

MERIT BADGE SERIES



MEDICINE



BOY SCOUTS OF AMERICA

HOW TO USE THIS PAMPHLET

The secret to successfully earning a merit badge is for you to use both the pamphlet and the suggestions of your counselor.

Your counselor can be as important to you as a coach is to an athlete. Use all of the resources your counselor can make available to you. This may be the best chance you will have to learn about this particular subject. Make it count.

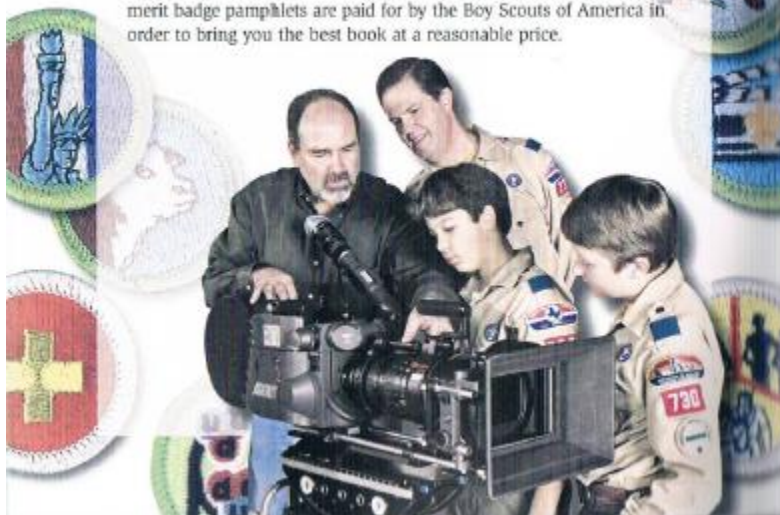
If you or your counselor feels that any information in this pamphlet is incorrect, please let us know. Please state your source of information.

Merit badge pamphlets are reprinted annually and requirements updated regularly. Your suggestions for improvement are welcome.

Send comments along with a brief statement about yourself to Youth Development, S209 • Boy Scouts of America • 1325 West Walnut Hill Lane • P.O. Box 152079 • Irving, TX 75015-2079.

WHO PAYS FOR THIS PAMPHLET?

This merit badge pamphlet is one in a series of more than 100 covering all kinds of hobby and career subjects. It is made available for you to buy as a service of the national and local councils, Boy Scouts of America. The costs of the development, writing, and editing of the merit badge pamphlets are paid for by the Boy Scouts of America in order to bring you the best book at a reasonable price.



BOY SCOUTS OF AMERICA
MERIT BADGE SERIES

MEDICINE



BOY SCOUTS OF AMERICA®

Requirements



Harvey



Nightingale

1. Discuss with your counselor the influence that EIGHT of the following people had on the history of medicine:
 - a. Hippocrates
 - b. William Harvey
 - c. Antonie van Leewenhoek
 - d. Edward Jenner
 - e. Florence Nightingale
 - f. Louis Pasteur
 - g. Gregor Mendel
 - h. Joseph Lister
 - i. Robert Koch
 - j. Daniel Hale Williams
 - k. Wilhelm Conrad Roentgen
 - l. Marie and Pierre Curie
 - m. Walter Reed
 - n. Karl Landsteiner
 - o. Alexander Fleming
 - p. Charles Richard Drew
 - q. Helen Raussig
 - r. James Watson and Francis Crick
 - s. Jonas Salk
2. Explain the Hippocratic Oath to your counselor, and compare the original version to a more modern one. Discuss to whom those subscribing to the original version of the oath owe the greatest allegiance.

35917
ISBN 978-0-6395-3244-6
©2009 Boy Scouts of America
2012 Printing

BANG/Brainerd, MN
3-2012/063024

3. Discuss the health-care provider–patient relationship with your counselor, and the importance of such a relationship in the delivery of quality care to the patient. Describe the role of confidentiality in this relationship.
4. Do the following:
 - a. Describe the roles the following people play in the delivery of health care in your state. (Note: Not all may exist in your state.)
 - (1) Allopathic physician
 - (2) Chiropractor
 - (3) Emergency medical technician
 - (4) Licensed practical/vocational nurse
 - (5) Medical assistant
 - (6) Medical laboratory technologist
 - (7) Nurse-midwife
 - (8) Nurse practitioner
 - (9) Occupational therapist
 - (10) Optometrist
 - (11) Osteopathic physician
 - (12) Pharmacist
 - (13) Physical therapist
 - (14) Physician's assistant
 - (15) Podiatrist
 - (16) Psychologist
 - (17) Radiologic technologist
 - (18) Registered nurse
 - (19) Respiratory therapist
 - b. Describe the educational and licensing requirements for FIVE of those in 4a—other than 4a(1)—practicing health care in your state.
5. a. Tell what is meant by the term “primary care” with regard to a medical specialty. Briefly describe the types of work done by physicians in the following “core” specialties:
 - (1) Internal medicine*
 - (2) Family medicine*
 - (3) Obstetrics/gynecology*



*Primary care specialties

- (4) Pediatrics
- (5) Psychiatry
- (6) Surgery

t. Describe the additional educational requirements for these specialties.

6. a. Briefly describe the types of work performed by physicians in FIVE of the following specialties or subspecialties:

- (1) Allergy/immunology
- (2) Anesthesiology
- (3) Cardiology
- (4) Colon and rectal surgery
- (5) Dermatology
- (6) Emergency medicine
- (7) Endocrinology
- (8) Gastroenterology
- (9) Geriatric medicine
- (10) Hematology/oncology
- (11) Infectious disease
- (12) Nephrology
- (13) Neurosurgery
- (14) Neurology
- (15) Nuclear medicine
- (16) Ophthalmology
- (17) Orthopedic surgery
- (18) Otolaryngology/head and neck surgery
- (19) Pathology
- (20) Physical medicine and rehabilitation
- (21) Plastic, reconstructive, and maxillofacial surgery
- (22) Preventive medicine
- (23) Radiology
- (24) Rheumatology
- (25) Thoracic/cardiothoracic surgery
- (26) Urology
- (27) Vascular surgery

b. Describe the additional educational requirements for the FIVE specialties or subspecialties you chose in 6a.



7. a. Visit a physician's office[†], preferably one who delivers "primary care." (This may be that of your counselor.) Discuss the components of a medical history and physical examination (an official BSA health form may be used to guide this discussion), and become familiar with the instruments used.

- b. Describe the characteristics of a good diagnostic test to screen for disease (e.g., routine blood pressure measurement). Explain briefly why diagnostic tests are not "perfect."
- c. Show how to take a blood pressure and a pulse reading.

8. Do the following:

- a. Discuss the roles medical societies, employers, the insurance industry, and the government play in influencing the practice of medicine in the United States.
- b. Briefly tell how your state monitors the quality of health care within its borders, and how it provides care to those who do not have health insurance.

9. Discuss with your counselor the health-care delivery systems in the United States, Sweden, and China.

10. Serve as a volunteer at a health-related event or facility in your community (e.g., blood drive, "health fair," blood pressure screening, etc.) approved by your counselor.

[†] If this cannot be arranged, demonstrate to your counselor that you understand the components of a medical history and physical, and discuss the instruments involved.





Contents

The History of Medicine	9
The Oath of Hippocrates	20
The Health-Care Professional–Patient Relationship	24
Health-Care Professions	26
Medical Education and Specialties	37
Nursing Education and Specialties	57
The Practice of Medicine	62
Influencing Medical Practice	77
Medicine—Here and Abroad	85
Resources	94



The History of Medicine

The practice of medicine has a rich history that spans several centuries. Since the first use of plants and other items as simple medicines and balms, many men and women have contributed to the advancement of the "healing arts."

Methods to improve techniques and make use of new technologies are developed nearly every day as researchers strive to find additional ways to combat disease. In fact, so much is happening that it is impossible to cover the subject completely here. However, we can establish a good foundation for the understanding of the medical profession by first reviewing a short summary of highlights in the history of medicine.*



* Adapted from materials provided by J. Worth Estes, M.D., of the American Association for the History of Medicine, and Thomas R. Welch, M.D.

