

# DIVERSIFIED HEALTH OCCUPATIONS

**Seventh Edition**

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**Diversified Health Occupations, Seventh Edition**

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## CHAPTER 3

# Careers in Health Care

## Chapter Objectives

After completing this chapter, you should be able to:

- ◆ Compare the educational requirements for associate's, bachelor's, and master's degrees
- ◆ Contrast certification, registration, and licensure
- ◆ Describe at least 10 different health careers by including a definition of the career, three duties, educational requirements, and employment opportunities
- ◆ Investigate at least one health career by writing to listed sources or using the Internet to request additional information on the career
- ◆ Interpret at least 10 abbreviations used to identify health care career workers
- ◆ Define, pronounce, and spell all key terms (see page 3 for explanation of accent mark use)

Observe Standard Precautions



Instructor's Check—Call Instructor at This Point



Safety—Proceed with Caution



OBRA Requirement—Based on Federal Law



Math Skill



Legal Responsibility



Science Skill



Career Information



Communications Skill



Technology



## KEY TERMS

- admitting officers/clerks  
 art, music, dance therapists  
 associate's degree  
 athletic trainers (ATs)  
 audiologists  
 bachelor's degree  
 biological or medical scientists  
 biological technician  
 biomedical (clinical) engineer  
 biotechnological engineer (bioengineer)  
 biomedical equipment technicians (BETs)  
 cardiovascular technologist  
 central/sterile supply workers  
 certification  
 continuing education units (CEUs)  
 dental assistants (DAs)  
 dental hygienists (*den'-tall hi-geen'-ists*)  
 dental laboratory technicians (DLTs)  
 dentists (DMDs or DDSs)  
 dialysis technicians (*die-ahl'-ih-sis tek-nish'ins*)  
 dietetic assistants  
 dietetic technicians (DTs)  
 dietitians (RDs)  
 Doctor of Chiropractic (DC) (*Ky-row-prak'-tik*)  
 Doctor of Medicine (MD)  
 Doctor of Osteopathic Medicine (DO) (*Oss-tee-ohp'-ath-ik*)  
 Doctor of Podiatric Medicine (DPM) (*Poh'-dee'-ah-trik*)  
 doctorate/doctoral/doctor's degree  
 electrocardiograph (ECG) technicians (*ee-lek'-trow-car'-dee-oh-graf tek-nish'-ins*)  
 electroencephalographic (EEG) technologist (*ee-lek'-troh-en-sef-ahl-oh-graf'-ik tek-nahl'-oh-jist*)  
 electroneurodiagnostic technologist (END) (*ee-lek'-troh-new-roh-die-ag-nah'-stik*)  
 embalmers (*em-bahl'-mers*)  
 emergency medical technician (EMT)  
 endodontics (*en'-doe-don'-tiks*)  
 entrepreneur (*on'trah-peh-nor'*)  
 epidemiologists  
 first responder  
 forensic science technician  
 funeral directors  
 genetic counselors  
 geriatric aides/assistants (*jerry-at'-rik*)  
 health care administrators  
 health information (medical records) administrators (RAs)  
 health information (medical records) technicians  
 health science technology education (HSTE)  
 home health care assistants  
 housekeeping workers/sanitary managers  
 licensed practical/vocational nurses (LPNs/LVNs)  
 licensure (*ly'-sehn-shur*)  
 massage therapists  
 master's degree  
 medical assistants (MAs)  
 medical illustrators  
 medical interpreters/translators  
 medical (clinical) laboratory assistants  
 medical (clinical) laboratory technicians (MLTs)  
 medical (clinical) laboratory technologists (MTs)  
 medical librarians  
 medical transcriptionists  
 medication aides/assistants  
 mortuary assistants  
 multicompetent/multiskilled worker  
 nurse assistants  
 occupational therapists (OTs)  
 occupational therapy assistants (OTAs)  
 ophthalmic assistants (OAs)  
 ophthalmic laboratory technicians  
 ophthalmic medical technologists (OMTs)  
 ophthalmic technicians (OTs)  
 ophthalmologists  
 opticians (*ahp-tish'-ins*)  
 optometrists (ODs) (*ah'-tom'-eh-trists*)  
 oral surgery  
 orthodontics (*or'-thow-don'-tiks*)  
 paramedic (EMT-P)  
 patient care technicians (PCTs)  
 pedodontics (*peh'-doe-don'-tiks*)  
 perfusionists (*purr-few'-shun-ists*)

