TABLE 7-2 Some Types of Pneumonia

Type of Pneumonia	Location	Cause
bacterial pneumonia	lungs	usually streptococcus bacteria
bronchial pneumonia, bronchopneumonia	walls of the smaller bronchial tubes	may be postoperative or from tuberculosis
chronic pneumonia	lungs	any recurrent inflammation or infection
double pneumonia	both lungs at the same time	bacterial infection
pneumocystis carinii pneumonia	lungs	usually seen in AIDS patients
viral pneumonia	lungs	caused by viral infection

Several environmental agents cause **pneumoconiosis**, a lung condition caused by dust in the lungs. **Black lung** or **anthracosis** is caused by coal dust and is, therefore, a threat to coal miners; **asbestosis** is caused by asbestos particles released during construction of ships and buildings; **silicosis** is caused by the silica dust from grinding rocks or glass, and other manufacturing materials, such as pipe, building, and roofing products.

Disorders of the pleura, other than pleuritis, include **pneumothorax**, an accumulation of air or gas in the pleural cavity; **empyema**, pus in the pleural cavity; **hemothorax**, blood in the pleural cavity; **pleural effusion**, an escape of fluid into the pleural cavity; and, rarely, **mesothelioma**, a cancer associated with asbestosis.

The respiratory system may be disturbed by spasms that cause coughing or constriction. When severe, these spasms can be life-threatening. **Bronchospasms** occur in the bronchi (as seen in asthma), and **laryngospasms** occur in the larynx.

VOCABULARY REVIEW

In the previous section, you learned terms relating to pathology. Before going on to the exercises, review the terms below and refer to the previous section if you have questions. Pronunciations are provided for certain terms. Sometimes information about where the word came from is included after the term. The etymologies (word histories) are for your information only. You do not need to memorize them.

Term	Definition
adenoiditis [ĂD-ĕ-nŏy-DĪ-tis] adenoid-, adenoids + -itis, inflammation	Inflammation of the adenoids.
anthracosis [ăn-thră-KŌ-sis] anthrac-, coal + -osis, condition	Lung disease caused by long-term inhalation of coal dust; black lung disease.
apnea [ĂP-nĕ-ă] Greek <i>apnoia</i> , lack of breath	Cessation of breathing.

Term	Definition
asbestosis [äs-bĕs-TŌ-sĭs] asbest(os) + -osis	Lung disorder caused by long-term inhalation of asbestos (as in construction work).
asthma [ÄZ-mă] Greek, difficult breathing	Chronic condition with obstruction or narrowing of the bronchial airways.
atelectasis [ät-ĕ-LĚK-tă-sĭs]	Collapse of a lung or part of a lung.
bacilli (<i>sing.</i> , bacillus) [bă-SĪL-ĭ (bă-SĪL-ĭs)] Latin, <i>bacillum</i> , walking stick	A type of bacteria.
black lung	See anthracosis.
bradypnea [brăd-ĭp-NĒ-ă] brady-, slow + -pnea, breathing	Abnormally slow breathing.
bronchitis [brŏng-KĪ-tĭs] bronch-, bronchus + -itis	Inflammation of the bronchi.
bronchospasm [BRŎNG-kŏ-spăzm] broncho-, bronchus + -spasm, contraction	Sudden contraction in the bronchi that causes coughing.
Cheyne-Stokes respiration [chān stŏks rĕs-pĭ-RĀ-shŭn]	Irregular breathing pattern with a period of apnea followed by deep, labored breathing that becomes shallow, then apneic.
chronic bronchitis	Recurring or long-lasting bouts of bronchitis.
chronic obstructive pulmonary disease	Disease of the bronchial tubes or lungs with chronic obstruction.
crackles [KRĀK-ls]	Popping sounds heard in lung collapse or other conditions; rales.
croup [krŭp]	Acute respiratory syndrome in children or infants accompanied by seal-like coughing.
cystic fibrosis [SĪS-tĭk fĭ-BRŌ-sĭs]	Disease that causes chronic airway obstruction and also affects the bronchial tubes.
diphtheria [dĭf-THĒR-ĕ-ă] Greek <i>diphthera</i> , leather	Acute infection of the throat and upper respiratory tract caused by bacteria.
dysphonia [dĭs-FŌ-nĕ-ă] dys-, abnormal + Greek <i>phone</i> , voice	Hoarseness usually caused by laryngitis.
dyspnea [dĭsp-NĒ-ă, DĪSP-nĕ-ă] Greek <i>dyspnoia</i> , bad breathing	Difficult breathing.
emphysema [ĕm-fă-SĒ-mă, ĕm-fă-ZĒ-mă] Greek, inflation of the stomach	Chronic condition of hyperinflation of the air sacs; often caused by prolonged smoking.
empyema [ĕm-pĭ-Ē-mă] Greek, formation of pus	Pus in the pleural cavity.
epiglottitis [ĕp-ĭ-glŏt-Ī-tĭs] epiglott(is) + -itis	Inflammation of the epiglottis.