Highlights

Date	Event
3000–1400 a.c.	The first textbooks of medicine and surgery appear in ancient Egypt, providing evidence of practice in these fields.
400–200 a.c.	The Greek physician Hippocrates and his followers lay the groundwork for medical practice for centuries to come, especially in their emphasis on the influence of factors such as diet, weather, and rest on a patient's ability to recover.
Circa A.D. 50	Diocorides compiles a list of the drugs available at that time, which were derived mostly from plants. Physicians continued to prescribe some of these drugs until the 20th century, but most are used only in the practice of folk alternative medicine today.
131–201	Galen writes books on anatomy, physiology, and practical medicine that remain authoritative until the 1500s.
Circa 900	The Arab physician Rhazes describes smallpox and measles.
Circa 1270	Spectacles (glasses) for correcting vision are introduced in Venice.
Circa 1330	The invention and introduction of gunpowder changes the nature of war wounds. This requires adaptation by physicians treating these wounds, which are much more destructive and life-threatening than wounds made by arrows, swords, and clubs.
1348–50	The “ Black Death ” (bubonic plague) kills a third of the population of Europe. It wasn't until 1894–98 that the plague was found to be caused by bacteria that normally infest rats but are transferred to humans by fleas that find human hosts after their rat hosts die.
1440–50	Paracelsus introduces many chemical drugs to the practice of medicine.
1538–43	Andreas Vesalius publishes the first anatomical drawings to challenge the erroneous theories of Galen .
1545–75	Ambroise Paré develops new methods for treating wounds.

Date	Event
1553	Servetus describes the circulation of blood through the lungs.
Early 1600s	Through experimentation, William Harvey discovers that blood, propelled by the force of the heart's contractions, circulates throughout the body in a closed system. (Previously, blood was thought to flow only in one direction, as Galen had taught.) Although Harvey did not determine how the smallest arteries and veins were connected to each other, he knew a connection must exist.
Circa 1635	Cinchona , or Peruvian bark (a tree bark now known to contain the drug quinine), is introduced for the treatment of what is now recognized as malaria.
1658	Jan Swammerdam discovers red blood cells.
1660	Marcello Malpighi discovers that small vessels (capillaries) connect arteries and veins, thus completing the discoveries of Harvey .
1669	Richard Lower discovers that veins in the lungs absorb gases from the air.
1670	Thomas Willis discovers that diabetes can be diagnosed by excess sugar present in the urine.
1673–90	Antonie van Leeuwenhoek creates microscopes that allow observation of bacteria, protozoa, sperm, and the structure of the retina of the eye, among other cells.
1721	Dr. Zabdiel Boylston and Rev. Cotton Mather begin the first large-scale inoculations to protect against smallpox in Boston. They injected fluid from the sores of a smallpox patient into the skin of the person to be protected, causing a mild, but seldom fatal, case of the disease. After this, the person would not contract smallpox, even in major epidemics.
1726	Rev. Stephen Hales first measures blood pressure (in horses).
1740	Friedrich Hoffman describes rubella (German measles).
1742	Anders Celsius invents the 100-degree thermometer.
1752	Pennsylvania Hospital , the first general hospital in North America, opens.

Date	Event
1761	Giovanni Baptista Morgagni publishes the first major book on autopsy (postmortem anatomic pathology).
1765	The first medical school in this country opens in Philadelphia.
1768	William Heberden describes the angina pectoris syndrome (chest pain, usually with exertion).
1771–85	Oxygen is isolated by Joseph Priestley and Willem Scheele and is defined by Antoine-Laurent Lavoisier , who describes its exchange with carbon dioxide in the lungs (respiration) and its role in maintaining life.
1760	Benjamin Franklin invents bifocal lenses for glasses.
1785	William Withering introduces digitalis for the treatment of "dropsy" (now called heart failure) after the first clinical trial of any drug. (A clinical trial is an experiment that uses actual patients to determine whether a certain drug is effective.)
1786	John Coakley Lettsom describes addiction to alcohol and other drugs.
1795	The British navy adopts lemon juice (containing vitamin C) as its standard method to prevent scurvy.
1798	Edward Jenner discovers that smallpox can be prevented with fluid from cowpox sores, and that this method, called vaccination (from the Latin word for cow, <i>vacca</i>), is safer than inoculation. (Both methods stimulate the body to produce a protective response to the smallpox virus.)
1803	Thomas Percival publishes the first major book on medical ethics.
1809	Ephraim McDowell performs the first major abdominal surgery (removal of a large tumor of the ovary).
1811	Charles Bell discovers the function of the individual spiral nerves, which control different muscles and receive sensations from specific parts of the limbs and skin.

Date	Event
1816	René-Théophile-Hyacinthe Laennec develops the stethoscope.
1833	William Beaumont publishes his first experiments on gastric digestion after observing how the stomach responds to various foods and emotions through a "window" produced by a musket wound in the stomach of a backwoods hunter.
1839	Theodor Schwann publishes his theory of disease at the level of the cell.
1845	Rudolf Virchow and Hughes Bennet describe leukemia (cancer of the white blood cells).
1846	The first public demonstration of anesthesia using ether by dentist William T. G. Morton and surgeon John Collins Warren is given at Massachusetts General Hospital in Boston. (Crawford Long of Georgia had used this four years earlier but did not publish his work.)
1847	James Young Simpson introduces the use of chloroform for obstetrical (during childbirth) anesthesia.
1848–58	Claude Bernard discovers that the liver stores food energy, that nerves control blood flow through different tissues by constricting and dilating blood vessels, and that curare relaxes (paralyzes) skeletal muscles.
1849	Thomas Addison describes pernicious anemia (now known to be caused by lack of absorption of vitamin B ₁₂) and adrenal gland failure (now called Addison's disease).
1850	The organism causing anthrax, a devastating disease of sheep, is the first disease-producing bacterium to be discovered.
1853	The hypodermic syringe is invented.
1858	Rudolf Virchow publishes a major work on disease processes at the level of the cell.
1859	Florence Nightingale publishes her pioneering <i>Notes on Nursing</i> , establishing the foundation for that profession.

Date	Event
1860–81	Louis Pasteur demonstrates the presence of bacteria in air, explaining how disease can be transmitted by an airborne route. He also is credited with classifying various types of bacteria, developing vaccines for anthrax and rabies, and developing the process to sterilize milk by heating it quickly to high temperatures, thus killing any bacteria present (pasteurization).
1861	Ignaz Semmelweis demonstrates that “childbed fever” is transmitted by the contaminated hands of health-care personnel, indicating the need for careful handwashing to help prevent the spread of disease. Paul Broca discovers the area of the brain responsible for speech.
1864	Julius Cohnheim discovers the mechanism of inflammation (response of tissue to an irritant or injury).
1865	Gregor Mendel publishes the results of his classic experiments with pea plants, revealing the basic laws of inheritance, and leading the way to the discovery of genes and DNA (the molecule that “codes” for genes).
1867	Joseph Lister introduces antiseptic surgery by spraying carbolic acid (phenol) over the operative field to reduce the likelihood of infection in the surgical wound. (It would be another 10 years before such infections were found to be caused by bacteria.)
1868	Ewald Hering and Joseph Breuer describe how the body regulates respiration (breathing).
1869	Charles-Edouard Brown-Sequard describes the role of endocrine secretions (hormones) in regulating body functions.
1878–82	Robert Koch discovers the bacteria that cause wound infections and tuberculosis. He also establishes a set of rules (still known as “Koch’s Postulates”) for proving that a specific microorganism causes a specific illness.
1880	Charles-Louis-Alphonse Laveran discovers the microorganism that causes malaria.

