

CHAPTER

1

Learning Terminology

After studying this chapter, you will be able to:

- 1.1 Explain how medical terms are developed
- 1.2 Describe the process of pluralizing terms
- 1.3 Describe how to interpret pronunciation marks
- 1.4 Define the four word parts used to build medical terms
- 1.5 Define common medical combining forms
- 1.6 List basic legal and ethical issues for health-related professionals
- 1.7 Describe how medical documentation is compiled
- 1.8 Describe HIPAA in relation to allied health

The Language of Medicine

Many everyday terms that we use to describe our health and our medical care go back to the early history of civilization. The language of medicine dates to the time when people had only spoken language, not written. Like all people who followed after them, they gave names to parts of their bodies, to illnesses, and to the cures they used. Some of these names survive in the roots and words still used today in medical terminology. For example, the ancient Greeks thought of the disease we call “cancer” as something eating at a person on the inside, and so named the condition *karkinos*, meaning both crab and cancer.

Medical terminology began to become standardized when Hippocrates (460–377 B.C.), a Greek physician, set about to organize an approach to medicine. The Hippocratic oath that is generally attributed to him has been in use for over 2,000 years. The actual Hippocratic oath along with other information about the oath appears in the student online learning center at www.mhhe.com/medterm3e.

Derivation of Medical Terminology

Many medical terms originate directly from ancient Greek or Latin terms. Table 1-1 shows a sampling of words taken directly from those languages. Notice how the terms have retained their meaning over the centuries. Other languages form words in the same way. For example, the word nerve is derived from the Latin *nervus*. In Spanish, the word *nervio* is also derived

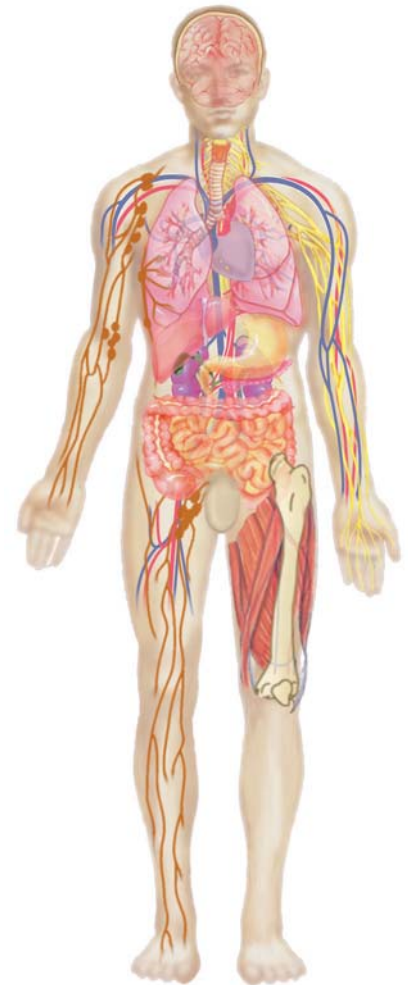


TABLE 1–1 Derivations of Terms

Modern Term	Historical Derivation
artery	Latin <i>arteria</i> ; Greek <i>arteria</i>
cardi(o), the heart	Greek <i>kardia</i>
cell	Latin <i>cella</i> , chamber
gene	Greek <i>genos</i> , birth
hernia	Latin <i>hernia</i> , rupture
ligament	Latin <i>ligamentum</i>
nerve	Latin <i>nervus</i>
sinus	Latin <i>sinus</i> , cavity
tendon	Latin <i>tendo</i>
vein	Latin <i>vena</i>

from the same Latin word. (In the student online learning center (www.mhhe.com/medterm3e), you will find a Spanish-English glossary of some of the key terms used in this book. In many cases, you will find the words very similar to their English counterparts.)

Later, people of many cultures used these ancient terms in their languages. Even though the appearance of the words changed, the roots from which the words developed remained the original Greek or Latin terms. Over the ensuing centuries, people involved in medicine and the development of treatments tended to look for Greek or Latin words or roots to describe their newest discoveries. Hence, many medical terms used today are based on ancient Greek and Latin. Word building became and remains the primary way to describe new medical discoveries.

The study of the origin of words is called *etymology*. General language terms tend to change dramatically. It takes a talented word detective to find the actual root of a word that has undergone centuries of change. Remember that most languages, up until the last 500 years, were spoken by most of the population, but were available in written form to only a few. Although books had been around for many centuries, printed material was not available to the general population until the advent of the printing press in the sixteenth century. Even then, it took some time for large numbers of people to become readers of newspapers, journals, and books. As spoken words are passed down through generations, pronunciations (and even meanings) often change. An example is the word *heart*. It is derived from Old English *heorte*, which ultimately comes from an early Germanic word, related to Greek *kardia*, meaning heart, and found in words like *cardiac*, *cardiology*, and *cardiogram*.

The change in medical terms has generally been less drastic. Most people who have studied medicine since Greek and Roman times have also studied the Latin and Greek languages as part of learning medical terminology. So, a suffix, *-tomy*, which means “cutting,” may be used in modern types of surgery (*phlebotomy*, incision into a vein), but the basic meaning is still the original one, “cutting.” Throughout this text, you will learn the parts of words that enable you to understand many medical terms.

HISTORY OF MEDICAL TERMS EXERCISES

Fill in the Blanks

1. If a word is derived from an Old English word, it might also be related to a _____ or _____ word that means the same thing.
2. The first organized approach to medicine was formalized by _____.
3. The word cardiology is derived from a _____ root.
4. Two languages studied throughout the history of medicine are _____ and _____.
5. When a word is passed through spoken language only, it is more likely to be altered than if it is passed through _____ language.

Pluralizing Terms

Most English plurals are formed by adding *-s* or *-es* to a word. This is also true of many medical terms (cancer, cancers; abscess, abscesses). However, medical terms derived from ancient Greek and Latin often use the regular plural forms from those languages (bursa, bursae; embolus, emboli). Throughout time, some of these ancient plural forms have been replaced by adding *-s* or *-es*. As you study the text, you will learn which plurals are commonly used as well as irregular plurals (foot, feet; tooth, teeth). Table 1-2 shows the formation of plurals.