## KEY TERMS

### periodontics

(peh'-ree-oh-don'-tiks)

### pharmacists (PharmDs)

(far'-mah-sists)

### pharmacy technicians

### phlebotomists

### physical therapists (PTs)

### physical therapist assistants (PTAs)

### physicians

### physician assistants (PAs)

### process technician

### prosthodontics

(pross'-thow-don'-tiks)

### psychiatric/mental health technicians

### psychiatrists

### psychologists

(sy-koll'-oh-jists)

### radiologic technologists

(RTs) (ray'-dee-oh-loge'-ik

tek-nahl'-oh-jists)

### recreational therapists (TRs)

### recreational therapy

assistants

### registered nurses (RNs)

### registration

### respiratory therapists (RTs)

### respiratory therapy technicians (RTTs)

### social workers (SWs)

### speech-language

pathologists

### surgical technologists/

technicians (STs)

### unit secretaries/ward clerks/ unit coordinators

### veterinarians (DVMs or VMDs)

(vet'-eh-ran-air'-e-ans)

### veterinary assistants

### veterinary technologists/ technicians (VTs)

## 3:1 INFORMATION



### Introduction to Health Careers

There are more than 250 different health care careers, so it would be impossible to discuss all of them in this chapter. A broad overview of a variety of careers is presented, however.



Educational requirements for health careers depend on many factors and can vary from state to state. Basic preparation begins in high school (secondary education) and should include the sciences, social studies, English, and mathematics. Keyboarding, computer applications, and accounting skills are also utilized in most health occupations. Secondary **health science technology education (HSTE)** programs can prepare a student for immediate employment in many health careers or for additional education after graduation. Post-secondary education (after high school) can include training in a career/technical school, community college, or university. Some careers require an **associate's degree**, which is awarded by a career/technical school or a community college after completion of a prescribed two-year course of study. Other careers require a **bachelor's degree**, which is awarded by a college or university after a prescribed course of study that usually lasts for four or more years. In some cases, a **master's degree** is required. This is awarded by a college or university after completion of one or more

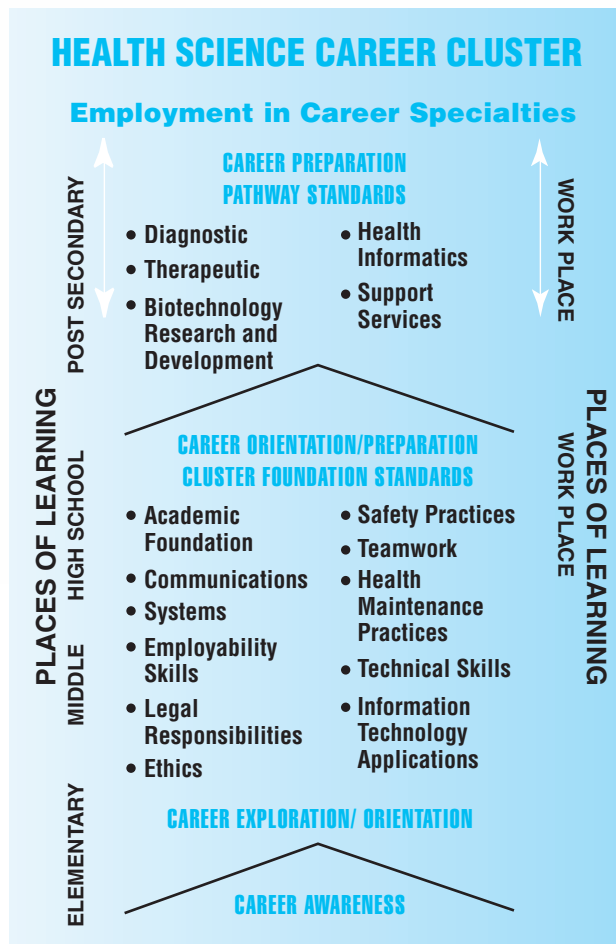
years of work beyond a bachelor's degree. Other careers require a **doctorate, doctoral, or doctor's degree**, which is awarded by a college or university after completion of two or more years of work beyond a bachelor's or master's degree. Some doctorates can require four to six years of additional study.