Date	Event
1883	Edwin Klebs discovers the diphtheria bacillus.
	Elie Metchnikoff finds that one of the body’s methods of protecting itself against disease depends on phagocytes (cells that “eat” bacteria and debris and destroy them).
1884	Carl Koller introduces the use of cocaine for local anesthesia in eye surgery.
1886	Reginald Fitz describes the process of appendicitis.
1890	Emil von Behring introduces a vaccine for diphtheria.
1893	Daniel Hale Williams , founder of Chicago’s Provident Hospital, performs the first recorded repair of the pericardium (the sac that surrounds the heart). Provident Hospital was the first interracial hospital in the United States.
1895	Wilhelm Conrad Roentgen discovers the X-ray, which can be used to “see” inside the body, establishing a powerful new tool for diagnosing disease; this is the basis for the field of radiology.
1897–98	Ronald Russ discovers that the parasite causing malaria is transmitted by mosquitoes.
1898	Marie and Pierre Curie discover radium and perform pioneering work that will eventually lead to treatments for some forms of cancer.
1899	Aspirin is introduced to clinical medicine.
1899–1900	Walter Reed demonstrates that yellow fever can be transmitted by mosquitoes.
1900	Sigmund Freud publishes his pioneering work in the field of psychiatry, <i>The Interpretation of Dreams</i> .
1901	Karl Landsteiner discovers the A, B, and O blood groups on red blood cells, laying the groundwork for safe blood transfusions.
1903	The modern blood pressure cuff (sphygmomanometer) is introduced.

Date	Event
1906	Clemens von Pirquet develops his theory of allergic disease.
1906–20	Gowland Hopkins , and others, investigate and name the vitamins ("vital amines").
1910–20	The electrocardiograph (ECG/EKG) is invented and initially developed.
1914–19	Edward C. Kendell discovers thyroxin, the thyroid hormone.
1921–22	Frederick Banting and Charles Best isolate insulin and use it in the first successful treatment of diabetes (caused by a lack of this hormone).
1929	Alexander Fleming discovers, by accident, that a common mold produces a substance called penicillin that can stop the growth of bacteria. First used to cure a serious bacterial infection in 1942, it was the first true antibiotic (a substance made by one microorganism that can inhibit the growth of another one).
1935	Sulfonamides , the first synthetic chemicals used to treat infections, are introduced.
1938–39	Charles Richard Drew develops a technique to process blood plasma so that it can be preserved for longer periods of time and on a larger scale to meet demand during World War II. In 1941, he becomes director of the first American Red Cross blood bank.
1940s	The development of open-heart surgery occurs, as does the first use of drugs for cancer chemotherapy .
1942–44	Helen Taussig identifies the cause of blue baby syndrome (anoxemia) as a congenital heart defect that results in a lack of oxygen in the blood and a bluish tint to the skin. With Alfred Blalock and Vivien Thomas , she develops a surgical procedure to treat the syndrome, which Blalock performs successfully in 1944.
1945–47	The artificial kidney is developed.
1950s	The first drugs for psychiatric illness are developed.

Date	Event
1953	James Watson and Francis Crick publish a paper describing the structure of DNA, laying the foundation for an understanding of how genes reproduce and code for genetic information.
1954	The first kidney transplant is performed at Boston's Peter Bent Brigham Hospital.
1954 and 1963	Jonas Salk develops the killed polio vaccine (1955) and Albert Sabin introduces the inactivated oral polio vaccine (1963). One of the major causes of infant death and disability is nearly completely eliminated by vaccines.
1967	Christian Bernard performs the first heart transplant surgery at Capetown, South Africa.
1977–80	An intensive worldwide vaccination campaign culminates with the complete eradication of smallpox . For the first time in history, medicine totally eliminates a disease.
1981	Acquired immune deficiency syndrome (AIDS) first appears in the United States; the responsible virus and modes of transmission are identified.
1983	Cyclosporine , the first drug developed specifically to help prevent the rejection of transplanted organs, is introduced. Transplantation of the heart, liver, lung, pancreas, and intestine becomes feasible, marking the start of a new era in the treatment of diseases of these organs.
Late 1980s	First anti-AIDS drugs are developed and found effective.
1994	Obesity researchers from Rockefeller University (New York) discover leptin, a weight-regulating hormone, and identify the gene that produces this hormone.
1995	Researchers discover a gene responsible for a rare but aggressive form of Alzheimer's , the degenerative disease that causes memory loss, poor judgment, and increasingly affects an individual's ability to carry on with day-to-day activities. Their finding could lead to a test that can identify people who may be genetically susceptible to the disease.

Date	Event
1996	A breakthrough in anti-AIDS drugs is made with the discovery of protease inhibitors , which significantly reduce the amount of HIV in the blood by attacking the enzyme protease.
1997	Scientists in Scotland are able to clone a mammal for the first time. Dolly, a sheep cloned from cells taken from another sheep's udder, is born in February.
1998	Research teams led by James A. Thomson at the University of Wisconsin—Madison and John D. Gearhart at Johns Hopkins University report that they have successfully isolated and cultured human embryonic stem cells. Scientists will be able to explore the possibility of developing specialized cells and a renewable source of replacement cells and tissue to treat diseases and disabling conditions such as spinal cord injuries, diabetes, and arthritis. There is great debate about weighing the potential medical benefits against the ethical concerns of this research. In 2001, President George W. Bush approves limited federal funding for embryonic stem cell research with the use of existing stem cell lines.
2001–02	The U.S. Food and Drug Administration approves the use of the oral drug imatinib mesylate to treat chronic myeloid leukemia (2001) and gastrointestinal stromal tumors (2002), both rare, life-threatening forms of cancer. Known as Gleevec , it is the first drug to be approved that targets specific intracellular signaling molecules that cause cancer, whereas chemotherapy drugs damage normal, healthy cells as well.
2003	The International Human Genome Sequencing Consortium announces the completion of the Human Genome Project , a 13-year global effort to find the blueprint for the human genetic makeup. Scientists hope that the mapping of the human genome, or the layers of tens of thousands of genes in the body, and subsequent research will eventually lead to the treatment and cure of many of the world's most devastating diseases.

The Bubonic Plague—Past and Present†

In 1348, three trade ships from Asia docked at Genoa, Italy, bringing with them spices, silks, and an unexpected stowaway—the deadly bubonic plague, an infectious disease carried by rat fleas. In two years, the contagion had spread rapidly across Europe, reaching as far as England and leaving almost a third of Europe's population dead in its wake. The epidemic became known as the Pestilence, the Great Mortality, and—the name we recognize today—the Black Death.

Within a few days of a small flea bite or exposure to an infected person, victims were taken with fever, extreme fatigue, and swollen, painful lymph nodes called *buboes*. Medieval medicine was of little help, and the disease rapidly progressed to the victim's bloodstream and lungs, causing death. It was rumored in some areas there were not enough left living to bury the vast number of dead. Outbreaks of plague continued to occur over the next few centuries, devastating Europe socially, culturally, and economically.

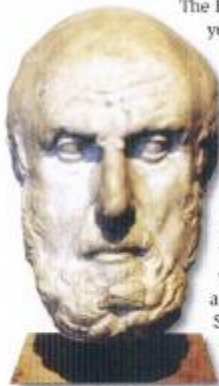
Caused by a bacterium called *Yersinia pestis*, the plague still exists today, though mostly in underdeveloped rural and agricultural parts of the world. The United States reports an average of 10 to 15 cases of plague a year; worldwide, there are 1,000 to 3,000 reports a year, according to the World Health Organization. There are three progressive stages of plague: *bubonic*, *septicemic* (in which the bloodstream is infected), and *pneumonic* (in which the lungs are infected). As in the Middle Ages, humans are usually infected by the fleas of the domestic rat, once the infected host rat is dead.

Today we have the benefit of effective antibiotics to treat plague, but if left untreated, this disease can still be fatal. Preventive measures worldwide must be enforced to control plague—vaccination, antibiotic drug therapies, public health education, and most importantly, environmental sanitation.



† Some of the information in this section was taken from the "Plague" home page of the Centers for Disease Control website, <http://www.cdc.gov/ncidod/dvbid/plague/index.htm>.