TABLE 1–2 Formation of Plurals

Singular Words	Plural Words	Pluralizing Rules
joint, face, angioma, cancer, muscle, paraplegic	joints, faces, angiomas, cancers, muscles, paraplegics	Add <i>-s</i> to words ending in any vowel or consonant except <i>s</i> , <i>x</i> , <i>z</i> , or <i>y</i> .
abscess, reflex	abscesses, reflexes	Add <i>-es</i> to words ending in <i>s</i> , <i>x</i> , or <i>z</i> .
vasectomy	vasectomies	Remove the <i>y</i> and add <i>-ies</i> to words ending in <i>-y</i> preceded by a consonant. When an ending <i>-y</i> is preceded by a vowel, the usual plural suffix is <i>-s</i> .
appendix, radix	appendices, radices	Remove the <i>x</i> and add <i>-ces</i> to Latin words ending in <i>x</i> .
fossa	fossae	Add <i>-e</i> to Latin terms ending in <i>-a</i> .
staphylococcus	staphylococci	Remove <i>-us</i> and add <i>-i</i> to Latin words ending in <i>-us</i> .
ganglion, datum	ganglia, data	Remove <i>-on</i> and add <i>-a</i> to Greek words ending in <i>-on</i> ; remove <i>-um</i> from and add <i>-a</i> to Latin words ending in <i>-um</i> .
neurosis	neuroses	Change <i>-sis</i> to <i>-ses</i> in Greek words ending in <i>-sis</i> .

Spelling and Pronunciation of Medical Terms

Misspellings and mispronunciations in a medical setting can result in life-threatening situations. A misspelled or a misunderstood abbreviation for a medicine dosage was responsible for the death of several children in a cancer ward. Recently, a famous actor's infant twins were given a potentially fatal dose of a blood thinner because of a misspelled abbreviation. Several new AIDS medications are close enough in sound to other drugs as to make prescribing, particularly by telephone, difficult. A physician ordered a prescription for an AIDS drug, saquinavir, for an AIDS patient. The pharmacy filled a prescription for a sedative, Sinequan, and the patient became critically ill.

For quick checking of terms, you can use www.medical-spell-checker.com, which is not an official Web site but is provided free for Internet users. It is important to note that such sites are supported by advertising, so use them carefully.

Aside from the possibility of written mistakes, people in health care must remain vigilant in checking and rechecking verbal instructions. Misspellings that result in harm to a patient may become legal issues. Patients have the right to expect a certain standard of care. Misunderstandings caused by incorrect or misspelled words may be disastrous in certain circumstances. For example, some hospitals and doctors' offices require that written forms requesting an electrocardiogram include the abbreviation EKG instead of ECG because of the possible confusion of a written "C" with an "E" as in EEG (electroencephalogram).

Learning how to spell and pronounce medical terms is a matter of practice. In this text, spellings and pronunciations are given in both the vocabulary review sections of each chapter and in the end-of-chapter review sections. Familiarizing yourself with correct spellings of terms is a matter of practice and of seeing the terms over and over again. Pronouncing a word out loud each time you see the pronunciation will help familiarize you with the sound of the word. You may also want to write and pronounce terms several terms or work with a partner writing and pronouncing terms to each other. (Note: Not everyone agrees on every pronunciation, and there may be regional variations. If your instructor has a particular preference, follow that preference.) Also, use your own medical dictionary as a reference when you have a question. It is a good idea to know some basic terms in other languages such as Spanish when you work in an area where many people mainly speak that language. Since Spanish is the second most common language spoken in the United States today, this textbook has a Spanish-English glossary for your reference.

MORE ABOUT . . .

Medical Errors

Both government and the health care industry are investigating ways to avoid the increasing number of medical errors (mistakes). Several companies have now devised an electronic method for entering prescriptions (known as CPOE, computerized physician order entry) with only doctors having passwords; the amounts and drug names are double-checked by the program. Some health care services centers now require every direction or order given by phone to be read back at least once for confirmation. Some surgeons insist that a patient actually write "yes" on the correct limb to be operated on before they will proceed.

For more information on medical errors, go to www.ahrq.gov and search for medical errors.

TABLE 1–3 Pronunciation Guide

Vowel	Long (–) or Short (˘)	Examples of Pronunciation
a	long ā	pace, plate, atrium
e	long ē	feline, easy, beat
i	long ī	dine, line, I, bite
o	long ō	boat, wrote, rose
u	long ū	cute, cube
a	short ă	rap, cat, mar
e	short ě	ever, pet
i	short ĭ	pit, kitten
o	short ɔ̆	pot, hot
u	short ŭ	put, cut

In this text, there are two ways we help you learn to pronounce words. First, we capitalize one syllable of all words with two or more syllables so you can tell where the heaviest accent falls. For example, the word *femoral* is pronounced FEM-or-al, with the accent on the first syllable. Next, we add marks, called *diacritical marks*, to the vowels to guide you in pronouncing them. Vowels are either long or short, as shown in Table 1-3.

Long and short vowels are just a guide to help you pronounce the words correctly. English dictionaries have much more extensive pronunciation systems, with many degrees of vowel sounds. For the purposes of learning medical terminology, long and short marks provide enough guidance.

Some spelling differences occur in different fields of allied health. For example, medical transcriptionists follow AAMT (The American Association for Medical Transcription) style. In this style, diseases, procedures, and conditions that are named after people are spelled without the possessive form. For example, *Alzheimer's disease* is spelled *Alzheimer disease* and *Fontan's operation* is spelled *Fontan operation*. The AMA (American Medical Association) has also adopted this practice. However, U.S. government Websites still use the possessive form, as do most organizations (for example, Alzheimer's Foundation of America). Appendix F gives some examples of these style differences.

PRONUNCIATION EXERCISES

Saying What You Mean

In the following list of words, the accented syllable is shown in capital letters. The vowels need a long or short mark added. As an exercise in how familiar you already are with medical words, add the diacritical marks to the vowels. Check the answers at the end of the chapter.

6. anemia [a-NE-me-a]
7. angioplasty [AN-je-o-plas-te]
8. bursitis [ber-SI-tis]
9. disease [di-ZEZ]
10. hemoglobin [HE-mo-GLO-bin]
11. lymphoma [lim-FO-ma]
12. neuritis [nu-RI-tis]
13. osteoporosis [OS-te-o-po-RO-sis]

14. paraplegia [par-a-PLĒ-je-a]
15. pulse [puls]
16. radiation [ra-de-A-shun]
17. reflex [RE-fleks]
18. retina [RET-i-na]
19. rheumatism [RU-ma-tizm]
20. sciatica [si-AT-i-ka]
21. septum [SEP-tum]
22. sinus [SI-nus]
23. therapy [THAR-a-pe]
24. typhoid [TI-foyd]
25. vaccine [VAK-sen]

Forming Medical Terms

Many medical terms are formed from two or more word parts. There are four word parts to learn about in the study of medical terminology.