Term	Definition
epistaxis [ĚP-ĭ-STĀK-sĭs] Greek, nosebleed	Bleeding from the nose, usually caused by trauma or a sudden rupture of the blood vessels of the nose.
eupnea [yŭp-NĒ-ă, YŪP-nĕ-ă] Greek <i>eupnoia</i> , good breath	Normal breathing.
hemoptysis [hĕ-MŌP-tĭ-sĭs] hemo-, blood + Greek <i>ptysis</i> , spitting	Lung or bronchial hemorrhage resulting in the spitting of blood.
hemothorax [hĕ-mō-THŌR-ăks] hemo- + thorax	Blood in the pleural cavity.
hypercapnia [hĭ-pĕr-KĀP-nĕ-ă] hyper-, excessive + Greek <i>kapnos</i> , smoke	Excessive buildup of carbon dioxide in lungs, usually associated with hypoventilation.
hyperpnea [hĭ-pĕrp-NĒ-ă] hyper- + -pnea, breathing	Abnormally deep breathing.
hyperventilation [HĪ-pĕr-vĕn-tĭ-LĀ-shŭn] hyper- + ventilation	Abnormally fast breathing in and out, often associated with anxiety.
hypopnea [hĭ-PŌP-nĕ-ă] hypo-, below normal + -pnea	Shallow breathing.
hypoventilation [HĪ-pŏ-vĕn-ĭ-LĀ-shŭn] hypo- + ventilation	Abnormally low movement of air in and out of the lungs.
hypoxemia [hĭ-pŏk-SĒ-mĕ-ă] hyp-, below normal + ox(ygen) + -emia, blood	Deficient amount of oxygen in the blood.
hypoxia [hĭ-PŌK-sĕ-ă] hyp- + ox(ygen) + -ia, condition	Deficient amount of oxygen in tissue.
laryngitis [lăr-ĭn-JĪ-tĭs] laryng-, larynx + -itis	Inflammation of the larynx.
laryngospasm [lă-RĪNG-gŏ-spăsm] laryngo-, larynx + -spasm	Sudden contraction of the larynx, which may cause coughing and may restrict breathing.
laryngotracheobronchitis [lă-RĪNG-gŏ-TRĀ-kĕ-ŏ-brŏng-KĪ-tĭs] laryngo- + tracheo-, trachea + bronch- + -itis	Inflammation of the larynx, trachea, and bronchi.
mesothelioma [MĚZ-ŏ-thĕ-lĕ-Ō-mă] mesotheli(um), layer of cells as in the pleura + -oma, tumor	Rare cancer of the lungs associated with asbestosis.
nasopharyngitis [NĀ-zŏ-fă-rĭn-JĪ-tĭs] naso- + pharyng-, pharynx + -itis	Inflammation of the nose and pharynx.
nosebleed	See epistaxis.
orthopnea [ŏr-thŏp-NĒ-ă, ŏr-THŌP-nĕ-ă] ortho-, straight + -pnea	Difficulty in breathing, especially while lying down.

Term	Definition
pansinusitis [pän-sī-nū-SĪ-tĭs] pan-, all + sinusitis	Inflammation of all the sinuses.
paroxysmal [pär-ök-SĪZ-mäl] Greek <i>paroxysmos</i> , spasm	Sudden, as a spasm or convulsion.
pertussis [pĕr-TŪS-ĭs] Latin <i>per</i> , intensive + <i>tussis</i> , cough	Severe infection of the pharynx, larynx, and trachea caused by bacteria; whooping cough.
pharyngitis [fär-ĭn-JĪ-tĭs] pharyng- + -itis	Inflammation of the pharynx; sore throat.
pleural effusion [PLŪR-äl ě-FYŪ-zhŭn]	Escape of fluid into the pleural cavity.
pleuritis, pleurisy [plū-RĪ-tĭs, PLŪR-ĭ-sĕ] pleur-, pleura + -itis	Inflammation of the pleura.
pneumoconiosis [NŪ-mō-kō-nĕ-Ō-sĭs] pneumo-, lung + Greek <i>kōnis</i> , dust + -osis	Lung condition caused by inhaling dust.
pneumonia [nū-MŌ-nĕ-ă] Greek, lung condition	Acute infection of the alveoli.
pneumonitis [nū-mō-NĪ-tĭs] pneumon-, lung + -itis	Inflammation of the lung.
pneumothorax [nū-mō-THŌR-ăks] pneumo- + thorax	Accumulation of air or gas in the pleural cavity.
pulmonary abscess [PŪL-mō-nār-ĕ ĀB-sĕs]	Large collection of pus in the lungs.
pulmonary edema [PŪL-mō-nār-ĕ ě-DĒ-mă]	Fluid in the air sacs and bronchioles usually caused by failure of the heart to pump enough blood to and from lungs.
rales [răhlz]	See crackles.
rhinitis [rĭ-NĪ-tĭs] rhin-, nose + -itis	Nasal inflammation.
rhinorrhea [rĭn-nō-RE-ă] rhino-, nose + -rrhea, discharge	Nasal discharge.
rhonchi [RŌNG-kĭ]	See wheezes.
silicosis [sĭl-ĭ-KŌ-sĭs]	Lung condition caused by silica dust from grinding rocks or glass or other materials used in manufacturing.
singultus [sĭng-GŪL-tŭs]	Hiccuping.
sinusitis [sĭ-nū-SĪ-tĭs] sinus + -itis	Inflammation of the sinuses.
stridor [STRĪ-dŏr] Latin, a harsh sound	High-pitched crowing sound heard in certain respiratory conditions.

Term	Definition
tachypnea [tāk-ĭp-NĒ-ă] tachy-, fast + -pnea	Abnormally fast breathing.
tonsillitis [TŌN-sĭ-LĪ-tĭs] tonsill-, tonsils + -iti	Inflammation of the tonsils.
tracheitis [trā-kē-Ī-tĭs] trache-, trachea + -itis	Inflammation of the trachea.
tuberculosis [tū-bĕr-kyū-LŌ-sĭs] Latin <i>tuberculum</i> , small nodule + -osis	Acute infectious disease caused by bacteria called bacilli.
upper respiratory infection	Infection of all or part of upper portion of respiratory tract.
wheezes [HWĒZ-ĕz]	Whistling sounds heard on inspiration in certain breathing disorders, especially asthma.
whooping cough [HŌOP-ĭng kăwf]	See pertussis.

CASE STUDY

X-rays for Pneumonia

Many of the elderly patients admitted to the hospital through the emergency room are suffering from pneumonia. Their chest x-rays will show evidence of the disease. Usually, after a course of antibiotics, the patients are x-rayed again. If the x-rays are not clear a second time, some other underlying problem, such as an abnormal growth or latent disease, may be suspected. Elderly patients, particularly those who are bedridden, are particularly susceptible to pneumonia.

Critical Thinking

128. Why is a bedridden person more susceptible to pneumonia than a patient who is ambulatory?
129. Patients with any kind of respiratory infection often have breathing problems when lying down, even for weeks after the infection has begun to subside. Why can lying down cause breathing problems?

PATHOLOGICAL TERMS EXERCISES

Match the Condition

Match the words in the column on the left with the definition in the column on the right.