The Oath of Hippocrates



Hippocrates

The Hippocratic Oath, although somewhat changed over the years, serves as a general code of ethics for the practice of medicine. Almost universally, those completing medical school stand before their professors and instructors during graduation ceremonies and promise to uphold the values attributed to the teachings of Hippocrates in the third or fourth century B.C. This ancient document, written by an unknown author, is very much alive today.*

Changing With the Times

The shaded text on the following pages presents two versions of the Hippocratic Oath—the original and a more modern one (in bold print, adapted at Ohio State University and currently used at many other schools). Changes in society and what is viewed as accepted medical practice have prompted modifications of this now classic promise. For instance:

- References to Greek gods, more appropriate in the day of Hippocrates, have been replaced by a generalized statement recognizing various beliefs and religions.
- Elaborate promises about perpetuating the healing arts from generation to generation no longer reflect the current methods used and are, for this reason, not included.
- Specific statements about the primary reliance on dietary measures to prevent illness have been generalized to recognize the use of more modern techniques such as medication.
- A reference forbidding surgery (“I will not use the knife”) reflected the separation of medicine and surgery at the time. As no such separation exists today, this statement is omitted.

*Portions of this section were adapted from materials provided by Irwin J. Cohen, M.D., M.P.H., of the Department of Community Medicine, Tulane University School of Medicine.

Comparing Oaths

I swear by Apollo Physician and Asclepius and Hygieia and Panacels . . . that I will fulfill according to my ability and judgment this oath and this covenant:

I do solemnly swear, by whatever I hold most sacred:

To hold him who has taught me this art as equal to my parents and to live my life in partnership with him . . . to give a share of precepts and oral instruction and all the other learning to my sons and to the sons of him who has instructed me and to pupils who have signed the covenant and have taken an oath according to the medical law, but to no one else.

That I will be loyal to the profession of medicine, and just and generous to its members.

I will apply dietetic measures for the benefit of the sick according to my ability and judgment; I will keep them from harm and injustice.

I will neither give a deadly drug to anybody if asked for it, nor will I make a suggestion to this effect. . . . In purity and holiness I will guard my life and my art.

That I will exercise my art solely for the cure of my patients and the prevention of disease, and will give no drug nor perform any operation for a criminal purpose and far less suggest such a thing. That I will lead my life and practice my art in uprightness and honor.

I will not use the knife, not even on sufferers from stone, but will withdraw in favor of such men as are engaged in this work.

Whatever houses I may visit, I will come for the benefit of the sick, remaining free of all intentional injustice. . . .

That into whatsoever home I shall enter, it shall be for the good of the sick and the well to the utmost of my power and that I will hold myself aloof from wrong and from corruption and from tempting of others to vice.

What I may see or hear in the course of the treatment or even outside of the treatment in regard to the life of men, which on no account one must spread abroad, I will keep to myself. . . .

That whatsoever I shall see or hear of the lives of men that is not fitting to be spoken abroad, I shall keep inviolably secret.

If I fulfill this oath and do not violate it, may it be granted to me to enjoy life and art. . . . If I transgress it and swear falsely, may the opposite of all this be my lot.

(Translation of the original Hippocratic Oath)

These things I do promise, and in proportion as I am faithful to this oath may happiness and good repute be ever mine—the opposite if I shall be forsworn.

(Version of the Hippocratic Oath administered at the Ohio State University in 2007)

Oath of Maimonides

Some medical schools in the United States use this oath in place of the Hippocratic Oath. The Oath of Maimonides reminds those in the medical profession to treat all patients equally, regardless of race, color, or creed.

The eternal providence has appointed me to watch over the life and health of Thy creatures. May the love for my art actuate me at all time; may neither avarice nor miserliness, nor thirst for glory or for a great reputation engage my mind; for the enemies of truth and philanthropy could easily deceive me and make me forgetful of my lofty aim of doing good to Thy children.

May I never see in the patient anything but a fellow creature in pain.

Grant me the strength, time and opportunity always to correct what I have acquired, always to extend its domain; for knowledge is immense and the spirit of man can extend indefinitely to enrich itself daily with new requirements.

Today he can discover his errors of yesterday and tomorrow he can obtain a new light on what he thinks himself sure of today. Oh, God, Thou has appointed me to watch over the life and death of Thy creatures; here am I ready for my vocation and now I turn unto my calling.



Other minor changes were made to simplify and clarify the language.

The original version of the oath directs the loyalty of the physician to his or her teachers (i.e., promising to "hold him who has taught me this art as equal to my parents") and to perpetuating the profession, rather than to the patients he or she treats. The modern version of the oath emphasizes patient care and moral behavior.

The Meaning of the Oath

As you can see, comparison of the two oaths reveals several differences, but most of the basic principles of the original have been preserved. The importance of the Hippocratic Oath, either in its original or modern version, must not be underestimated. As one takes the oath, a student actually becomes a physician. This change does not occur when the student receives a diploma from medical school or passes the required examinations to receive a legal license to practice. Such events merely certify that the student has acquired a minimum, necessary amount of special knowledge. It is important to note that the oath is not concerned with technical competence, but rather with *how physicians do what they do*.

In its text (modern version), a taker of the oath promises to "lead my life and practice my art in uprightness and honor." It seems then that the quality of one's work as a physician is dependent not only on how one practices medicine, but also on how one lives. To be a good physician, *one must lead a good life*.

This emphasis on the physician's "goodness" rather than on his or her technical competence is prompted by the special relationship that exists between patient and physician. The patient comes to the physician in a somewhat vulnerable state—ill or fearful of illness. To feel better, the patient must place complete trust in the skills of the physician. To do so, the patient must be convinced that the physician's efforts will always be designed to promote the patient's welfare. This concern is frequently more important than technical ability in establishing trust.

It is appropriate, then, that a student should become a physician only when he or she takes an oath that emphasizes a virtuous life. Such an oath establishes a solid bond between the physician and that physician's future patients.

The Health-Care Professional-Patient Relationship



The relationship a patient has with a health-care professional is important if the patient is to receive the best medical care possible. Frequently, patients need to reveal fairly personal information about themselves that they might not realize could be related to their illness—information they might not feel comfortable discussing with their closest friends, let alone someone they might not feel they can trust completely. If a patient is reluctant to provide this information and it turns out to be important, a diagnosis could be missed.

To prevent this from happening, a health-care professional and a patient must *communicate* with each other. The provider must put the patient at ease, but make him or her understand that the information is important in determining what medical problem might be present, and that the information will be used only for that purpose. In other words, the information will be treated as *confidential*, and will be disclosed only to people directly involved in that patient's medical care.

This is frequently easier said than done, and it can take several years to develop a rapport to where the patient can comfortably discuss information of a truly personal nature with the provider. Yet, this rapport is absolutely necessary if the professional is to be able to help the patient in all situations.

Even when a good relationship exists, however, a patient might still be reluctant to disclose certain information fully, and a health-care professional must be willing to consider this possibility if other facts (e.g., those discovered through a physical examination or laboratory testing) indicate that the patient is being less than truthful.

Questions about the use of illegal drugs or alcoholic beverages, as well as sexual activity, are appropriate in a medical setting if the health-care professional feels information about these areas might be related to a patient's problem. It is not difficult to imagine, however, that questions about these subjects could be distressing or embarrassing for the patient to answer, especially if the patient is concerned that revealing information about an illegal activity (such as drug use) might result in that information being given to the police.

With few exceptions, the expectation has always been that discussions between a patient and a health-care professional are **privileged**. The information shared is protected from disclosure to any third parties, including legal authorities. In some cases (child abuse, for example), though, physicians are required by law to report suspicions to legal authorities.

Recently, however, there have been instances of erosion of this expectation of confidentiality. Insurance companies, in their role as payers for much medical care, are increasingly collecting details of patient medical histories and treatments.

With the recent expansion of computerized medical records, unauthorized access to confidential medical information is a growing concern. The Health Insurance Portability and Accountability Act of 1996 (HIPPA) addresses this concern to some extent by defining how confidential health information can be used and who can access it. By law, patients must be informed of their privacy rights when they seek medical care.

If patients do not feel they can trust those treating them, they are unlikely to provide potentially vital information. It is therefore extremely important for a health-care professional to hold in highest regard the trust placed in him or her by the patient, and to maintain the confidential nature of medical conversations.