A health science career cluster has been developed by the National Consortium on Health Science and Technology Education (NCHSTE) (figure 3-1). This cluster allows a student to see how early career awareness and exploration provide the foundation for making informed choices to prepare for a career in health care. Students who take required courses in middle school and high school have the foundation for success at the post-secondary level.

## CERTIFICATION, REGISTRATION, AND LICENSURE

Three other terms associated with health careers are *certification*, *registration*, and *licensure*. These are methods used to ensure the skill and competency of health care personnel and to protect the consumer or patient.

**Certification** means that a person has fulfilled requirements of education and performance and meets the standards and qualifications estab-



**FIGURE 3-1** This cluster shows how early career awareness and exploration can provide a foundation for making informed choices to prepare for a career in health care.

lished by the professional association or government agency that regulates a particular career. A certificate or statement is issued by the association. Examples of certified positions include certified dental assistant, certified laboratory technician, and certified medical assistant.

**Registration** is required in some health care careers. This is performed by a regulatory body (professional association or state board) that administers examinations and maintains a current list (“registry”) of qualified personnel in a given health care area. Examples of registered positions include registered dietitian, registered respiratory therapist, and registered radiologic technologist.

**Licensure** is a process whereby a government agency authorizes individuals to work in a given occupation. Health care careers requiring licensure can vary from state to state. Obtaining

and retaining licensure usually requires that a person complete an approved educational program, pass a state board test, and maintain certain standards. Examples of licensed positions include physician, dentist, physical therapist, registered nurse, and licensed practical/vocational nurse.

## ACCREDITATION

For most health careers, graduation from an accredited program is required before certification, registration, and/or licensure will be granted. Accreditation ensures that the program of study meets the established quality competency standards and prepares students for employment in the health career. It is important for a student to make sure that a technical school, college, or university offers accredited programs of study before enrolling. Two major accrediting agencies for health care programs are the Commission on Accreditation of Allied Health Education Programs (CAAHEP) and the Accrediting Bureau of Health Education Schools (ABHES). A student can contact these agencies to determine whether an HSTE program at a specific school is accredited.

## CONTINUING EDUCATION UNITS

**Continuing education units (CEUs)** are required to renew licenses or maintain certification or registration in many states (figure 3-2). An individual must obtain additional hours of education in the specific health career area during a specified period. For example, many states require registered nurses to obtain 24 to 48 CEUs every 1 to 2 years to renew licenses. Health care workers should be aware of the state requirements regarding CEUs for their given careers.

## EDUCATION LEVELS, TRENDS, AND OPPORTUNITIES

Generally speaking, training for most health care careers can be categorized into four levels: professional, technologist or therapist, technician, and aide or assistant, as shown in table 3-1.



**FIGURE 3-2** Continuing education units (CEUs) are required to renew licenses or maintain certification or registration in many states.

A common trend in health care is the **multi-competent or multiskilled worker**. Because of high health care costs, smaller facilities and rural areas often cannot afford to hire a specialist for every aspect of care. Therefore, workers are hired who can perform a variety of health care skills. For example, a health care worker may be hired to perform the skills of both an electro-

cardiograph (ECG) technician (who records electrical activity of the heart) and an electroencephalographic (EEG) technologist (who records electrical activity of the brain). Another example might involve combining the basic skills of radiology, medical (clinical) laboratory, and respiratory therapy. At times, workers trained in one field or occupation receive additional education to work in a second and even third occupation. In other cases, educational programs have been established to prepare multicompetent workers.

Another opportunity available in many health occupations is that of entrepreneur. An **entrepreneur** is an individual who organizes, manages, and assumes the risk of a business. Some health care careers allow an individual to work as an independent entrepreneur, while others encourage the use of groups of cooperating individuals. Many entrepreneurs must work under the direction or guidance of physicians or dentists. Because the opportunity to be self-employed and to be involved in the business area of health care exists, educational programs are including business skills with career objectives. A common example is combining a bachelor's degree in a specific health care career with a master's degree in business. Some health care providers who may be entrepreneurial include dental laboratory technicians, dental hygienists, nurse practitioners, physical therapists, physician assistants, respiratory therapists, recreational therapists, physicians, dentists, chiropractors, and optometrists. Although entrepreneurship involves many risks and requires a certain level of education and ability, it can be an