- | | |
|-------------------------------|--------------------------------|
| 130. ____ pleurisy, pleuritis | a. whooping cough |
| 131. ____ epistaxis | b. deficient oxygen in blood |
| 132. ____ dysphonia | c. black lung |
| 133. ____ hypoxemia | d. pleural inflammation |
| 134. ____ hypercapnia | e. hoarseness |
| 135. ____ anthracosis | f. inability to breathe |
| 136. ____ pleural effusion | g. nosebleed |
| 137. ____ pertussis | h. fast breathing |
| 138. ____ tachypnea | i. too much carbon dioxide |
| 139. ____ apnea | j. fluid in the pleural cavity |

Check Your Knowledge

Circle T for true or F for false.

- 140. Foreign material comes into the body during internal respiration. T F
- 141. Dysphonia is associated with laryngitis. T F
- 142. Diphtheria, pertussis, and tuberculosis are all caused by bacteria. T F
- 143. A pleural effusion is a type of cancer. T F
- 144. Respiratory spasms may cause uncontrollable coughing. T F
- 145. Bronchospasms occur during tonsillitis. T F
- 146. Tuberculosis cannot be passed from one person to another. T F
- 147. Atelectasis is another name for a nosebleed. T F
- 148. Inflammation of the voice box is called laryngitis. T F
- 149. Hypopnea is abnormally deep breathing. T F

Fill In the Blanks

- 150. Inflammation of the throat is called _____.
- 151. Any lung condition caused by dust is called _____.
- 152. Chronic bronchial airway obstruction is a symptom of _____.
- 153. The sounds heard in atelectasis are _____ or _____.
- 154. Many respiratory conditions are caused or made worse by _____, an addictive habit.

Surgical Terms

When breathing is disrupted or chronic infections of the respiratory tract occur, surgical procedures can provide relief. Ear, nose, and throat (ENT) doctors or **otorhinolaryngologists** specialize in disorders of the upper respiratory tract. Sometimes it is necessary to remove parts of the respiratory system, either to relieve constant infections or to remove abnormal growths. A **tonsillectomy** is excision of the tonsils (often to stop recurrent tonsillitis). An **adenoidectomy** is removal of the adenoids; a **laryngectomy** removes the larynx (usually to stop cancerous growth); a **pneumonectomy** is the excision of a lung; and a **lobectomy** is the excision of a lobe of a lung (as when cancer is present).

Surgical repair can relieve respiratory problems caused by trauma, abnormalities, growths, or infections. A **bronchoplasty** is the repair of a bronchus; **laryngoplasty** is the repair of the larynx; **rhinoplasty** is the repair of the bones of the nose; **septoplasty** is the repair of the nasal septum; and **tracheoplasty** is the repair of the trachea.

Incisions into parts of the respiratory system are sometimes necessary. **Thoracic surgeons** are the specialists who usually perform such procedures. A **laryngotracheotomy** is an incision of the larynx and trachea; **pneumobronchotomy** is an incision of the lung and bronchus; **septostomy** is the creation of an opening in the nasal septum; **sinusotomy** is an incision of

a sinus; **thoracotomy** is an incision into the chest cavity; **thoracostomy** is the establishment of an opening in the chest cavity to drain fluid; and **tracheotomy** is an incision into the trachea, usually to provide an airway (Figure 7-8). Surgical punctures provide a means to aspirate or remove fluid. **Laryngocentesis** is a surgical puncture of the larynx; **pleurocentesis** is a surgical puncture of pleural space; and **thoracocentesis** is a surgical puncture of the chest cavity.

Artificial openings into the respiratory tract may allow for alternative airways as in a **tracheostomy** (artificial tracheal opening) or a **laryngostomy** (artificial laryngeal opening). An **endotracheal intubation** is the insertion of a tube through the nose or mouth, pharynx, and larynx and into the trachea to establish an airway. A **pleuropexy** is performed to attach the pleura in place surgically, usually in case of injury or deterioration.

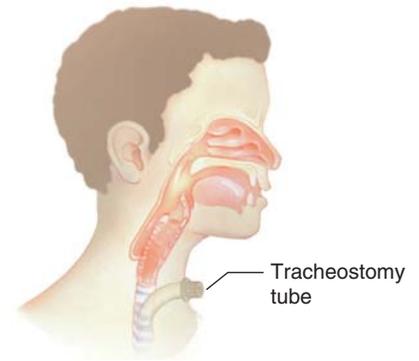


FIGURE 7-8 A tracheotomy provides an emergency airway.

VOCABULARY REVIEW

In the previous section, you learned terms relating to surgery. Before going on to the exercises, review the terms below and refer to the previous section if you have questions. Pronunciations are provided for certain terms. Sometimes information about where the word came from is included after the term. The etymologies (word histories) are for your information only. You do not need to memorize them.

Term	Definition
adenoidectomy [ĂD-ĕ-nŏy-DEK-tŏ-mĕ] adenoid-, adenoids + -ectomy, removal	Removal of the adenoids.
bronchoplasty [BRŎNG-kŏ-plăs-tĕ] broncho-, bronchus + -plasty, repair	Surgical repair of a bronchus.
endotracheal intubation (ET) [ĔN-dŏ-TRĀ-kĕ-ăl ĩn-tū-BĀ-shŭn] endo- within + trache-, trachea + -al, pertaining to	Insertion of a tube through the nose or mouth, pharynx, and larynx and into the trachea to establish an airway.
laryngectomy [LĂR-ĭn-JĔK-tŏ-mĕ] laryng-, larynx + -ectomy	Removal of the larynx.
laryngocentesis [lă-RĬNG-gŏ-sĕn-TĔ-sĭs] laryngo-, larynx + -centesis, puncture	Surgical puncture of the larynx.
laryngoplasty [lă-RĬNG-gŏ-plăs-tĕ] laryngo- + -plasty	Repair of the larynx.
laryngostomy [LĂR-ĭng-GŎS-tŏ-mĕ] laryngo- + -stomy, mouth	Creation of an artificial opening in the larynx.
laryngotracheotomy [lă-RĬNG-gŏ-trĀ-kĕ-ŎT-ŏ-mĕ] laryngo- + tracheo-, trachea + -tomy, cutting	Incision into the larynx and trachea.
lobectomy [lŏ-BĔK-tŏ-mĕ] lob-, lobe + -ectomy	Removal of one of the lobes of a lung.
otorhinolaryngologist [ŏ-tŏ-RĬ-nŏ-lăr-ĭng-GŎL-ŏ-jĭst] oto-, ear + rhino-, nose + laryngo- + -logist, specialist	Medical doctor who diagnoses and treats disorders of the ear, nose, and throat.