Having a physician you trust and can communicate with is as important as having regular checkups.



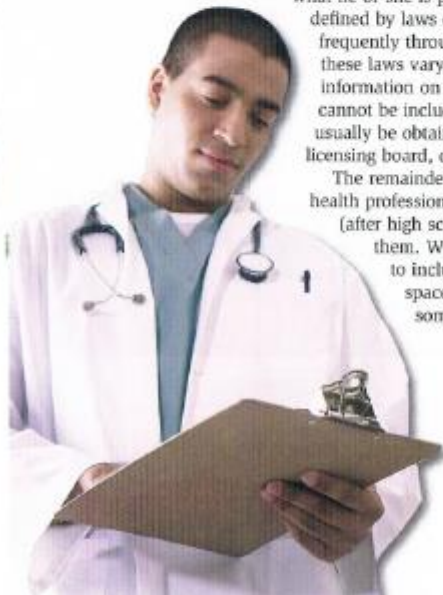
Health-Care Professions

Although it might not be immediately obvious, many different professionals play a part in the delivery of health care in the United States. Of these, the most visible are usually the physicians and nurses with whom you come in contact when you have a minor illness. However, other professionals who provide services supporting the various aspects of diagnosis and treatment, as well as those who may be consulted outside the scope of a physician's care, also play very important roles in seeing that patients receive assistance with the various health problems they might have.

Each of these professionals serves a specific function, and what he or she is permitted to do within that field is defined by laws established by state governments, frequently through the granting of licenses. As these laws vary somewhat around the country, information on licensing for each profession cannot be included here. Such information can usually be obtained from your state's professional licensing board, or the equivalent.

The remainder of this section describes various health professions and the educational requirements (after high school) usually required to practice them. While an attempt has been made to include as many of these as possible, space limitations have necessitated some omissions.*

*Some of the descriptions for health professions contained in this section were adapted from materials in the *American Medical Association Encyclopedia of Medicine* (Random House, 1989), with permission.



Physician (Allopathic). This professional is trained in the practice of medicine and surgery, has graduated from a school granting a doctor of medicine (M.D.) degree, and is qualified to practice all aspects of these areas. A physician diagnoses and treats illnesses and injuries and advises patients on preventive measures to help them lead a safe, healthy life and avoid medical problems. To arrive at a diagnosis and decide on a treatment, physicians usually take a patient's medical history, perform a physical examination of the patient, and order laboratory or diagnostic tests if necessary. Their training incorporates evidence-based medicine, in which physicians consider the findings of biomedical research and their own clinical knowledge (as well as their patients' preferences) to make treatment decisions.

Educational requirements: Completion of an undergraduate college degree followed by four years of medical school education leading to a doctor of medicine degree. Some universities offer highly competitive "accelerated premedical-medical degree programs" for incoming freshmen in which students can complete the requirements for both an undergraduate and a medical degree in six or seven years.



Physician (Osteopathic). This professional is trained in the practice of medicine and surgery, has graduated from a school granting a doctor of osteopathy (D.O.), and is qualified to practice all aspects of these areas. Like allopathic physicians, osteopathic physicians diagnose and treat illnesses and injuries and impart preventive advice. They also consider medical history, a physical examination, and diagnostic tests when making decisions. Osteopaths, however, use a system of diagnosis and treatment that emphasizes the role of the musculoskeletal system in the healthy functioning of the body. Their training is similar to that of allopathic physicians but focuses on the relationship between parts of the body and manipulative therapy, a hands-on approach to alleviating symptoms, reducing pain, and preventing health problems.

Educational requirements: Completion of an undergraduate college degree followed by four years of medical school education leading to a doctor of osteopathic medicine degree.

Chiropractor. A specialist in this area practices a theory of healing based on the belief that disease results from a lack of normal nerve function. Chiropractic relies on physical manipulation and adjustment of the spine for therapy, rather than on drugs or surgery. Chiropractors make use of X-rays and special techniques to diagnose and treat back disorders and other musculoskeletal problems. In some states they perform physical examinations and do some minor surgery.

Educational requirements: Completion of at least two years of college education followed by four years of training in chiropractic leading to a doctor of chiropractic degree.



Optometrist. These specialists are trained to examine, diagnose, treat, and manage diseases and disorders related to the eye and vision. They prescribe glasses, contact lenses, and other vision aids, as well as vision therapy and (in some states) medicines for the treatment of eye diseases. Optometrists also are trained to identify when it might be necessary to refer a patient to an ophthalmologist (physician specializing in eyes) for medical or surgical treatment. In some states they are permitted to monitor selected patients for chronic conditions.

Educational requirements: Completion of an undergraduate college degree followed by four years of education leading to a doctor of optometry degree.

Podiatrist. A specialist in this field deals with the examination, diagnosis, treatment, and prevention of diseases and malfunctions of the foot and its related structures. Podiatric medicine is concerned with many different types of foot problems, including walking disorders in children, ankle injuries among adolescents, fractures among athletes and joggers, bunions and hammer toes among men and women of all ages, and care of foot ulcers, toenails, and infections in people who have diabetes.

Educational requirements: Completion of an undergraduate college degree followed by four years of education leading to a doctor of podiatric medicine degree.

Pharmacist. This professional is responsible for the preparation and dispensing of drugs. Pharmacists are expert in the uses of medications for the prevention and treatment of diseases and are aware of known side effects and toxicities of such medications. They fill prescriptions, counsel patients on possible interactions that can exist with medications they might be receiving from different health-care professionals, and make decisions concerning the substitution of generic equivalents that might be more affordable for some patients, unless specifically forbidden by the prescriber.

Educational requirements: Successful completion of two years of undergraduate coursework followed by four years of training leading to a doctor of pharmacy degree.



Psychologist. This professional is a specialist in the diagnosis and treatment of behavioral disorders and mental and emotional illness. Those in the field are expert in the internal aspects of the mind, such as memory, feelings, thought, and perception, and external manifestations such as speech and behavior. They administer intelligence and personality tests and analyze the results. Their role with patients also includes counseling or psychotherapy. They refer appropriate patients to psychiatrists when medical treatment (i.e., medication) might be indicated. In a few states, however, psychologists have prescribing privileges.

Educational requirements: Completion of a master's or doctor of philosophy or doctor of psychology degree.

Physician Assistant. This professional performs diagnostic, therapeutic, preventive, and health maintenance services under the supervision of a physician to allow more effective and focused application of the physician's particular knowledge and skills. Individuals concentrating in surgical fields perform a number of functions formerly done only by surgeons within a variety of appropriate settings such as hospital surgical suites, surgical clinics, emergency rooms, and office practices. Physician assistants are accountable for their own actions and to their supervising physicians.

Educational requirements: Completion of an undergraduate college degree and two years of additional clinical training.

Nurse. This professional is trained to assist patients who are in recovery from an illness or injury to regain as much independence as possible. Nurses continuously monitor the patient, including measuring and recording bodily functions and changes in the patient's condition. They perform tasks to help prevent injury and optimize health, administer medications, and provide emotional support and comfort. Nurses also educate patients about medical conditions and treatments. They are more concerned with the patient's overall reaction to a disorder than with the disorder itself. They are devoted to the control of physical pain, the relief of mental suffering, and, when possible, the avoidance of complications. In terminal cases, a nurse's responsibilities include helping the patient meet death with as little distress and as much dignity as possible.



There are two main classifications of nurses: **licensed practical** or **licensed vocational nurses** and **registered nurses**. Licensed practical/vocational nurses provide basic nursing care, usually under the supervision of physicians or registered nurses. Registered nurses provide a broader, more advanced level of nursing care and work under the supervision of or in collaboration with physicians.

Advanced Practice Registered Nurse. Registered nurses may obtain additional training to specialize or to become advanced practice registered nurses (APRNs). The four types of advanced practice registered nurses are nurse practitioners, clinical nurse specialists, nurse-midwives, and certified registered nurse anesthetists.