- A **word root** is the fundamental portion of a word that contains the basic meaning. For example, the word root *cardi* means “heart.”
- **Combining forms** are the word root and a combining vowel that enable two parts to be connected. For example, the word root *cardi* + the combining vowel *-o-* can form words relating to the basic meaning “heart,” such as *cardiology*, the practice that studies, diagnoses, and treats disorders of the heart. It is often easier to understand medical terms by looking at the suffix first. Thus, *-logy*, the study of, plus the prefix *cardio-* gives you a quick understanding of the definition.
- **Prefixes** are word parts attached to the beginning of a word or word root that modify the meaning of that word root. For example, the prefix *peri-*, meaning “around, near, surrounding,” helps to form the word *pericardium*, meaning “around or surrounding the heart.” Common prefixes used in medical terminology are discussed in Chapter 2 as well as in the body systems chapters.
- **Suffixes** are word parts attached to the end of a word or word root that modify the meaning of that word root. For example, the suffix *-oid*, meaning “like or resembling,” helps to form the word *fibroid*, meaning “made of fibrous tissue.” Common suffixes used in medical terminology are discussed in Chapter 2 as well as in the body systems chapters.

By familiarizing yourself with the word parts in this chapter and in Chapters 2 and 3, you will find the separate chapters about body systems easier to understand. Once you have learned the basic words, combining forms, and word parts in the systems chapters, you will be able to define many of the medical terms you will encounter as a health care professional.

Word Roots and Combining Forms

Most medical word roots come directly from Greek and Latin terms. The history of a word is called its *etymology*. The list that follows includes common medical combining forms with meanings that are not specifically part of a body system or may apply both to general terms and to specific body systems. (Body systems combining forms are discussed in later chapters.) Many of the combining forms in this chapter form medical terms when used with word parts or other terms. In Chapter 2, you will study prefixes and suffixes. Once you master all three basic word parts, along with roots, you will have the basic tools necessary for understanding medical terms.

COMBINING FORM	MEANING	EXAMPLE
acanth(o)	spiny; thorny	<i>acanthoid</i> [ă-KĂN-thöyd], spine-shaped
actin(o)	light	<i>actinotherapy</i> [ĂK-tin-ō-THĀR-ă-pē], ultraviolet light therapy used in dermatology
aer(o)	air; gas	<i>aerogen</i> [ĀR-ō-jēn], gas-producing microorganism
alge, algesi, algio, algo	pain	<i>algospasm</i> [ĂL-gō-spăzm], pain caused by a spasm
amyl(o)	starch	<i>amylophagia</i> [ĂM-ī-lō-FĀ-jē-ă], abnormal craving for starch
andro	masculine	<i>androblastoma</i> [ĂN-drō-blăs-TŌ-mă], testicular tumor
athero	plaque; fatty substance	<i>atheroma</i> [ăth-ēr-Ō-mă], swelling on the surface of an artery from a fatty deposit
bacill(i)	bacilli; bacteria	<i>bacilliform</i> [bă-SĪL-ī-fōrm], rod-shaped like a bacterium
bacteri(o)	bacteria	<i>bacteriogenic</i> [băk-TĒR-ē-ō-JĚN-ĭk], caused by bacteria
bar(o)	weight; pressure	<i>barostat</i> [BĂR-ō-stăt], pressure-regulating device
bas(o), basi(o)	base	<i>basophilic</i> [BĀ-sō-FĪL-ĭk], having an affinity for basic dyes (said of tissue)
bio-	life	<i>biopsy</i> [BĪ-öp-sē], sampling of tissue from living patients
blasto	immature cells	<i>glioblastoma</i> [GLĪ-ō-blăs-TŌ-mă], growth consisting of immature neural cells
cac(o)	bad; ill	<i>cacomelia</i> [kăk-ō-MĒ-lē-ă], congenital limb deformity
calc(o), calci(o)	calcium	<i>calcipenia</i> [kăl-sĭ-PĒ-nē-ă], calcium deficiency
carcin(o)	cancer	<i>carcinogen</i> [kăr-SĪN-ō-jēn], cancer-producing substance
chem(o)	chemical	<i>chemolysis</i> [kēm-ŌL-ĭ-sĭs], chemical decomposition
chlor(o)	chlorine, green	<i>chloruresis</i> [klō-yū-RĒ-sĭs], excretion of chloride in urine
chondrio, chondro	cartilage, grainy, gritty	<i>chondrocyte</i> [KŌN-drō-sĭt], cartilage cell
chore(o)	dance	<i>choreoathetosis</i> [KŌR-ē-ō-ăth-ē-TŌ-sĭs], abnormal body movements
chrom, chromat, chromo	color	<i>chromatogenous</i> [krō-mă-TŎJ-ē-nŭs], producing color
chrono	time	<i>chronometry</i> [krō-NŌM-ē-trē], measurement of time intervals

COMBINING FORM	MEANING	EXAMPLE
chyl(o)	chyle, a digestive juice	<i>chylopoiesis</i> [KĪ-lō-pōy-Ē-sīs], production of chyle in the intestine
chym(o)	chyme, semifluid production of chyme in the stomach	<i>chymopoiesis</i> [KĪ-mō-pōy-Ē-sīs], present during digestion
cine(o)	movement	<i>cineradiography</i> [SĪN-ě-rā-dē-ŎG-ră-fē], imaging of an organ in motion
coni(o)	dust	<i>coniometer</i> [kō-nē-ŎM-ě-tēr], device for measuring dust
crin(o)	secrete	<i>crinogenic</i> [krĭn-ō-JĚN-ĭk], causing secretion; <i>endocrine</i> [EN-do-krin], a gland that secretes internally into systemic circulation
cry(o)	cold	<i>cryocautery</i> [KRĪ-ō-KĂW-tēr-ē], destruction of tissue by freezing
crypt(o)	hidden; obscure	<i>cryptogenic</i> [krĭp-tō-JĚN-ĭk], of obscure origin
cyan(o)	blue	<i>cyanopsia</i> [sĭ-ă-NŎP-sē-ă], condition following a cataract operation in which all objects appear blue
cycl(o)	circle; cycle; ciliary body	<i>cyclectomy</i> [sĭ-KLĚK-tō-mē], removal of a part of a ciliary body
cyst(o), cysti	bladder, cyst, cystic duct	<i>cystoid</i> [SĪS-tōyd], bladder-shaped
cyt(o)	cell	<i>cytoarchitecture</i> [SĪ-tō-ĂR-kĭ-tĕk-chūr], arrangement of cells in tissue
dextr(o)	right, toward the right	<i>dextrocardia</i> [DĚKS-trō-KĂR-dē-ă], displacement of the heart to the right
dips(o)	thirst	<i>dipsomania</i> [dĭp-sō-MĂ-nē-ă], alcoholism
dors(o), dorsi	back	<i>dorsalgia</i> [dōr-SĂL-jē-ă], upper back pain
dynamo	force; energy	<i>dynamometer</i> [dĭ-nă-MŎM-ě-tēr], instrument for measuring muscular power
echo	reflected sound	<i>echocardiogram</i> [ĕk-ō-KĂR-dē-ō-grăM], ultrasound recording of the heart
electr(o)	electricity; electric	<i>electrocardiogram</i> [ē-lĕk-trō-KĂR-dē-ō-grăM], graphic record of heart's electrical currents
eosin(o)	red; rosy	<i>eosinophilic</i> [ē-ō-sĭn-ō-FĪL-ĭk], staining readily with certain dyes
ergo	work	<i>ergograph</i> [ĚR-gō-grăf], instrument for measuring work of muscular contractions
erythr(o)	red, redness	<i>erythroclasis</i> [ēr-ĭ-THRŎK-lă-sĭs], fragmentation of red blood cells