Term	Definition
pleurocentesis [PLŪR-ō-sĕn-TĒ-sĭs] pleuro-, pleura + -centesis	Surgical puncture of pleural space.
pleuropexy [PLŪR-ō-PĚK-sĕ] pleuro- + -pexy, a fixing	Fixing in place of the pleura surgically, usually in case of injury or deterioration.
pneumobronchotomy [NŪ-mō-brōng-KŎT-ō-mĕ] pneumo-, lung + broncho- + -tomy	Incision of the lung and bronchus.
pneumonectomy [NŪ-mō-NĚK-tō-mĕ] pneumon-, lung + -ectomy	Removal of a lung.
rhinoplasty [RĪ-nō-plās-tĕ] rhino-, nose + -plasty	Surgical repair of the bones of the nose.
septoplasty [SĚP-tō-plās-tĕ] sept(um) + -plasty	Surgical repair of the nasal septum.
septostomy [sĕp-TŎS-tō-mĕ] sept(um) + -stomy	Creation of an opening in the nasal septum.
sinusotomy [sĭn-ŭ-SŎT-ō-mĕ] sinus + -tomy	Incision of a sinus.
thoracic [thō-RĀS-ĭk] surgeon	Surgeon who specializes in surgery of the thorax.
thoracocentesis [THŎR-ă-kō-sĕn-TĒ-sĭs] thoraco-, thorax + -centesis	Surgical puncture of the chest cavity.
thoracostomy [thōr-ă-KŎS-tō-mĕ] thoraco- + -stomy	Establishment of an opening in the chest cavity.
thoracotomy [thōr-ă-KŎT-ō-mĕ] thraco- + -tomy	Incision into the chest cavity.
tonsillectomy [TŎN-sĭ-LĚK-tō-mĕ] tonsill-, tonsils + ectomy	Removal of the tonsils.
tracheoplasty [TRĀ-kĕ-ō-PLĀS-tĕ] tracheo-, trachea + plasty	Repair of the trachea.
tracheostomy [TRĀ-kĕ-ŎS-tō-mĕ] tracheo- + -stomy	Creation of an artificial opening in the trachea.
tracheotomy [trā-kĕ-ŎT-ō-mĕ] tracheo- + -tomy	Incision into the trachea.

SURGICAL TERMS EXERCISES

Check Your Knowledge

Match the terms in the left column with the definitions in the right column.

- | | |
|-----------------------|----------------------------------|
| 155. ____ rhinoplasty | a. artificial laryngeal opening |
| 156. ____ pleuropexy | b. removal of a lobe of the lung |

157. ___ adenoidectomy
158. ___ tracheostomy
159. ___ tracheotomy
160. ___ laryngectomy
161. ___ lobectomy
162. ___ laryngostomy
163. ___ pleurocentesis
164. ___ septostomy
- c. puncture of the pleura
- d. creation of an opening in the nasal septum
- e. incision into the trachea
- f. removal of the adenoids
- g. repair of the nose
- h. attaching of the pleura
- i. removal of the larynx
- j. artificial tracheal opening

Fill In the Blanks

165. An incision into the chest cavity is a _____.
166. An airway can be provided by an emergency _____.
167. Cancer of the lung may require a _____.
168. Surgical attaching of the pleura in place is called _____.
169. The nasal septum is repaired during _____.

CASE STUDY

Asthma Emergencies

Emergency rooms are also visited frequently by people with asthma. A severe asthmatic attack requires medication and close monitoring or it can be fatal. Once the patient is stabilized, various tests may be necessary to determine the pathology in the lungs. June Lytel is a 10-year-old who has asthma. Recently she has had tonsillitis. Four months ago, another case of tonsillitis caused inflammation of her upper respiratory tract. She

had two emergency room visits for asthma attacks during the URI. Her physician, an ENT, is also a surgeon.

Critical Thinking

170. Why is it important that her doctor is a surgeon?
171. How might surgery help avoid future URIs?

Pharmacological Terms

Antibiotics, antihistamines, and anticoagulants are used for respiratory system disorders just as with other system disorders. Specific to respiratory problems are **bronchodilators**, drugs that dilate the walls of the bronchi (as during an asthmatic attack), and **expectorants**, drugs that promote coughing and the expulsion of mucus. **Antitussives** relieve coughing, and **decongestants** help congestion of the upper respiratory tract. Table 7-3 lists some medications commonly prescribed for respiratory disorders.

Two mechanical devices aid in respiration. Mechanical **ventilators** (Figure 7.9) actually serve as a breathing substitute for patients who cannot breathe on their own. **Nebulizers** deliver medication through the nose or mouth to ease breathing problems. Some nebulizers are MDI (metered dose inhalers) that deliver a specific amount of spray with each puff of the inhaler.



FIGURE 7-9 An inhaler is often used to treat asthma.

TABLE 7-3 Some Common Agents Used to Treat the Respiratory System

Drug Class	Purpose	Generic	Trade Name
antitussives	to relieve coughing	codeine dextromethorphan diphenhydramine	none except in combination Benlyn, Pertussin, Robitussin, and others Allermax, Benadryl, and many others
bronchodilators	to dilate the walls of the bronchi and prevent spasms	albuterol ephedrine epinephrine terbutaline omalizumab theophylline	Ventolin, Proventil Bronkaid, Primatene Bronkaid Mist, Primatene Mist Brethaire, Brethine Xolair Theo-Dur, Slo-Bid
decongestants	to lower and prevent mucus buildup	pseudoephedrine xylometazoline	Drixoral, Sudafed, and others Otrivin
expectorants	to promote coughing and expelling of mucus	guaifenesin	Humibid, Robitussin

Recently, new medications have become available to control asthma attacks. Traditionally, asthmatics used ventilators or nebulizers to control the occurrence or intensity of attacks. Now it is possible to take medication in pill form to avoid most attacks.