Educational requirements: For a licensed practical/vocational nurse, usually one year of training. For a registered nurse, two to four years of training leading to a diploma in nursing, an associate degree in nursing, or a bachelor of science degree in nursing. Specialization may require additional training or special certification. For an advanced practice registered nurse, completion of a registered nursing program and often additional clinical experience, followed by additional training usually leading to a master's degree or higher in nursing.

Medical Assistant. A person in this role performs a broad range of administrative and clinical duties under the supervision of a licensed medical professional. Administrative duties include preparing and maintaining medical records, handling medical transcription, and serving as a liaison between the physician and other individuals. Clinical duties include infection control, taking patient histories and vital signs, performing first aid and CPR, preparing patients for procedures, assisting with examinations and treatments, performing selected diagnostic tests, and administering medications as directed by the supervising personnel.

Educational requirements: Completion of a program that is either two years in length, resulting in an associate degree, or one year, resulting in a certificate or diploma.



Emergency Medical Technician. This professional is trained to recognize, assess, and manage medical emergencies of acutely ill or injured patients in pre-hospital settings. There are several levels of expertise and training, the most advanced of which is the paramedics. EMT training includes the ability to initiate appropriate invasive and noninvasive treatments for airway and respiratory problems, cardiac arrest, and psychological crises. Emergency medical technicians work principally in advanced life-support units and ambulance services that are under medical supervision and direction (often through radio communication).

Educational requirements: Completion of a program of 600 to 1,000 hours of instruction, including exposure to supervised clinical situations.



Medical Laboratory Technologist. Professionals in this area perform laboratory tests that play an important role in the detection, diagnosis, and treatment of many diseases. They perform these tests in conjunction with pathologists and other physicians, or scientists who specialize in clinical chemistry, microbiology, or other biological sciences. They develop data on the blood, tissues, and fluids in the human body by using a variety of precision instruments and are trained to recognize interdependency of tests. They also have a knowledge of physiological conditions affecting test results in order to confirm these results.

Educational requirements: Approximately two years of college-level work in related sciences and mathematics and one year of clinical education.

Radiologic Technologist. Some professionals in this role provide services using imaging modalities involving X-rays, magnetism, or ultrasound, as directed by those qualified to order and/or perform radiologic procedures. Others administer radiation therapy for various cancers and other conditions. They are responsible for quality control programs and are particularly concerned with limiting radiation exposure to patients and others. They exercise independent judgment in the technical performance of medical imaging procedures by adopting variable technical parameters of the procedure to the condition of the patient and by initiating lifesaving first aid and basic life-support procedures as necessary during medical emergencies.

Educational requirements: Two to four years of training, depending on program design, objectives, and the degree or certificate awarded.

Interested in a Career in Medicine?

Ask questions. Pursuing a career in medicine is rewarding, but it also takes a lot of hard work and dedication. Find out from your doctor and other health-care professionals about the kind of work they do, what their schooling and training was like, what they like best about the career, and what some of the challenges they face are. Their answers can help you determine if a career in medicine is right for you and can help you choose the specific profession that interests you most.

Study hard. Try your best to do well in school, no matter the class. Science and math classes are important if you hope to pursue a medical career, but so are other types of classes, such as English. Some classes teach you valuable skills, such as good communication, and some classes help you become well-rounded. It is also a good idea to choose advanced-level classes in school if they are available.

Get involved. Through extracurricular activities, hobbies, and volunteering, you can demonstrate your curiosity, dedication, and uniqueness. Team sports and group activities in particular give you experience working with others, and they may also offer leadership opportunities. Volunteering at a health-related event or facility in your community is a good idea. This kind of public service offers you an opportunity to learn more about health care and shows your interest in helping others through that field.

Occupational Therapist. These health-care professionals administer treatment aimed at enabling people disabled by physical illness or a serious accident to relearn muscular control and coordination, to cope with everyday tasks (such as dressing), and, when possible, to resume some form of employment. They apply purposeful, goal-oriented activity in their evaluation, diagnosis, and/or treatment, and help people who are impaired by physical injury, illness, emotional disorder, developmental disability, or the aging process to achieve optimum functioning, prevent disability, or maintain health.

Educational requirements: Completion of an undergraduate degree and at least six months of additional practical experience in occupational therapy.

Physical Therapist. These specialists administer treatment of disorders or injuries with physical methods or agents, such as exercise, massage, heat (including ultrasound and diathermy), cold, water (e.g., whirlpool), light, and electrical current. Exercises may be passive (in which the therapist moves parts of the patient's body) or active (in which the patient is taught to contract and relax certain muscle groups). Physical therapists help the patient prevent or reduce joint stiffness; restore muscle strength in the treatment of arthritis or after a fracture has healed; reduce pain, inflammation, and muscle spasm; and retrain joints and muscles after stroke or nerve injury.

Educational requirements: Completion of an undergraduate degree and at least six months of additional practical experience in physical therapy.

Respiratory Therapist. Professionals in this role apply scientific knowledge and theory to the practical clinical problems of respiratory care. They are qualified to assume primary responsibility of all respiratory care modalities under the direction of a physician and usually in a hospital setting. Respiratory therapists collect and review data (e.g., blood gases), monitor and adjust ventilatory assistance devices, and administer other types of treatments and evaluations.

Educational requirements: Programs are usually two years in length, leading to an associate degree; some longer programs lead to a bachelor's degree.

Military Medicine

Medical professionals practicing military medicine work for the United States through the Department of Defense and the Department of Health and Human Services. They serve in times of war and peace, wherever they are needed in the United States and abroad.

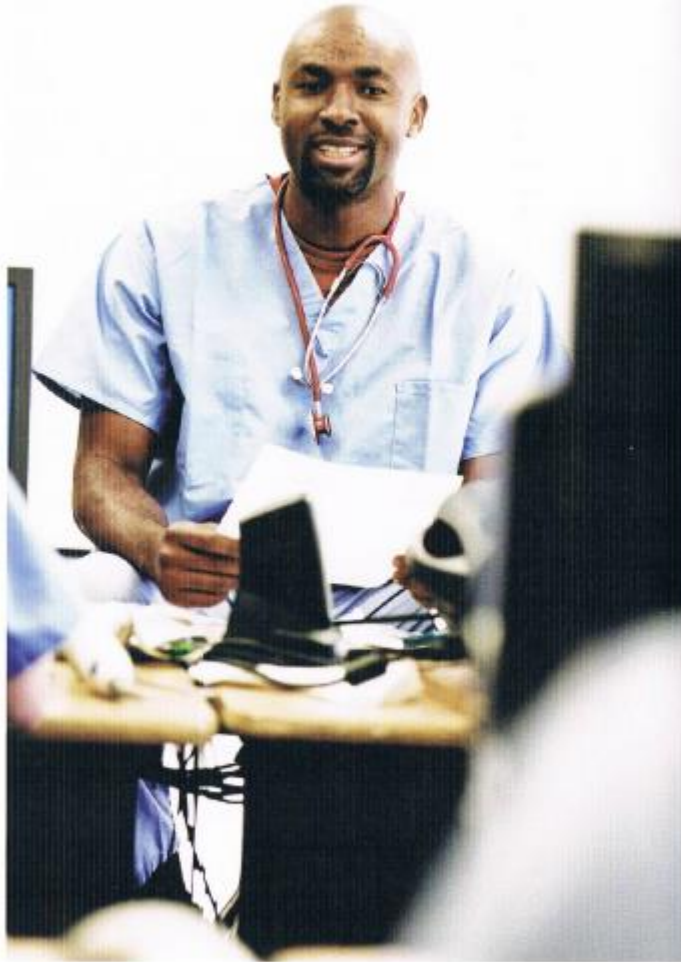
Military physicians, nurses, and other medical staff care for active members of the military in two ways: first, by providing medical care to military personnel in garrison (at a permanent base) and in field medical units, and second, by providing health services to their dependent family members. They also provide routine medical care for military retirees. Sometimes, military medical personnel are deployed to provide humanitarian aid to communities in need around the world.

This work requires not only traditional medical education, but also preparation in areas that are particularly important to military service, including combat-casualty care, field training, and aspects of preventive medicine. Their efforts help keep troops in good condition.