COMBINING FORM	MEANING	EXAMPLE
esthesio	sensation, perception	<i>esthesiometry</i> [ĕs-thĕ-zĕ-ŎM-ĕ-trĕ], measurement of tactile sensibility
ethmo	ethmoid bone	<i>ethmonasal</i> [ĕth-mŏ-NĀ-sāl], relating to the ethmoid and nasal bones
etio	cause	<i>etiopathology</i> [Ē-tĕ-ŏ-pĀ-THŎL-ŏ-jĕ], study of the cause of an abnormality or disease
fibr(o)	fiber	<i>fibroplastic</i> [fi-brŏ-PLĀS-tĭk], producing fibrous tissue
fluor(o)	light; luminous; fluorine	<i>fluorochrome</i> [FLŪR-ŏ-krŏm], fluorescent contrast medium
fungi	fungus	<i>fungicide</i> [FŪN-jĭ-sĭd], substance that destroys fungi
galact(o)	milk	<i>galactophoritis</i> [gĀ-LĀK-tŏ-fŏ-RĪ-tĭs], inflammation of the milk ducts
gen(o)	producing; being born	<i>genoblast</i> [JĔN-ŏ-blĀst], nucleus of a fertilized ovum
gero, geront(o)	old age	<i>gerontology</i> [jĀr-ŏn-TŎL-ŏ-jĕ], study of the problems of aging
gluco	glucose	<i>glucogenic</i> [glŭ-kŏ-JĔN-ĭk], producing glucose
glyco	sugars	<i>glycopenia</i> [glĭ-kŏ-PĔ-nĕ-Ā], sugar deficiency
gonio	angle	<i>goniometer</i> [gŏ-nĕ-ŎM-ĕ-tĕr], instrument for measuring angles
granulo	granular	<i>granuloma</i> [grĀn-yŭ-LŎ-mĀ], small, granular lesion
gyn(o), gyne, gyneco	women	<i>gynopathy</i> [gĭ-NŎP-Ā-thĕ], disease peculiar to women
home(o), homo	same; constant	<i>homeoplasia</i> [HŎ-mĕ-ŏ-PLĀ-zhĕ-Ā], formation of new, similar tissue
hydr(o)	hydrogen, water	<i>hydrocephaly</i> [hĭ-drŏ-SĔF-Ā-lĕ], condition characterized by excessive fluid accumulation in the head
hypn(o)	sleep	<i>hypnogenesis</i> [hĭp-nŏ-JĔN-ĕ-sĭs], induction of sleep
iatr(o)	physician; treatment	<i>iatrogenic</i> [ĭ-Āt-rŏ-JĔN-ĭk], produced or caused by treatment or diagnostic procedure
ichthy(o)	dry; scaly; fish	<i>ichthyotoxism</i> [ĭK-thĕ-ŏ-TŎK-sĭzm], poisoning by fish
idio	distinct; unknown	<i>idiopathic</i> [ĭD-ĕ-ŏ-PĀTH-ĭk], of unknown origin (said of a disease)

COMBINING FORM	MEANING	EXAMPLE
immun(o)	safe; immune	<i>immunodeficient</i> [ĪM-yū-nō-dē-FĪSH-ěnt], lacking in some essential immune function
kal(i)	potassium	<i>kalemia</i> [kă-LĒ-mē-ă], presence of potassium in the blood
karyo	nucleus	<i>karyolysis</i> [kăr-ē-ŎL-ĭ-sĭs], destruction of a cell nucleus
ket(o), keton(o)	ketone; acetone	<i>ketogenesis</i> [kē-tō-JĔN-ě-sĭs], metabolic production of ketones
kin(o), kine	movement	<i>kinesthesia</i> [KĪN-ēs-THĒ-zhē-ă], perception of movement
kinesi(o), kineso	motion	<i>kinesiology</i> [kĭ-nē-sē-ŎL-ō-jē], study of movement
kyph(o)	humpback	<i>kyphoscoliosis</i> [KĪ-fō-skō-lē-Ŏ-sĭs], kyphosis combined with scoliosis
lact(o), lacti	milk	<i>lactogen</i> [LĂK-tō-jēn], agent that stimulates milk production
latero	lateral, to one side	<i>lateroduction</i> [LĂT-ēr-ō-DŪK-shŭn], movement to one side
lepto	light, frail, thin	<i>leptomeninges</i> [lēp-tō-mě-NĪN-jēz], two delicate layers of meninges
leuk(o)	white	<i>leukoblast</i> [LŪ-kō-blăst], immature white blood cell
lip(o)	fat	<i>lipoblast</i> [Lĭ-pō-blăst], embryonic fat cell
lith(o)	stone	<i>lithotomy</i> [lĭ-THŎT-ō-mē], operation for removal of stones
log(o)	speech, words, thought	<i>logopathy</i> [lŏg-ŎP-ă-thē], speech disorder
lys(o)	dissolution	<i>lysemia</i> [lĭ-SĒ-mē-ă], dissolution of red blood cells
macr(o)	large; long	<i>macromelia</i> [măk-rō-MĒ-lē-ă], abnormally sized limb
medi(o)	middle; medial plane	<i>mediolateral</i> [MĒ-dē-ō-LĂT-ēr-ă], relating to the medial plane and one side of the body
meg(a), megal(o)	large; million	<i>megaloencephaly</i> [MĔG-ă-lyō-ěn-SĔF-ă-lē], abnormally large brain
melan(o)	black; dark	<i>melanoderma</i> [MĔL-ă-nō-DĔR-mă], abnormal skin darkening
mes(o)	middle; median	<i>mesocephalic</i> [MĔZ-ō-sě-FĂL-ĭk], having a medium-sized head
micr(o)	small; one-millionth; tiny	<i>microorganism</i> [MĪ-krō-ŎR-găn-ĭzm], tiny organism