**TABLE 3-1** Education and Levels of Training

CAREER LEVEL	EDUCATIONAL REQUIREMENT	EXAMPLES
<b>Professional</b>	Four or more years of college with bachelor's, master's, or doctoral degree	Medical doctor Dentist
<b>Technologist or Therapist</b>	Three to four years of college plus work experience, usually bachelor's degree and, at times, master's degree	Medical (clinical) laboratory technologist Physical therapist Speech therapist Respiratory therapist
<b>Technician</b>	Two-year associate's degree, special health science technology education, or three to four years of on-the-job training	Dental laboratory technician Medical (clinical) laboratory technician Surgical technician
<b>Aide or Assistant</b>	Specific number of hours of specialized education or one or more years of training combining classroom and/or on-the-job training	Dental assistant Medical assistant Nurse assistant

extremely satisfying choice for the individual who is well motivated, self-confident, responsible, creative, and independent.

## NATIONAL HEALTH CARE SKILL STANDARDS

The National Health Care Skill Standards (NHCSS) were developed to indicate the knowledge and skills that are expected of health care workers primarily at entry and technical levels. The seven groups of standards include the following:

- ◆ *Health Care Core Standards*: specify the knowledge and skills that most health care workers should have; discuss an academic foundation, communication skills, employability skills, legal responsibilities, ethics, safety practices, teamwork, information technology applications, technical skills, health maintenance practices, and knowledge about the systems in the health care environment
- ◆ *Therapeutic/Diagnostic Core Standards*: specify the knowledge and skills required to focus on direct patient care in both the therapeutic and diagnostic health care careers; include health maintenance practices, patient interaction, intrateam communication, monitoring patient status, and patient movement
- ◆ *Therapeutic Cluster Standards (Therapeutic Services)*: specify the knowledge and skills required of workers in health care careers that are involved in changing the health status of the patient over time; include interacting with patients, communicating with team members, collecting information, planning treatment, implementing procedures, monitoring patient status, and evaluating patient response to treatment
- ◆ *Diagnostic Cluster Standards (Diagnostic Services)*: specify the knowledge and skills required of workers in health care careers that are involved in creating a picture of the health status of the patient at a single point in time; include communicating oral and written information, assessing patient's health status, moving and positioning patients safely and efficiently, explaining procedures and goals, preparing for procedures, performing diagnostic procedures, evaluating test results, and reporting required information
- ◆ *Health Informatics Services Cluster Standards*: specify the knowledge and skills required of workers in health care careers that are involved with the documentation of patient care; includes communicating information accurately within legal boundaries, analyzing information, abstracting and coding medical records and documents, designing and/or implementing effective information systems, documenting information, and understanding operations to enter, retrieve, and maintain information
- ◆ *Support (Environmental) Services Cluster Standards*: specify the knowledge and skills required of workers in health care careers that are involved with creating a therapeutic environment to provide direct or indirect patient care; include developing and implementing the administration, quality control, and compliance regulations of a health care facility; maintaining a clean and safe environment through aseptic techniques; managing resources; and maintaining an aesthetically appealing environment
- ◆ *Biotechnology Research and Development Standards*: specify the knowledge and skills required of workers in health care careers that are involved in bioscience research and development; include comprehending how biotechnology contributes to health and the quality of life, developing a strong foundation in math and science principles, performing biotechnology techniques, understanding and following laboratory protocols and principles, working with product design and development, and complying with bioethical policies

Examples of some of the health careers included in the NHCSS Clusters are shown in table 3-2. The careers listed are discussed in detail in this chapter.

## INTRODUCTION TO HEALTH CAREERS

In the following discussion of health careers, a basic description of the job duties for each career is provided. The various levels in each health care career are also given. In addition, tables for each career group show educational requirements, job outlook, and average yearly earnings.