VOCABULARY REVIEW

In the previous section, you learned terms relating to pharmacology. Before going on to the exercises, review the terms below and refer to the previous section if you have any questions. Pronunciations are provided for certain terms. Sometimes information about where the word came from is included after the term. The etymologies (word histories) are for your information only. You do not need to memorize them.

Term	Definition
antitussives [ăn-tē-TŪS-sivs] anti-, against + Latin <i>tussis</i> , cough	Agents that control coughing.
bronchodilators [bröng-kō-dī-LĀ-törz] broncho- + dilator, agent that dilates	Agents that dilate the walls of the bronchi.
decongestants [dē-kön-JĔST-ănts]	Agents that relieve mucus congestion of the upper respiratory tract.
expectorants [ĕk-SPĔK-tō-rănts] ex-, out of + Latin <i>pectus</i> , chest	Agents that promote the coughing and expelling of mucus.

Term	Definition
nebulizers [NĔB-yū-līz-ĕrz]	Devices that deliver medication through the nose or mouth in a fine spray to the respiratory tract.
ventilators [VĔN-tī-lā-tōrz]	Mechanical breathing devices.

CASE STUDY

Mechanical Breathing Apparatus

Missy Ruiz, a 24-year-old mother of two, was admitted to Midvale's trauma center after a serious car accident. Melissa could not breathe on her own because of trauma to her windpipe. A tracheotomy was performed so that she could be connected to a ventilator. Brain scans showed little activity, and doctors gave her only a slight chance for recovery. With intravenous feeding and the ventilator, Melissa could survive in a vegetative state for a long time.

Critical Thinking

172. Melissa cannot breathe unassisted. What organ directs the breathing process? Why is Melissa's breathing process interrupted?
173. Melissa is bedridden. What respiratory disease might she contract?

PHARMACOLOGICAL TERMS EXERCISES

Check Your Knowledge

Complete the sentences below by filling in the blanks.

174. Coughing can be controlled with _____.
175. Insufficiently dilated bronchi can be treated with _____.
176. Productive coughing is helped with _____.
177. Medication is delivered in a fine spray by means of a _____.
178. A person who cannot breathe on his or her own may be kept alive on a _____.

CHALLENGE SECTION

The following chest x-ray report is from a patient who received x-rays during an emergency room visit.

*Patient: Marina Sanchez
Age: 55
Physician: Dr. J. Woo*

CHEST: 11/6/XXXX:

PA and lateral views of the chest show evidence of patchy alveolar density in the right midlung field, inferior to minor fissure on PA view. It appears to be located in the lateral segment of

(continued)

the right middle lobe, which may represent infiltrate. However, the possibility of a pulmonary neoplasm cannot be excluded. Suggest follow-up chest x-ray after 1 to 2 weeks to confirm its resolution. Remainder of right and left lung are free of any acute pathology. The cardiovascular silhouette shows normal heart size with normal pulmonary vasculature. Both hemidiaphragms are unremarkable. The visualized bony thorax is unremarkable.

In the hospital patient was examined for coronary artery disease. Doctors are now discussing recommendation for a CABG.

Critical Thinking

This patient currently has a high fever and chest tightness. He will be treated for infection. What else did the radiologist suggest as a possible cause of his pulmonary problems? Why do you think a follow-up chest x-ray is necessary?

TERMINOLOGY IN ACTION

Shown below is a referral letter for a 65-year-old patient with severe emphysema. Write a brief description of the disease and discuss the most likely cause of the disease.

*Dr. Youssef Muhammed
12 Park Street
Dexter, MI 99999
Dear Dr. Mohammed:*

Mr. Alima will be making an appointment to see you in the very near future. He is a 65-year-old male who has had emphysema for many years. Recently it has become quite severe. At this time, he presents with complaints of weakness, even with the most minimal exertion.

I have not instituted any change in his therapy as he plans to see you within the week and will follow your recommendations.

I am enclosing my office notes for your review. Please do not hesitate to contact me if you need further information.

Sincerely,

Allison Jankman, MD

Enclosure

USING THE INTERNET

Go to the American Lung Association's Web site (<http://www.lungusa.org>). Write a short paragraph about research being done on one disease of the respiratory system.

CHAPTER REVIEW

The material that follows is to help you review all the material in this chapter.

Remembering the Word Parts

Put the letter of the correct definition for each of the following respiratory word parts in the space provided. Answers may be used more than once or not used at all.

- | | |
|------------------------|--|
| 179. adenoid(o) ____ | a. air sac |
| 180. phren(o) ____ | b. throat |
| 181. alveol(o) ____ | c. adenoids |
| 182. phon(o) ____ | d. carbon dioxide |
| 183. bronch(o) ____ | e. diaphragm |
| 184. pharyng(o) ____ | f. nose |
| 185. capn(o) ____ | g. pleura |
| 186. ox(o) ____ | h. tonsil |
| 187. oxi- ____ | i. lobe |
| 188. epiglott(o) ____ | j. area between lungs, middle of thoracic cavity |
| 189. or(o) ____ | k. mouth |
| 190. laryng(o) ____ | l. oxygen |
| 191. nas(o) ____ | m. voice, sound |
| 192. lob(o) ____ | n. sinus |
| 193. mediastin(o) ____ | o. flap that closes over the trachea during swallowing |
| 194. pleur(o) ____ | p. bronchi |
| 195. rhin(o) ____ | q. voicebox |
| 196. pneum(o) ____ | r. bronchus, tube going to lung |
| 197. steth(o) ____ | s. airway, tube connecting throat to bronchi |
| 198. -pnea ____ | t. chest |
| 199. pneumon(o) ____ | u. tongue |
| 200. thorac(o) ____ | v. breathing |
| 201. tonsil(o) ____ | w. air/lung |
| 202. trache(o) ____ | x. lining of the lungs |

Using Your Allied Health Dictionary

For each of the following word parts, find a respiratory term in your allied health dictionary. Give the meaning of the term.