COMBINING FORM	MEANING	EXAMPLE
mio	smaller; less	<i>miopragia</i> [mī-ō-PRĀ-jē-ă], lessened functional activity
morph(o)	structure; shape	<i>morphology</i> [mōr-FŎL-ō-jē], study of the structure of animals and plants
narco	sleep; numbness	<i>narcolepsy</i> [NĀR-kō-lēp-sē], sleep disorder
necr(o)	death; dying	<i>necrology</i> [nē-KRŎL-ō-jē], study of the cause of death
noct(i)	night	<i>nocturia</i> [nŏk-TŪ-rē-ā], urination at night
normo	normal	<i>normocyte</i> [NŎR-mō-sīt], normal red blood cell
nucle(o)	nucleus	<i>nucleotoxin</i> [NŪ-klē-ō-TŎK-sĭn], poison that acts upon a cell nucleus
nyct(o)	night	<i>nyctalopia</i> [nĭk-tă-LŎ-pē-ă], reduced ability to see at night
oncho, onco	tumor	<i>oncolysis</i> [ŏng-KŎL-ĭ-sĭs], destruction of a tumor
orth(o)	straight; normal	<i>orthodontics</i> [ōr-thō-DŎN-tĭks], dental specialty concerned with correction of tooth placement
oxy	sharp; acute; oxygen	<i>oxyphonia</i> [ŏk-sē-FŎN-nē-ă], shrillness of voice
pachy	thick	<i>pachyonychia</i> [PĀK-ē-ō-NĪK-ē-ă], abnormal thickening of the nails
path(o)	disease	<i>pathogen</i> [PĀTH-ō-jĕn], disease-causing substance
phago	eating; devouring; swallowing	<i>phagocyte</i> [FĀG-ō-sīt], cell that ingests bacteria and other particles
pharmaco	drugs; medicine	<i>pharmacology</i> [FĀR-mă-KŎL-ō-jē], the science of drugs, including their sources, uses, and interactions
phon(o)	sound; voice; speech	<i>phonometer</i> [fō-NŎM-ĕ-tĕr], instrument for measuring sound
phot(o)	light	<i>photometer</i> [fō-TŎM-ĕ-tĕr], instrument for measuring light
physi, physio	physical; natural	<i>physiotherapy</i> [FĪZ-ē-ō-THĀR-ă-pē], physical therapy
physo	air; gas; growing	<i>physocele</i> [FĪ-sō-sēl], swelling due to gas
phyt(o)	plant	<i>phytoxin</i> [fĭ-tō-TŎK-sĭn], substance from plants that is similar to a bacterial toxin
plasma, plasm	formative; plasma	<i>plasmapheresis</i> [PLĀZ-mă-fē-RĒ-sĭs], separation of blood into parts

COMBINING FORM	MEANING	EXAMPLE
poikilo	varied; irregular	<i>poikilocyte</i> [PÖY-kĩ-lō-sīt], irregularly shaped red blood cell
pseud(o)	false	<i>pseudodiabetes</i> [SŪ-dō-dī-ă-BĒ-tēz], false positive test for sugar in the urine
pyo	pus	<i>pyocyst</i> [PĪ-ō-sist], cyst filled with pus
pyreto	fever	<i>pyretogenous</i> [pī-rē-TÖJ-ě-nūs], causing fever
pyro	fever; fire; heat	<i>pyrogenic</i> [pī-rō-JĚN-ĭk], causing fever
radio	radiation; x-ray; radius	<i>radiography</i> [RĀ-dē-ÖG-ră-fē], x-ray examination
salping(o)	tube	<i>salpingectomy</i> [săl-pĩn-JĚK-tō-mē], removal of the fallopian tube
schisto	split	<i>schistocytosis</i> [SKĪS-tō-sī-TŌ-sis], bladder fissure
schiz(o)	split; division	<i>schizophrenia</i> [skiz-ō-FRĚ-nē-ă, skits-ō-FRĚ-nē-ă], a spectrum of mental disorders often with a disorder in perception
scler(o)	hardness; hardening	<i>scleroderma</i> [sklēr-ō-DĚR-mă], thickening and hardness of the skin
scolio	crooked; bent	<i>scoliometer</i> [skō-lē-ÖM-ě-tēr], instrument for measuring curves
scoto	darkness	<i>scotograph</i> [SKŌ-tō-grăf], appliance for helping the blind to write
sidero	iron	<i>sideropenia</i> [SĪD-ēr-ō-PĚ-nē-ă] abnormally low level of iron in the blood
sito	food; grain	<i>sitotoxin</i> [sī-tō-TÖK-sĩn], any food poison
somat(o)	body	<i>somatogenic</i> [SŌ-mă-tō-JĚN-ĭk], originating in the body
somn(o), somni	sleep	<i>somnambulism</i> [söm-NĀM-byū-lĩzm], sleepwalking
sono	sound	<i>sonomotor</i> [sön-ō-MŌ-tēr], relating to movements caused by sound
spasmo	spasm	<i>spasmolytic</i> [SPĀZ-mō-LĪT-ĭk], agent that relieves spasms
spher(o)	round; spherical	<i>spherocyte</i> [SFĚR-ō-sīt], spherical red blood cell
spir(o)	breath; breathe	<i>spiroscope</i> [SPĪ-rō-skōp], device for measuring lung capacity
squamo	scale; squamous	<i>squamofrontal</i> [SKWĀ-mō-FRŌN-tăl], relating to the squamous part of the frontal bone

COMBINING FORM	MEANING	EXAMPLE
staphyl(o)	grapelike clusters	<i>staphylococcus</i> [STĀF-ĭ-lō-KÖK-ŭs], a common species that is the cause of a variety of infections
steno	narrowness	<i>stenocephaly</i> [stĕn-ō-SĔF-ă-lē], narrowness of the head
stere(o)	three-dimensional	<i>stereology</i> [STĚR-ē-ÖL-ō-jē], study of three-dimensional aspects of a cell
strepto	twisted chains; streptococci	<i>streptococcus</i> [strĕp-tō-KÖK-ŭs], a common organism that can cause various infections
styl(o)	peg-shaped	<i>styloid</i> [STĪ-lōyd], peg-shaped; said of a bony growth
syring(o)	tube	<i>syringitis</i> [sĭ-rĭn-JĪ-tĭs], inflammation of the eustachian tube
tel(o), tele(o)	distant; end; complete	<i>telophase</i> [TĚL-ō-fāz], final stages of mitosis or meiosis
terato	monster (as a malformed fetus)	<i>teratogen</i> [TĚR-ă-tō-jĕn], agent that causes a malformed fetus
therm(o)	heat	<i>thermometer</i> [thĕr-MÖM-ĕ-tĕr], an instrument for measuring temperature
tono	tension; pressure	<i>tonometer</i> [tō-NÖM-ĕ-tĕr], instrument for measuring pressure
top(o)	place; topical	<i>topography</i> [tō-PÖG-ră-fĕ], description of a body part in terms of a specific surface area
tox(i), toxico, toxo	poison; toxin	<i>toxipathy</i> [tök-SĪP-ă-thĕ], disease due to poisoning
tropho	food; nutrition	<i>trophocyte</i> [TRÖF-ō-sĭt], cell that provides nutrition
vivi	life	<i>viviparous</i> [vĭ-VĪP-ă-rŭs], giving birth to living young
xanth(o)	yellow	<i>xanthoderma</i> [zăn-thō-DĚR-mă], yellowish skin
xeno	stranger	<i>xenophobia</i> [zĕn-ō-FÖ-bĕ-ă], extreme fear of strangers or foreigners
xer(o)	dry	<i>xerasia</i> [zĕ-RĀ-zhĕ-ă], dry and brittle hair condition
xiph(o)	sword; xiphoid	<i>xiphocostal</i> [ZĪF-ō-KÖS-tăł], relating to the xiphoid process and the ribs
zo(o)	life	<i>zooblast</i> [ZÖ-ō-blăst], animal cell
zym(o)	fermentation; enzyme	<i>zymogram</i> [ZĪ-mō-grăm], strips of paper for testing for location of enzymes