**TABLE 3-2** Health Science Center Pathways

*Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development*

Pathways			
Therapeutic Services	Diagnostics Services	Health Informatics	Support Services
Sample Career Specialties/Occupations			
Acupuncturist	Cardiovascular technologist	Admitting clerk	Biomedical/clinical engineer
Anesthesiologist assistant	Clinical lab technician	Applied researcher	Bioinformatics associate
Art/music/dance therapist	Computer tomography (CT) technologist	Community services specialist	Bioinformatics specialist
Athletic trainer	Cytogenetic technologist	Data analyst	Biomedical chemist
Audiologist	Cytotechnologist	Epidemiologist	Biostatistician
Certified nursing assistant	Diagnostic medical sonographer	Ethicist	Cell biologist
Chiropractor	Electrocardiographic (ECG) technician	Health educator	Clinical trials research associate
Dental assistant/hygienist	Electronic diagnostic (EEG) technologist	Health information coder	Clinical trials research coordinator
Dental lab technician	Exercise physiologist	Health information services	Geneticist
Dentist	Geneticist	Health care administrator	Lab assistant—genetics
Dietician	Histotechnologist	Medical assistant	Lab technician
Dosimetrist	Magnetic resonance (MR) technologist	Medical biller/patient financial services	Microbiologist
EMT	Mammographer	Medical information technologist	Molecular biologist
Exercise physiologist	Medical technologist/clinical laboratory scientist	Medical librarian/cybrarian	Pharmaceutical scientist
Home health aide		Patient advocate	Quality assurance technician
Kinesiotherapist		Public health educator	Quality control technician
Licensed practical nurse			Regulatory affairs specialist
Massage therapist			Research assistant
Medical assistant			
Mortician			

Occupational therapist/assistant	Nuclear medicine technologist	Reimbursement specialist (HFMA)	Research associate
Ophthalmic medical personnel	Nutritionist	Risk management	Research scientist
Optometrist	Pathologist	Social worker	Toxicologist
Orthotist/prosthetist	Pathology assistant	Transcriptionist	
Paramedic	Phlebotomist	Unit coordinator	
Pharmacist/pharmacy technician	Positron emission tomography (PET) technologist	Utilization manager	
Physical therapist/assistant	Radiologic technologist/radiographer		
Physician (MD/DO)			
Physician's assistant			
Psychologist			
Recreation therapist			
Registered nurse			
Respiratory therapist			
Social worker			
Speech language pathologist			
Surgical technician			
Veterinarian/veterinary technician			

**Pathway Knowledge and Skills Clusters**

- Academics foundation • Communications • Systems • Employability skills • Legal responsibilities • Ethics
- Safety practices Teamwork • Health maintenance practices • Technical skills • Information technology application

From National Consortium of Health Science and Technology Education, 2005.


To simplify the information presented in these tables, the highest level of education for each career group is listed. The designations used are as follows:

- ◆ *On-the-job*: training while working at a job
- ◆ *HSTE program*: health science technology education program
- ◆ *Associate's degree*: two-year associate's degree
- ◆ *Bachelor's degree*: four-year bachelor's degree
- ◆ *Master's degree*: one or more years beyond a bachelor's degree to obtain a master's degree
- ◆ *Doctoral (Doctor's) degree*: doctorate with four or more years beyond a bachelor's degree

It is important to note that although many health careers begin with HSTE programs, obtaining additional education after graduation from HSTE programs allows health care workers to progress in career level to higher-paying positions.

The job outlook or expected job growth through the year 2012 is stated in the tables as “below average,” “average,” or “above average.”

Average yearly earning is presented as a range of income, because earnings will vary according to geographical location, specialty area, level of education, and work experience.

 All career information presented includes a basic introduction. *Because requirements for various health care careers can vary from state to state, it is important for students to obtain information pertinent to their respective states.* More detailed information on any given career discussed can be obtained from the sources listed for that occupation's career cluster.

## 3:2 INFORMATION

### Therapeutic Services Careers

Therapeutic careers in health care are directed toward changing the health status of the patient over time.

Workers in the therapeutic services use a variety of treatments to help patients who are injured, physically or mentally disabled, or emotionally disturbed. All treatment is directed toward allowing patients to function at maximum capacity.

Places of employment include rehabilitation facilities, hospitals, clinics, mental health facilities, daycare facilities, long-term care facilities, home health care agencies, schools, and government agencies.

There are many health care careers in the therapeutic services cluster. Some of these careers are discussed in the following information sections.

## 3:2A INFORMATION

### Dental Careers

Dental workers focus on the health of the teeth and the soft tissues of the mouth. Care is directed toward preventing dental disease, repairing or replacing diseased or damaged teeth, and treating the gingiva (gums) and other supporting structures of the teeth.

Places of employment include private dental offices, laboratories, and clinics; or dental departments in hospitals, schools, health departments, or government agencies.