Those interested in military medicine enter the field by volunteering. They may attend the Uniformed Services University of the Health Sciences (USU), attend a medical school through the Armed Forces Health Professions Scholarship Program (HPSP), or join the military as a physician (such as through the Army Reserve's Specialized Training Assistance Program during residency). USU is the federal health sciences university in the United States. HPSP, on the other hand, allows students to attend other medical schools—students attend with financial support for tuition and other expenses and then they have an obligation to serve the military for a specific, predetermined number of years.

Individuals with a strong desire to serve their country and the willingness to make a commitment to military service can reap the benefits of a career in military medicine. Practicing military medicine has its challenges. However, working for the military offers such benefits as work overseas, full-tuition medical school scholarships or educational loan repayment, and the rank of officer in the armed forces.

Information in this section provided or reviewed by the Uniformed Services University of the Health Sciences. Other sources include USU's "Finger tip Facts," <http://www.usuhs.mil/vpe/USUFactSheet.pdf>; the U.S. Army Medical Department's "Introduction to the U.S. Army Medical Department," <http://www.armymedicine.army.mil/about/introduction.html>; the U.S. Navy's "Health Care Opportunities," <http://www.navy.com/healthcareopportunities/>; and the U.S. Air Force's "Health Care Careers," <http://www.airforce.com/careers/healthcare/careers.php>.



Medical Education and Specialties

In the earlier part of this century, the large majority of physicians were "generalists"; that is, they managed essentially all aspects of medical care for their patients using treatments known at that time. However, since that day, medical knowledge has increased many hundredfold as the result of ongoing research and the introduction of new technology for diagnosis and treatment. Therefore, it has become almost impossible for a single physician to know "everything about everything," let alone be able to apply this knowledge adequately to patient care.

The realization of this fact has resulted in diverse specialization among physicians so that some can concentrate on a given area, usually limited to a single organ system or a small set of related systems, while others remain more general in their approach. To permit this, medical education has adapted to meet the needs of today's specialists and subspecialists.

Educating Physicians

Most medical schools in the United States and Canada require evidence of superior performance in achieving a minimum of an undergraduate (bachelor's or the equivalent) college degree for admission. While many premedical students major in scientific fields such as biology or chemistry, any major can be acceptable if the required courses in biology, chemistry, physics, and English are included. An acceptable score on the Medical College Admission Test (administered by the Association of American Medical Colleges) and a personal interview are also usually required.



After physicians have completed their formal training, they are expected to stay up-to-date in their field. All states require allopathic physicians and some states require osteopathic physicians to earn continuing medical education credits to maintain their license to practice medicine.

During the first two years of medical school, students primarily will study the basic biomedical sciences. In years three and four, they focus on clinical sciences training in a hospital setting.

The basic sciences usually include anatomy (gross and microscopic), embryology, biochemistry, physiology, genetics, pathology, pharmacology, microbiology and immunology, and biostatistics. These might be taught individually or on a coordinated basis (by organ; for example, information about each of the above subjects regarding the heart is presented at one time).

The clinical sciences during the third year include broad exposure to certain "core" specialties, which are believed necessary to provide a foundation upon which to build, regardless of which specialty is eventually chosen. These usually include internal medicine and/or family medicine, obstetrics and gynecology, pediatrics, psychiatry, and surgery.

The fourth year is usually composed of a series of elective courses or rotations, allowing the soon-to-be-graduated student to explore specialties he or she might be interested in entering. As this final year progresses, more and more clinical responsibility is placed on the student to prepare him or her for the postgraduate training that will follow.

Choosing a Specialty and the "Match"

Having decided on a specialty, a student obtains a position in a training program for that specialty by submitting applications, much in the way one applies to college and medical school. Frequently, candidates will do elective rotations during medical school in the program for which they would most like to be accepted, primarily to show interest and to have their clinical skills better evaluated.

After all applications have been submitted and interviews have been held, the candidate submits to the "Match"—a rank-ordered list of the programs he or she would like to attend. The Match is the National Resident Matching Program, a computerized service that pairs students with postgraduate (residency) training programs. Each program submits to the Match a similar rank-ordered list of the people it would like to train. After some calculations, a list of matched candidates and programs is released. The graduating student can then plan to participate in the program where a position is acquired.

Residency and Fellowship

In past years, most physicians completed a year of postgraduate training called an "internship" that provided a broad, general overview of medical practice, attempting to give the new physician a strong background regardless of the more limited specialty that might be pursued. Since 1982, however, this year has been absorbed into the specialty's first year of training in a residency (called that because physicians used to live at the hospital facility and were actually "resident" there). There are very few first-year positions that resemble the old internships. These preliminary or transitional years usually are filled by physicians who will enter the specialties of dermatology, radiology, ophthalmology, or neurology.

Postgraduate training requires several years of study in the field chosen by the new physician, depending on the requirements of each discipline. As in clinical training in medical school, increasing levels of responsibility are placed on the resident as training progresses until competence is achieved for practice without supervision. Following the completion of training, residency graduates are eligible for certification in the specialty, a process that involves written and, in some cases, oral examinations.

Some areas of certain specialties are considered too complicated to be learned within the confines of a residency and have been further broken down into subspecialties, usually requiring an additional residency or fellowship (which is post-residency training).



Core and Primary Care Specialties

To give students a strong background in certain core subjects, most medical schools require exposure to specific, general specialties. These tend to include what are commonly referred to as primary care specialties—internal medicine, family medicine, obstetrics and gynecology, and pediatrics—so called because physicians in these areas are frequently the primary contact patients have with the medical profession and are relied upon to manage their overall care.

Primary care physicians often follow a patient on a day-to-day basis as needed and are usually able to handle routine problems. They make decisions regarding if and when patients need referrals to specialists. They also are responsible for being familiar with the care being given by any other specialists involved to avoid problems that could result from interactions between therapies. In doing this, they serve essentially as coordinators of their patients' health care.

The remainder of this section describes the various medical specialties and the educational requirements (beyond completion of an undergraduate college degree followed by four years of medical school education leading to either an M.D. or D.O. degree) usually required to practice them.* While an attempt

has been made to include as many of these as possible, space limitations have necessitated some omissions.

Internal Medicine. Physicians in this specialty, called internists, provide comprehensive medical services for adults (and occasionally adolescents) on a continuing basis. Emphasis is placed on the treatment of problems with medication rather than surgery, and on coordination of care, with referrals to other specialists as needed. Various subspecialties exist (see below).

Educational requirements: Three-year residency; subspecialty fellowships are available.



*The descriptions of specialties and subspecialties contained in this section were adapted from materials in the *American Medical Association Encyclopedia of Medicine* (Random House, 1989), with permission.



Family Medicine. Physicians in this specialty provide comprehensive medical services for individuals, regardless of sex or age, on a continuing basis, and often care for all members of a family. Emphasis is placed on the treatment of all problems experienced by the person and on coordination of care, with referrals to other specialists as needed. Care ranges from minor procedures (like placing stitches) and treating acute illnesses to managing long-term conditions like hypertension or diabetes mellitus.

Educational requirements: Three-year residency; additional residency in geriatrics or obstetrics is available.

Obstetrics and Gynecology. Obstetricians are physicians who specialize in the care of a woman during pregnancy, labor, delivery, and the period immediately afterward. Prenatal care may include periodic examinations of the woman and her developing baby with recommendations for changes in activity or diet. These physicians also deliver the baby, performing a cesarean section if necessary. Gynecologists study, diagnose, and treat conditions of the female reproductive system, including infertility and cancer. Typically, a physician will be both an obstetrician and a gynecologist.

Educational requirements: Four-year residency. Subspecialty fellowships are available.



Pediatrics. These specialists are concerned with the growth and development of patients from infancy to adolescence, and with the diagnosis, treatment, and prevention of childhood diseases. They advise on the care of children, provide vaccinations, and conduct periodic well-baby and well-child examinations to assess general health and detect any problems. Special aspects of pediatrics include the care of newborn infants and children with disabilities. All of the subspecialties listed in the next section have pediatric counterparts.