Forming Medical Terms Exercises

Building Medical Words

Using the following word parts, build medical terms for the definitions given in the following questions. Use two word parts for each answer.

cephalic	cyesis	dys	macro
micro	necro	normo	nycto
osis	otic	phobia	phonia
pseudo	scolio	scope	

- instrument to view small items _____
- false pregnancy _____
- fear of night _____
- condition of difficult speech _____
- pertaining to a normal size head _____
- abnormal curvature of the spine _____

Understanding Word Parts

Define each of the following medical terms. Then break each term into word parts and give the definition for each part. If you need help with any suffixes, refer to Chapter 2.

- cyanosis _____

- leukocyte _____

- cytometer _____

- chondroma _____

- adipocoele _____

- fungicide _____

- glucogenesis _____

- karyocyte _____

- hydrotherapy _____

41. homeostasis _____

42. radiology _____

43. necrosis _____

44. dysphagia _____

Completing the Terms

Using one or more of the following combining forms, complete the word that best fits the definition given below. If you have difficulty understanding some of the word parts, refer to Chapter 2.

angi(o)	burs(o)	carcin(o)	cry(o)
cyst(o)	cyt(o)	erythr(o)	fibr(o)
glyc(o)	gynec(o)	hypn(o)	immun(o)
later(o)	lip(o)	lith(o)	lymph(o)
macr(o)	medi(o)	neur(o)	oste(o)

45. condition of red blood cells: _____ osis
46. cancerous tumor: _____ oma
47. ultrasound examination of the bladder: _____ graphy
48. examination of a cell: _____ scopy
49. cold therapy: _____ therapy
50. pertaining to one side: _____ al
51. deficiency of sugar: _____ penia
52. large enough to be examined with the naked eye: _____ scopic
53. breakdown of fats: _____ lysis
54. altered state of consciousness resembling sleep: _____ osis
55. toward the middle: _____ ad
56. impairment or insufficient development of immune response: _____ compromised
57. branch of medicine dealing with the diagnosis of disorders affecting women: _____ ology
58. resembling or made of fibers or fibrous tissue: _____ oid
59. surgical crushing of a stone: _____ tripsy
60. abnormal thinning and degeneration of the bone: _____ porosis
61. inflammation of the bursa: _____ itis
62. nerve inflammation: _____ itis
63. surgical repair of a vessel: _____ plasty
64. mass or tumor made of lymph tissue: _____ oma

Legal and Ethical Issues

Health care workers share some special obligations, both legally and ethically. Many legal decisions have upheld the right of patients to privacy in the health care setting. Patients also have the right to sue over maltreatment. Ethical standards require that patients and their families are treated fairly. “Fair” may include giving the best care, keeping clear records, or respecting patients’ rights. The American Hospital Association’s Patient’s Bill of Rights gives twelve guidelines for medical staff, administrative personnel, and patients. Although these are specifically meant for hospitals, most of the following guidelines provide a clear, ethical standard for patients’ rights in all health care settings.

- The right to considerate and respectful care.
- The right to relevant, current, and understandable information about their diagnosis, treatment, and prognosis.
- The right to make decisions about the planned care and the right to refuse care.
- The right to have an advance directive (such as a living will) concerning treatment if they become incapacitated.
- The right to privacy in all procedures, examinations, and discussions of treatment.
- The right to confidential handling of all information and records about their care.
- The right to look over and have all records about their care explained.
- The right to suggest changes in the planned care or to transfer to another facility.
- The right to be informed about the business relationships among the hospital and other facilities that are part of the treatment and care.
- The right to decide whether to take part in experimental treatments.
- The right to understand their care options after a hospital stay.
- The right to know about the hospital’s policies for settling disputes and to examine and receive an explanation of all charges.

For more information about the Patient’s Bill of Rights, go to the American Hospital Association’s Web site (www.aha.org).

As a worker in health care, you may be a clinical worker who provides direct care, or you may be an administrative worker who usually has access to, or responsibility for, patient records. In either case, the adherence to all legal and ethical standards is a fundamental requirement of your job. Many issues are legislated differently around the country. You must follow the rules of the state and institution for which you work. Never take it upon yourself to make medical decisions for which you have not been trained and are not qualified.

HIPAA and Allied Health Professions

In 1996, Congress passed the Health Insurance Portability and Accountability Act of 1996 (HIPAA). This law protects health insurance coverage for workers and their families when they change or lose their jobs. The act also requires the Department of Health and Human Services to

MORE ABOUT . . .

HIPAA and Privacy

The following are examples of possible violations of patient privacy under HIPAA regulations and some suggestions about how to avoid them.

- Telephone conversations with (or regarding) patients should not be held within earshot of the reception room or other patients. This is why phone triage is set apart from patient areas.
- A conversation with the patient being escorted down the hall to the exam or treatment room should not include the reason the patient is being seen, how treatment is progressing, or whether they followed the prep instructions for this visit. Limit the conversation until there is a private environment.
- Patient records, documents, telephone messages, lab reports, etc. should be sorted, processed, and/or filed promptly. If there is a need to retain the documents for processing or reference, the documents should be stored in an area apart from patient flow.
- When scheduling a procedure by phone, it should be done away from areas of high traffic, preferably in a private office.

establish national standards for electronic health care transactions and national identifiers such as personal identification numbers (or PINS) for providers, health plans, and employers. It also addresses the security and privacy of health data. The goal of the law is to improve the efficiency and effectiveness of the nation's health care system by encouraging the widespread use of electronic data interchange in health care.