203. eu-, good, normal _____
204. dys-, bad, difficult, abnormal _____
205. -itis, inflammation _____

206. -ectomy, removal, surgical removal _____
207. -tomy _____ cutting into, incision
208. -(o)stomy _____ new opening, creation of new opening
209. -meter _____ instrument to measure
210. -scope _____ instrument to view
211. brady- _____ slow
212. tachy- _____ fast
213. hyper- _____ above, beyond, too much
214. hyp(o)- _____ below, not enough, deficient
215. a- _____ not, absence of
216. orth(o)- _____ straight, upright
217. -rrhea _____ discharge, runny discharge
218. -plasty _____ surgical repair
219. -pexy _____ fixation
220. -centesis _____ surgical puncture to remove fluid

Understanding Respiratory Terms

Put the letter of the correct definition in the space provided.

- | | |
|--------------------------------------|--|
| 221. pneumothorax _____ | a. runny nose |
| 222. hyperpnea _____ | b. whooping cough |
| 223. CPR _____ | c. inflammation of the adenoids |
| 224. Abdominal thrust maneuver _____ | d. voice box |
| 225. spirometer _____ | e. saliva and mucus from the lung |
| 226. rhinorrhea _____ | f. air sacs |
| 227. sputum _____ | g. instrument for measuring breathing |
| 228. alveoli _____ | h. inflammation of the paranasal sinuses |
| 229. larynx _____ | i. cardiopulmonary resuscitation |
| 230. epiglottis _____ | j. air in the pleura |
| 231. paranasal sinusitis _____ | k. abnormally fast breathing |
| 232. nasopharynx _____ | l. Heimlich maneuver |
| 233. pertussis _____ | m. removal of a lung |
| 234. pneumonectomy _____ | n. flap of cartilage |
| 235. adenoiditis _____ | o. just above the soft palate |

DEFINITIONS

Define the following terms and combining forms. Review the chapter before starting. Make sure you know how to pronounce each term as you define it. The blue words in curly brackets are references to the Spanish glossary available online at www.mhhe.com/medterm3e.

WORD

236. Adam's apple
237. adenoid(o)
238. adenoidectomy [ÄD-ě-nöy-DĚK-tō-mē] {adenoidectomía}
239. adenoiditis [ÄD-ě-nöy-DĪ-tīs] {adenoiditis}
240. adenoids [ÄD-ě-nöydz] {adenoides}
241. alveol(o)
242. alveolus (*pl.*, alveoli) [äl-VĚ-ō-lūs (äl-VĚ-ō-lī)] {alvéolo}
243. anthracosis [än-thră-KŌ-sīs] {antracosis}
244. antitussives [än-tē-TŪS-sivs]
245. apex [Ä-pĕks] {apex}
246. apnea [ÄP-nē-ă] {apnea}
247. arterial blood gases
248. asbestosis [äs-bĕs-TŌ-sīs] {asbestosis}
249. asthma [ÄZ-mă] {asma}
250. atelectasis [ät-ě-LĚK-tă-sīs] {atelectasia}
251. auscultation [äws-kül-TĀ-shŭn] {auscultación}
252. bacilli (*sing.*, bacillus) [bă-SĪL-Ī (bă-SĪL-īs)] {bacilo}
253. base [bäs] {base}
254. black lung
255. bradypnea [brăd-ĭp-NĚ-ă] {bradipnea}
256. bronch(o), bronchi(o)
257. bronchial alveolar lavage [BRŎNG-kĕ-äl äL-VĚ-ō-lăr lä-VĂZH]
258. bronchial brushing
259. bronchiol(o)
260. bronchiole [BRŎNG-kĕ-öl] {bronquiolo}
261. bronchitis [brŏng-KĪ-tīs] {bronquitis}
262. bronchodilators [brŏng-kō-dĭ-LĀ-törz]
263. bronchography [brŏng-KŎG-ră-fĕ] {broncografía}
264. bronchoplasty [BRŎNG-kō-pläs-tĕ]
265. bronchoscope [BRŎNG-kō-skŏp] {broncoscopio}
266. bronchospasm [BRŎNG-kō-spăzm] {broncoespasmo}
267. bronchus (*pl.*, bronchi) [BRŎNG-kūs (BRŎNG-kī)] {bronquio}
268. capn(o)
269. Cheyne-Stokes respiration [chăn stŏks rĕs-pĭ-RĀ-shŭn]
270. chronic bronchitis
271. chronic obstructive pulmonary disease
272. cilia [SĪL-ĕ-ă]
273. crackles [KRĀK-ls]
274. croup [krŭp] {crup}
275. cystic fibrosis [SĪS-tĭk fĭ-BRŌ-sīs]
276. decongestants [dĕ-kŏn-JĚST-ănts]
277. diaphragm [DĪ-ă-främ] {diafragma}
278. diphtheria [dĭf-THĚR-ĕ-ă] {difteria}
279. dysphonia [dĭs-FŌ-nĕ-ă] {dissfonía}
280. dyspnea [dĭsp-NĚ-ă, DĪSP-nĕ-ă] {disnea}
281. emphysema [ĕm-fă-SĚ-mă, ĕm-fă-ZĚ-mă] {enfisema}
282. empyema [ĕm-pĭ-Ě-mă] {empiema}
283. endoscope [ĔN-dŏ-skŏp] {endoscopio}
284. endotracheal intubation [ĕn-dŏ-TRĀ-kĕ-äl ĭn-tŭ-BĀ-shŭn] (ET)
285. epiglott(o)
286. epiglottis [ĔP-ĭ-GLŎT-īs] {epiglotis}
287. epiglottitis [ĕp-ĭ-glŏt-Ī-tīs] {epiglotitis}
288. epistaxis [ĔP-ĭ-STĀK-sīs]
289. eupnea [yŭp-NĚ-ă, YŪP-nĕ-ă] {eupnea}
290. exhalation [ĕks-hă-LĀ-shŭn] {exhalación}
291. expectorants [ĕk-SPĚK-tŏ-rănts]
292. expiration [ĕks-pĭ-RĀ-shŭn] {expiración}
293. external nares [ĕks-TĚR-năl NĀR-ĕz]
294. external respiration
295. glottis [GLŎT-īs] {glotis}
296. hemoptysis [hĕ-MŎP-tĭ-sīs]
297. hemothorax [hĕ-mŏ-THŎR-ăks] {hemotórax}
298. hilum (*also* hilus) [HĪ-lŭm (HĪ-lŭs)] {hilio}
299. hypercapnia [hĭ-pĕr-KĀP-nĕ-ă]
300. hyperpnea [hĭ-pĕrp-NĚ-ă]
301. hyperventilation [HĪ-pĕr-vĕn-tĭ-LĀ-shŭn] {hiperventilación}
302. hypopharynx [HĪ-pŏ-FĀR-ĭngks] {hipofaringe}
303. hypopnea [hĭ-PŎP-nĕ-ă]
304. hypoventilation [HĪ-pŏ-vĕn-tĭ-LĀ-shŭn] {hipoventilación}
305. hypoxemia [hĭ-pŏk-SĚ-mĕ-ă] {hipoxemia}
306. hypoxia [hĭ-PŎK-sĕ-ă] {hipoxia}
307. inferior lobe [ĭn-FĚ-rĕ-ŏr lŏb]
308. inhalation [ĭn-hă-LĀ-shŭn] {inhalación}
309. inspiration [ĭn-spĭ-RĀ-shŭn] {inspiración}
310. intercostal muscles [ĭn-tĕr-KŎS-tăl MŪS-ĕlz]
311. internal respiration
312. laryng(o)
313. laryngectomy [LĀR-ĭn-JĚK-tŏ-mē]