Most dental professionals work in general dentistry practices where all types of dental conditions are treated in people of all ages. Some, however, work in specialty areas such as the following:

- ◆ **Endodontics**: treatment of diseases of the pulp, nerves, blood vessels, and roots of the teeth; often called root canal treatment
- ◆ **Orthodontics**: alignment or straightening of the teeth
- ◆ **Oral Surgery**: surgery on the teeth, mouth, jaw and facial bones; often called *maxillofacial surgery*
- ◆ **Pedodontics**: dental treatment of children and adolescents
- ◆ **Periodontics**: treatment and prevention of diseases of the gums, bone, and structures supporting the teeth
- ◆ **Prosthodontics**: replacement of natural teeth with artificial teeth or dentures

Levels of workers in dentistry include dentist, dental hygienist, dental laboratory technician, and dental assistant (see table 3-3).

**Dentists (DMD or DDS)** are doctors who examine teeth and mouth tissues to diagnose and treat disease and abnormalities; perform corrective surgery on the teeth, gums, tissues, and supporting bones; and work to prevent dental disease. They also supervise the work of other dental workers. Most are entrepreneurs.

**Dental hygienists (DHs)** work under the supervision of dentists. They perform prelimi-

**TABLE 3-3** Dental Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Dentist (DMD or DDS)</b>	<ul style="list-style-type: none"> <li>• Doctor of Dental Medicine (DMD) or Doctor of Dental Surgery (DDS)</li> <li>• 2 or more years additional education for specialization</li> <li>• Licensure in state of practice</li> </ul>	Below average growth	\$84,000–\$200,000
<b>Dental Hygienist (DH) Licensed Dental Hygienist (LDH)</b>	<ul style="list-style-type: none"> <li>• Associate's, bachelor's, or master's degree</li> <li>• Licensure in state of practice</li> </ul>	Above average growth	\$39,300–\$83,200
<b>Dental Laboratory Technician (DLT) Certified Dental Laboratory Technician (CDLT)</b>	<ul style="list-style-type: none"> <li>• 3–4 years on-the-job or 1–2 years HSTE program or associate's or bachelor's degree</li> <li>• Certification can be obtained from National Board for Certification in Dental Technology</li> </ul>	Average growth	\$23,200–\$53,600
<b>Dental Assistant (DA) and Certified Dental Assistant (CDA)</b>	<ul style="list-style-type: none"> <li>• 1–3 years on-the-job or 1–2 years in HSTE program or associate's degree</li> <li>• Licensure or registration required in most states</li> <li>• Certification can be obtained from Dental Assisting National Board</li> </ul>	Above average growth	\$19,900–\$38,700

nary examinations of the teeth and mouth, remove stains and deposits from teeth, expose and develop radiographs, apply cavity-preventing agents such as fluorides or pit and fissure sealants to the teeth, and perform other preventive or therapeutic (treatment) services to help the patient develop and maintain good dental health. In some states, dental hygienists are authorized to place and carve restorative materials, polish restorations, remove sutures, and/or administer anesthesia. Dental hygienists can be entrepreneurs.

**Dental laboratory technicians (DLTs)** make and repair a variety of dental prostheses (artificial devices) such as dentures, crowns, bridges, and orthodontic appliances according to the specifications of dentists. Specialities include dental ceramist and orthodontic technician. Some dental laboratory technicians are entrepreneurs.

**Dental assistants (DAs)**, working under the supervision of dentists, prepare patients for examinations, pass instruments, prepare dental materials for impressions and restorations, take

and develop radiographs, teach preventive dental care, sterilize instruments, and/or perform dental receptionist duties such as scheduling appointments and handling accounts. Their duties may be limited by the dental practice laws of the state in which they work.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Dental Education Association  
1400 K Street, NW  
Washington, DC 20005  
Internet address: [www.adea.org](http://www.adea.org)
- ◆ American Dental Assistants Association  
35 East Wacker Drive, Suite 1730  
Chicago, IL 60601-2211  
Internet address: [www.dentalassistant.org](http://www.dentalassistant.org)
- ◆ American Dental Association  
211 E. Chicago Avenue  
Chicago, IL 60611-2678  
Internet address: [www.ada.org](http://www.ada.org)

- ◆ American Dental Hygienists' Association  
444 N. Michigan Avenue, Suite 3400  
Chicago, IL 60611  
Internet address: [www.adha.org](http://www.adha.org)
- ◆ Dental Assisting National Board, Inc.  
676 North Saint Clair, Suite 1880  
Chicago, IL 60611  
Internet address: [www.danb.org](http://www.danb.org)
- ◆ National Association of Dental Laboratories  
325 John Knox Road  
Tallahassee, FL 32303  
Internet address: [www.nadl.org](http://www.nadl.org)
- ◆ National Association of Advisors for the Health Professions, Inc.  
P.O. Box 1518  
Champaign, IL 61824-1518  
Internet address: [www.naahp.org](http://www.naahp.org)
- ◆ For information about specific tasks of a dental assistant, ask your instructor for the Guideline for Clinical Rotations in the *Diversified Health Occupations Teacher's Resource Kit*. Additional career information is provided in the Career Highlight Section of Chapter 18 in this textbook.