Educational requirements: Three-year residency; subspecialty fellowships are available.

Psychiatry. Physicians in psychiatry are concerned with the study, prevention, and treatment of mental illness and emotional and behavioral problems, from psychological, social, and physical approaches, including drug therapy. Many subspecialties exist including child and adolescent psychiatry, social psychiatry, community psychiatry (addressing the care of the mentally ill outside psychiatric hospitals), forensic psychiatry (dealing with criminal and legal issues), and neuropsychiatry (relating to brain disorders with mental symptoms).

Educational requirements: Completion of one year of preliminary or transitional training plus three-year residency or completion of a four-year psychiatry residency. Subspecialty fellowships are available.

Surgery. Surgeons deal with the study, diagnosis, and management of all disorders treated by operative surgery. This includes incision (cutting) into the skin or other organs, removal or repair of diseased tissues or organs, restoring structures to their normal positions, transplantation of tissues or whole organs, and implantation of mechanical or electronic devices. Many procedures today are performed by subspecialists (see the next section). Those not done by subspecialists are frequently in the realm of the general surgeon, although considerable overlap in responsibilities exists.

Educational requirements: Five- to six-year residency; subspecialty residencies are available.

Other Specialties and Subspecialties

Allergy/Immunology. Specialists in these fields deal with the diagnosis and treatment of any form of allergy and the functioning of the immune system. They might conduct tests to determine agents to which a person is allergic and recommend ways to avoid exposure or to build up the patient's immunity, as well as place the patient on a regimen of medications to control allergic reactions. They might also devise ways to stimulate the immune system to produce immunity (principally through the use of vaccines).

Educational requirements: Completion of an internal medicine or pediatric residency and a two-year fellowship.



Anesthesiology. Physicians in this field administer the drugs that control pain and consciousness during surgery. Anesthesiologists also assess the condition of a patient's heart, lungs, and circulation before he or she is sent into the operating room. They decide what actions should be taken if an emergency develops and are responsible for monitoring the progress of the waking patient and watching for any developing complications in the recovery room after surgery. Anesthesiologists also specialize in the control of pain after surgery and in patients with conditions—such as cancer—that cause severe pain.

Educational requirements: Four-year residency.

Cardiology. Those in this subspecialty of internal medicine are expert at diagnosing and treating problems related to the heart and peripheral vessels. Guided by symptoms such as shortness of breath, chest pain, irregular heart rhythms, or pain in the legs with walking, a cardiologist examines X-rays, echocardiograms (studies using sound waves to view internal structures of the heart), electrocardiograms (studies showing the electrical activity of the heart), and special studies performed by injecting dye into the vessels of the heart to determine the specific cause of a problem. Depending on the results of the tests, the cardiologist might recommend changes in diet or physical activity, prescribe medication, perform a procedure for treatment, or refer the patient to a cardiothoracic or vascular surgeon.

Educational requirements: Completion of an internal medicine residency and a two-year fellowship.



Colon and Rectal Surgery. Physicians in this surgical subspecialty perform operations to correct disorders in or remove diseased tissue from the small intestines, colon (large intestine), or rectal area. Procedures can range from the removal of hemorrhoids to removal and reconstruction of part of the intestine (e.g., as in the treatment of colon cancer). Special techniques allow the physician to help patients retain fairly normal function, despite the often extensive removal of tissue required to treat disease in these organs.

Educational requirements: Completion of a surgery residency and one year of an additional residency.

Dermatology. Specialists in this area have been trained to treat conditions related to the skin, hair, and nails. Problems include everything from wrinkles, warts, and hair loss to acne, athlete's foot, and skin cancer. Treatment methods include medication, surgery, or the destruction of unwanted growths by freezing, burning, lasers, and radiation.

Educational requirements: Completion of one year of training (like an internship, usually in internal medicine) and a three-year residency.

Emergency Medicine. These physicians have been specially trained to deal with the broad range of life-threatening conditions, from acute asthma attacks to bullet wounds. The concern of the emergency care physician is to stabilize the patient as much as possible before transferring the patient to an appropriate hospital unit for further care.

Educational requirements:

Completion of a three- to four-year residency.



Endocrinology. Physicians in this subspecialty of internal medicine study and treat disease produced by abnormal function of the endocrine glands—structures that secrete hormones into the blood which regulate growth and metabolism. Disease may result if these glands produce too much or not enough of these important molecules (e.g., gigantism results from too much growth hormone, dwarfism from too little).

Educational requirements: Completion of an internal medicine residency and a two-year fellowship.

Gastroenterology. A gastroenterologist is a subspecialist in internal medicine who diagnoses and manages disorders of the digestive system. These specialists treat peptic ulcers of the stomach and duodenum and other conditions affecting the gastrointestinal tract, including the liver and gallbladder. The work of physicians in this area has been revolutionized by the development of fiber-optic endoscopes (long tubelike devices for looking inside and taking tissue samples from the esophagus, stomach, and intestines). Whenever possible, these specialists treat patients by advising them on diet and lifestyle and by prescribing medications. If necessary, they refer patients for surgical treatment.

Educational requirements: Completion of an internal medicine residency and a two-year fellowship.

Geriatric Medicine. Physicians in this specialty are concerned with the care of the elderly. Many diseases that affect this group occur in patients of all ages, but older people tend to respond differently to sickness and treatment. Aging is associated with progressive decline in the functioning of major organs. Consequently, infection in one of these organs that would normally cause only minor illness in a young adult might be life-threatening in an older person and might cause confusion in the patient because of the added stress placed on the brain during illness. Furthermore, medications tend to behave differently in these patients because of a decreased ability of the body to process these drugs with age. Geriatricians are taught to recognize and deal with the special needs of this group of patients.

Educational requirements: Completion of an internal medicine or family medicine residency and a one- or two-year additional residency or fellowship.



Hematology/Oncology.

Hematologists specialize in the study of blood and blood disorders such as anemia, leukemia (cancer of the white blood cells), and bleeding diatheses (clotting problems). They are experts at the measurement of blood constituents, used in the diagnosis of a wide range of disorders, not only those of the blood. Microscopic examination and the counting of blood and bone marrow cells (obtained using a special needle) are essential procedures in diagnosing different types of blood disorders.

Oncologists are specialists in the diagnosis and treatment of cancer. Many specialize in a particular type of cancer such as leukemia. They conduct tests to determine the location, type, and extent of disease, and administer or supervise treatment in the form of radiation therapy, chemotherapy, surgery, or a combination of these. Frequently, a physician will be both a hematologist and an oncologist.

Educational requirements: Completion of an internal medicine residency and either a two-year fellowship for each subspecialty or a three-year fellowship for both.

Infectious Disease. Physicians in this subspecialty of internal medicine receive concentrated training in the diagnosis and treatment of disease caused by the wide variety of disease-causing microorganisms (i.e., bacteria, viruses, protozoa, etc.) known to the medical profession.

They are frequently called upon to solve the mystery of which disease process may be causing a patient to have a fever or other symptoms for which no cause can seemingly be found, or to propose the most effective and efficient set of antibiotics or other medications to treat a patient infected with several organisms. They are also experts in the prevention of illness through the use of vaccines and medications taken in anticipation of possible exposure to disease (e.g., from travel to a foreign country) as well as the treatment of HIV/AIDS.

Educational requirements:

Completion of an internal medicine residency and a two-year fellowship.



Nephrology. Specialists in this subspecialty area of internal medicine are concerned with the normal functioning of the kidneys, and with the causes, diagnosis, and treatment of kidney disease. Methods of investigating the kidneys include kidney biopsy (removal of a small piece of tissue for study), kidney function tests (measurement of substances in the blood produced or processed by the kidneys), and special X-ray studies. Once a diagnosis is reached, these physicians propose the most effective drug or surgical therapy and make referrals as appropriate. They are experts in dialysis (methods of purifying the blood artificially—a function of the normal kidney) and the medical aspects of kidney transplantation.

Educational requirements: Completion of an internal medicine residency and a two-year fellowship.