WORD

314. laryngitis [lär-ĭn-Jĭ-tĭs]
{laryngitis}
315. laryngocentesis [lä-RĪNG-gō-sĕn-TĒ-sĭs]
316. laryngopharynx [lä-RĪNG-gō-fär-ĭngks]
317. laryngoplasty [lä-RĪNG-gō-pläs-tĕ] {laryngoplastia}
318. laryngoscopy [LÄR-ĭng-GÖS-kō-pĕ] {laryngoscopia}
319. laryngospasm [lä-RĪNG-gō-späsm]
320. laryngostomy [LÄR-ĭng-GÖS-tō-mĕ] {laryngostomía}
321. laryngotracheobronchitis [lä-RĪNG-gō-TRÄ-kĕ-ō-bröng-KĪ-tĭs]
322. laryngotracheotomy [lä-RĪNG-gō-trä-kĕ-ÖT-ō-mĕ]
323. larynx [LÄR-ĭngks] {laringe}
324. lob(o)
325. lobectomy [lō-BĚK-tō-mĕ] {lobectomía}
326. lung [lŭng] {pulmón}
327. mediastin(o)
328. mediastinoscopy [MĒ-dĕ-äs-tĭ-NÖS-kō-pĕ]
329. mediastinum [MĒ-dĕ-äs-TĪ-nŭm] {mediastino}
330. mesothelioma [MĚZ-ō-thĕ-lĕ-Ō-mă] {mesotelioma}
331. middle lobe
332. nas(o)
333. nasal cavity [NÄ-zäl KÄV-ĭ-tĕ]
334. nasal septum [NÄ-zäl SĔP-tŭm]
335. nasopharyngitis [NÄ-zō-fär-rĭn-Jĭ-tĭs]
336. nasopharyngoscopy [NÄ-zō-fär-rĭng-GÖS-kō-pĕ] {nasofaringoscopia}
337. nasopharynx [NÄ-zō-FÄR-ĭngks] {nasofaringe}
338. nebulizers [NĒB-yŭ-lĭz-ĕrz]
339. nose [nōz] {nariz}
340. nosebleed {epistaxis}
341. nostrils [NÖS-trĭlz] {naris}
342. or(o)
343. oropharynx [ÖR-ō-FÄR-ĭngks] {orofaringe}
344. orthopnea [ör-thöp-NĒ-ă, ör-THÖP-nĕ-ă] {ortopnea}
345. otorhinolaryngologist [ō-tō-RĪ-nō-lär-ĭng-GÖL-ō-jĭst]
346. ox(o), oxi, oxy
347. palatine tonsils [PÄL-ă-tĭn TÖN-sĭlz]
348. pansinusitis [pän-sĭ-nŭ-SĪ-tĭs]
249. paranasal sinuses [pär-ă-NÄ-säl SĪ-nŭs-ĕz]
350. parietal pleura [pä-RĪ-ĕ-täl PLÜR-ă]
351. paroxysmal [pär-ök-SĪZ-mäl] {paraxístico}
352. peak flow meter
353. percussion [pĕr-KŪSH-ŭn] {percusión}
354. pertussis [pĕr-TŪS-ĭs] {pertussis}
355. pharyng(o)
356. pharyngeal tonsils [fär-RĪN-jĕ-äl TÖN-sĭlz]
257. pharyngitis [fär-ĭn-Jĭ-tĭs] {faringitis}
358. pharynx [FÄR-ĭngks] {faringe}
359. phon(o)
360. phren(o)
361. pleur(o)
362. pleura (*pl.*, *pleurae*) [PLÜR-ă (PLÜR-ĕ)] {pleura}
363. pleural cavity [PLÜR-äl KÄV-ĭ-tĕ]
364. pleural effusion [PLÜR-äl ĕ-FYŪ-zhŭn]
365. pleuritis, pleurisy [plŭ-RĪ-tĭs, PLÜR-ĭ-sĕ] {pleuritis}
366. pleurocentesis [PLÜR-ō-sĕn-TĒ-sĭs]
367. pleuropexy [PLÜR-ō-PĚK-sĕ]
368. pneum(o), pneumon(o)
369. pneumobronchotomy [NŪ-mō-bröng-KÖT-ō-mĕ]
370. pneumoconiosis [NŪ-mō-kō-nĕ-Ō-sĭs] {neumoconiosis}
371. pneumonectomy [NŪ-mō-NĚK-tō-mĕ] {neumonectomía}
372. pneumonia [nŭ-MŌ-nĕ-ă] {neumonía}
373. pneumonitis [nŭ-mō-NĪ-tĭs] {neumonitis}
374. pneumothorax [nŭ-mō-THÖR-ăks] {neumotórax}
375. pulmonary abscess [PŪL-mō-när-ĕ ÄB-sĕs]
376. pulmonary edema [PŪL-mō-när-ĕ ĕ-DĒ-mă]
377. pulmonary function tests
378. rales [rählz] {rales}
379. respiratory [RĚS-pĭ-rä-tör-ĕ, rĕ-SPĪR-ă-tör-ĕ] system
380. respiratory tract
381. rhin(o)
382. rhinitis [rĭ-NĪ-tĭs] {rinitis}
383. rhinoplasty [RĪ-nō-pläs-tĕ] {rinoplastia}
384. rhinorrhea [rĭ-nō-RĒ-ă] {rinorrea}
385. rhonchi [RÖNG-kĭ] {ronquidos}
386. septoplasty [SĔP-tō-pläs-tĕ] {septoplastia}
387. septostomy [sĕp-TÖS-tō-mĕ] {septostomía}
388. septum [SĔP-tŭm] {tabique}
389. silicosis [sĭl-ĭ-KŌ-sĭs]
390. singultus [sĭng-GŪL-tŭs] {singulto}
391. sinusitis [sĭ-nŭ-SĪ-tĭs] {sinusitis}