There are a number of Web sites where you can learn about HIPAA (www.cms.gov; www.hhs.gov). You can also do a search for the keyword HIPAA and you will come up with many more sites.

CASE STUDY

Working in Health Care

The Crestview Walk-In Medical Center is a nonemergency clinic. It employs three doctors, four nurses, three medical assistants, and two receptionists. All twelve employees have access to the many patient records kept in the files and in the computers at Crestview. The small conference room at the back of the facility doubles as a lunchroom. Most of the staff bring their snacks and lunches to work because Crestview is in a suburban neighborhood that does not have many stores or restaurants nearby.

All the employees have one thing in common—the patients. When they gather in the conference room for meetings, the teams discuss how to handle their cases. However, when the room becomes a lunchroom, all

patient discussion stops. The facility has a strict policy that allows discussion of cases only in a professional setting. Everyone observes the ethical and legal codes that forbid staff from discussing cases outside the facility and outside the domain of a work situation.

Critical Thinking

65. Why should the facility have a policy about discussing specific cases among the staff? What should it be?
66. Based on what you understand about the roles of the physicians, nurses, medical assistants, and receptionists, who do you think should have access to patient files?

Using Medical Terminology

Many careers depend on a sound knowledge of medical terminology. Written or electronic records are developed and used by many people involved in health care services. Spoken directions are used to communicate orders for health care and administrative procedures in the health care setting. The role of each health care professional (worker) is usually limited to the skills, procedures, and knowledge outlined by state or federal law for each profession. Usually includes the duties that each person is or is not allowed to do. For example, physicians, nurse practitioners, and physician assistants diagnose, treat, and prescribe medications for the treatment of diseases. Nurses and medical assistants administer medications, track vital signs, and give care, but are not allowed to prescribe medication. Other health care employees (such as patient care technicians) may combine administrative and clinical duties in various health care settings. People in health information management perform many of the administrative tasks that allow facilities to get paid or reimbursed in the complicated world of health care. The systems chapters, case studies, and career pages in this text will introduce you to people working in the health care environment.

From the time someone calls or visits a physician's office, that patient's medical record is involved. The medical assistant or receptionist first gathers or updates personal information about the patient, such as name, address, and insurance information, as well as learns the patient's chief complaint, or reason for the visit. The medical documentation continues to grow as the provider (the physician, nurse, nurse-practitioner, and so on) sees the patient, gathers the pertinent medical history and performs a physical examination, reaches a diagnosis, and provides procedures appropriate for the condition or illness. If a patient is hospitalized, or additional laboratory or x-ray services are needed, hospital workers, laboratory technicians, and radiologists may perform procedures, which must be documented. The patient's medical record then provides the basis for payment for these services. Coders and billing clerks then fill out the paperwork necessary to enable the provider to get paid.

Documentation of health care services must be complete for both ethical and legal reasons. Many health care careers require an understanding of documentation. Documentation in the form of medical records typically uses many terms learned in medical terminology courses.

Formats for records depend on state law, the institution's responsibilities, the configuration of its computer systems, and its coding and billing practices. One plan of organization is the SOAP approach. SOAP stands for *subjective*, *objective*, *assessment*, and *plan*. When first dealing with a patient, the health care practitioner receives the subjective information from the patient (how the patient feels, what the symptoms are). Next, the health care practitioner performs an examination (takes temperature, blood pressure, pulse) and orders tests (blood and urine tests, allergy tests), thereby getting the objective facts needed for a diagnosis. The assessment stage is the examination of all data and the reaching of a conclusion (the diagnosis). Finally, a plan—treatments, medications, tests, and patient education—is determined and put into action for ongoing evaluation. Figure 1-1 is an

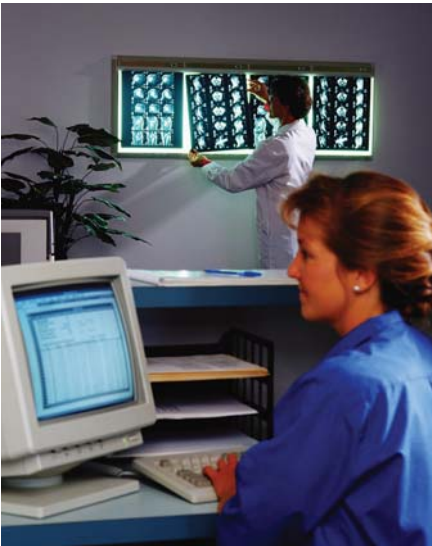


FIGURE 1-1 Medical procedures are documented electronically as in this hospital or on paper as in many medical offices. Sometimes, both types of documentation are used.

example of a SOAP medical record. Another method of documentation is chronological, in which patient interactions are listed in chronological order with the earliest date at the top (Figure 1-2). Figure 1-3 shows documentation for a specific procedure—with the procedure, the person performing it, and what took place. Appendix E gives patient records in several formats.

Do you know the difference between subjective and objective? Subjective information is something that is thought or felt in the mind but may not be observable by others. Objective information is something that can be measured or observed by others.

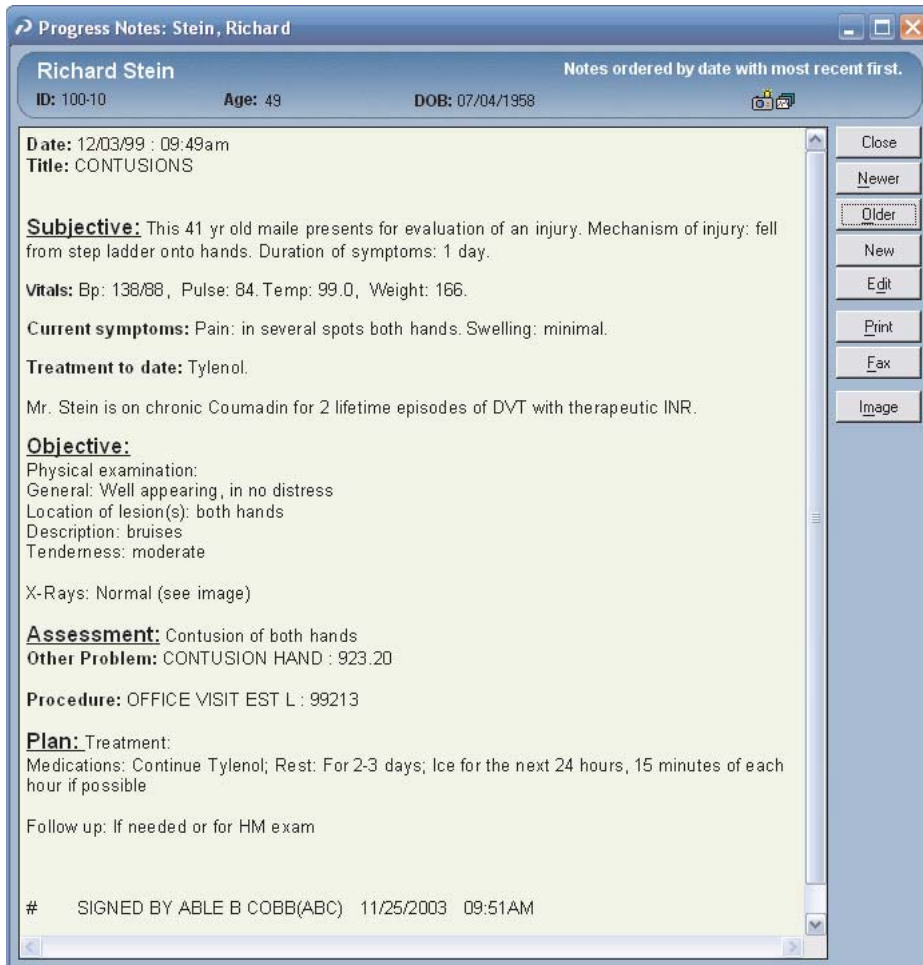


FIGURE 1-2 The SOAP method of keeping medical records.

Patient name <u>Angela O'Toole</u> Age <u>57</u> Current Diagnosis <u>angina</u>	
DATE/TIME <u>10/10/XX</u>	<u>Patient presents with increased chest pain, particularly after meals. Sent to lab for echocardiogram; BP 143/84. Leonard Glasser, M.D.</u>
<u>10/14/XX</u>	<u>Phone consultation with patient—echocardiogram shows status quo. Suspect acid reflux, tell patient to add Tagamet to medications. Leonard Glasser, M.D.</u>
<u>10/21/XX</u>	<u>Patient call—experiencing relief. Continue present medication and Tagamet. Leonard Glasser, M.D.</u>

FIGURE 1-3 A chronological medical record.

FIGURE 1-4 A medical record of a gastroscopy, a surgical procedure.

PROCEDURE: <i>Gastroscopy</i>		PATIENT: <i>Holly Berger</i>	
STAFF: <i>Dr. Walker</i>		ID no.: <i>888-22-8888</i>	
DATE <i>9/28/XX</i>	<i>Instrument—GIF100 video gastroscope</i>		
	<i>Premedication: 2% Cetacaine spray locally; Demerol 50 mg; Valium 20 mg IV; Atropine 0.4 mg IM.</i>		
	<i>History: 51 year-old white female with longstanding Crohn's disease, status post resection of the terminal ileum and proximal colon in 1971. The patient has been complaining of epigastric and right-sided abdominal pain with occasional nausea, vomiting over the last 3 weeks. Upper GI series and small bowel follow through showed narrowing of the duodenal bulb and post-bulbar segment and then approximately 8 cm. irregular stenotic area in the right side of the abdomen, probably at the area of the previous anastomosis and the right proximal jejunal stricture.</i>		
	<i>Procedure: The patient was brought to the endoscopy suite on a gurney. Her oropharynx was sprayed with 2% Cetacaine and then she was placed in the left lateral decubitus position.</i>		

SNOMED

Many health care providers and government agencies are involved in an international attempt to standardize medical terminology for use in electronic medical records. The adoption of SNOMED (Systematized Nomenclature of Medicine) Clinical Terms®, better known as SNOMED CT®, is a major step toward this goal. Eventually, it is expected that all medical coding and electronic transfer of medical data will use SNOMED as the basis for medical terms. SNOMED is gradually being standardized and is being uploaded into a database on the Internet continually. It is available in a number of languages. Currently, it is in use in Britain. It is expected that people who do medical coding will be using it for electronic records in the United States in the near future.

For more information, visit SNOMED's Web site (www.snomed.org).

ICD-9 and ICD-10

The set of diagnosis codes in the coding reference called *The International Classification of Diseases, 9th Revision, Clinical Modification* is the current standard for coding patient records and death certificates. Eventually, it is thought that ICD will be combined with SNOMED once all healthcare records are electronic.

The World Health Organization (WHO) developed the ICD CM system. The numeric reference indicates what edition is being used within the system. ICD-10CM and ICD-10PCS (Professional Coding System prepared by the Centers for Medicare and Medicaid) are currently available; however, the United States is not currently using the new updated classifications. More information on ICD-10 can be found at: www.ahima.org.

Abbreviations

Throughout this text, you will learn common medical abbreviations. In recent years, several organizations have come out with recommendations regarding the use of certain abbreviations that have caused confusion. See Appendix for more details on the use of abbreviations in the medical setting.

USING MEDICAL TERMINOLOGY EXERCISES

Analyzing the Record

Write S for subjective, O for objective, A for assessment, and P for plan after each of the following phrases.

67. I feel nauseous _____
68. Allergy medicine prescribed _____
69. Has dermatitis (rash) _____
70. My arm aches _____
71. Has hypertension _____

Check Your Knowledge

Circle T for true or F for false.

72. Nurses never add to a patient's record. T F
73. A medical assistant should be able to decipher the doctor's notes. T F
74. Rules of confidentiality apply to patient records. T F
75. Objective information is always given by the patient. T F
76. A plan for treatment must never be changed. T F
77. HIPAA governs the Patient's Bill of Rights. T F
78. SNOMED is used widely in the United States. T F
79. Privacy in the medical office is the responsibility of everyone who works there. T F
80. Combining forms are the same as prefixes. T F
81. A word's history is called its etymology. T F

USING THE INTERNET

82. At the Electronic Privacy Information Center site (<http://epic.org/privacy/medical/>), you will find discussions of current cases, articles, and advice on safeguarding medical records. Click one of the site's topics. Write a paragraph explaining the issue being discussed.
83. Using a search engine, find a site that discusses medical errors and gives details of one type of medical error that you find.

Name _____ Date _____

Chapter 1: Test of Pluralizing (25 Questions, 1 pt. each)

Give the plurals for the following terms. Where possible, give two different plurals.

1. carcinoma _____
2. frenulum _____
3. serum _____
4. psychosis _____
5. virus _____
6. septum _____
7. femur _____
8. kidney _____
9. tongue _____
10. urethra _____
11. ureter _____
12. malignancy _____
13. leukocyte _____
14. nucleus _____
15. reflex _____
16. tremor _____
17. venogram _____
18. suture _____
19. macula _____
20. thrombus _____
21. tricuspid _____
22. respiration _____
23. antibiotic _____
24. fungus _____
25. palate _____