WORD

392. sinusotomy [sīn-ū-SŎT-ō-mē] {sinosotomía}
393. soft palate [sŏft PĀL-ăt]
394. spir(o)
395. spirometer [sī-RŎM-ě-těr] {espirómetro}
396. sputum [SPŮ-tŭm] sample or culture
397. steth(o)
398. stridor [STRĪ-dŏr] {estridor}
399. superior lobe
400. sweat test
401. tachypnea [tăk-ĭp-NĒ-ă] {taquipnea}
402. thorac(o)
403. thoracic [thō-RĀS-ĭk] surgeon
404. thoracocentesis [THŎR-ă-kŏ-sĕn-TĒ-sĭs] {toracocentesis}
405. thoracostomy [thŏr-ă-KŎS-tŏ-mē] {torascostomía}
406. thoracotomy [thŏr-ă-KŎT-ŏ-mē] {toracotomía}
407. thorax [THŎ-răks] {tórax}
408. throat [thrŏt] {garganta}
409. throat culture
410. thyroid cartilage [THĪ-rŏyd KĀR-tĭ-lĭj]
411. tonsill(o)
412. tonsillectomy [TŎN-sĭ-LĚK-tŏ-mē] {tonsilectomía}
413. tonsillitis [TŎN-sĭ-LĪ-tĭs] {tonsilitis}
414. trache(o)
415. trachea [TRĀ-kē-ă] {tráquea}
416. tracheitis [trā-kē-Ī-tĭs]
417. tracheoplasty [TRĀ-kē-ŏ-PLĀS-tē] {traqueoplastia}
418. tracheostomy [TRĀ-kē-ŎS-tŏ-mē] {traquestomía}
420. tracheotomy [trā-kē-ŎT-ŏ-mē] {traqueotomia}
421. tuberculosis [tŭ-bĕr-kyŭ-LŎ-sĭs] {tuberculosis}
422. upper respiratory infection
423. ventilators [VĚN-tĭ-lā-tŏrz]
424. visceral pleura [VĪS-ĕr-ăl PLŪR-ă]
425. vocal cords
426. voice box
427. wheezes [HWĚZ-ĕz] {sibilancias}
428. whooping cough [HŎOP-ĭng kăwf]
429. windpipe

Abbreviations

Write out the full meaning of each abbreviation.

ABBREVIATION

430. ABG
431. AFB
432. A&P
433. AP
434. ARD
435. ARDS
436. ARF
437. BS
438. COLD
439. COPD
440. CPR
441. CTA
442. CXR
443. DOE
444. DPT
445. ENT
446. ET tube
447. FEF
448. FEV
449. FVC
450. HBOT
451. IMV
452. IPPB
453. IRDS
454. IRV
455. LLL
456. LUL
457. MBC
458. MDI
459. PA
460. PCP
461. PEEP
462. PFT
463. PND
464. RD
465. RDS
466. RLL
467. RUL
468. SARS
469. SIDS
470. SOB
471. T&A
472. TB
473. TLC
474. TPR
475. URI
476. VC
477. V/Q SCAN

Name _____ Date _____

Chapter 7: Word-Building (20 questions—1 pts. each)

Using the following combining forms, complete the word that best fits the definition of each word relating to the respiratory system listed below. Combining forms may be used more than once.

adenoid(o)	epiglott(o)	or(o)	pneum(o)
alveol(o)	laryng(o)	ox(o)	spir(o)
bronchi(o)	lob(o)	phon(o)	steth(o)
bronch(o)	mediastin(o)	phren(o)	thorac(o)
capn(o)	nas(o)	pleur(o)	trache(o)

1. Of the epiglottis: _____ ic
2. Destruction of the alveolus: _____ clasia
3. Incision into a lobe: _____ tomy
4. Abnormal voice production: _____ asthenia
5. Inflammation of the bronchus: _____ itis
6. Device for measuring respiration: _____ graph
7. Washing out of the pleura: _____ clysis
8. Inflammation of the nose and sinuses: _____ sinusitis
9. Incision into the chest wall: _____ tomy
10. Removal of the adenoids: _____ ectomy
11. Paralysis of the diaphragm: _____ plegia
12. Inflammation of the larynx and trachea: _____ tracheitis
13. Compound of oxygen: _____ ide
14. Excessive bronchial mucus: _____ rrhea
15. Recording of carbon dioxide: _____ gram
16. Device for examining the mediastinum: _____ scope
17. Inflammation of a lobe: _____ itis
18. Narrowing of the bronchial tube: _____ stenosis
19. Tracheal hemorrhage: _____ rrhagia
20. Removal of the larynx: _____ ectomy