### 3:2B INFORMATION



## Emergency Medical Services Careers

Emergency medical services personnel (figure 3-3) provide emergency, prehospital care to victims of accidents, injuries, or sudden illnesses. Although individuals with only basic training in first aid do sometimes work in this field, **emergency medical technician (EMT)** training is required for most jobs. Formal EMT training is available in all states and is offered by fire, police, and health departments, hospitals, career/technical schools, and as a nondegree course in technical/community colleges and universities.

Places of employment include fire and police departments, rescue squads, ambulance services, hospital or private emergency rooms, urgent care centers, industry, emergency helicopter services, and the military. Some EMTs are entrepreneurs. Emergency medical technicians sometimes serve as volunteers in fire and rescue departments.

Levels of EMT include the EMT basic, EMT intermediate, and EMT paramedic (see table



**FIGURE 3-3** Emergency medical technicians (EMTs) provide emergency, prehospital care to victims of accidents, injuries, or sudden illness.

3-4). Another emergency medical person is a first responder.

A **first responder** is the first person to arrive at the scene of an illness or injury. Common examples include police officers, security guards, fire department personnel, and immediate family members. The first responder interviews and examines the victim to identify the illness or cause of injury, calls for emergency medical assistance as needed, maintains safety and infection control at the scene, and provides basic emergency medical care. A certified first responder (CFR) course prepares individuals by teaching airway management, oxygen administration, bleeding control, and cardiopulmonary resuscitation (CPR).

Emergency medical technicians basic (EMT-B) provide care for a wide range of illnesses and injuries including medical emergencies, bleeding, fractures, airway obstruction, basic life support (BLS), oxygen administration, emergency childbirth, rescue of trapped persons, and transporting of victims.

Emergency medical technician defibrillator (EMT-D) is a new level of EMT-B. It allows EMT-Bs with additional training and competency in basic life support to administer electrical defibrillation to certain heart attack victims.

Emergency medical technicians intermediate (EMT-I) perform the same tasks as do EMT-Bs together with assessing patients, interpreting electrocardiograms (ECGs), administering defibrillation as needed, managing shock, using intravenous equipment, and inserting esophageal airways.

**TABLE 3-4** Emergency Medical Services Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Emergency Medical Technician Paramedic (EMT-P)(EMT-4)</b>	<ul style="list-style-type: none"> <li>• EMT-Intermediate plus additional 6–9 months to 2 years (over 1,000 hours) approved paramedic training or associate's degree</li> <li>• 6 months experience as paramedic</li> <li>• State certification</li> <li>• Registration by the National Registry of EMTs (NREMT) required in most states</li> <li>• Other states identify as EMT-4 and administer their own certification examination</li> </ul>	Above average growth	\$28,400–\$52,600
<b>Emergency Medical Technician Intermediate (EMT-I) (EMT-2 and EMT-3)</b>	<ul style="list-style-type: none"> <li>• EMT-Basic plus additional approved training of at least 35–55 hours with clinical experience</li> <li>• State certification</li> <li>• Registration by the NREMT required in some states</li> <li>• Other states identify as EMT-2 and EMT-3 and administer their own certification examination</li> </ul>	Above average growth	\$21,200–\$44,300
<b>Emergency Medical Technician Basic (EMT-B)(EMT-1)</b>	<ul style="list-style-type: none"> <li>• Usually minimum 110 hours approved EMT program with 10 hours of internship in emergency room</li> <li>• State certification</li> <li>• Registration by National Registry of EMTs (NREMT) required in some states</li> <li>• Other states identify as EMT-1 and administer their own certification examination</li> </ul>	Above average growth	\$19,200–\$35,700
<b>First Responder</b>	<ul style="list-style-type: none"> <li>• Minimum 40 hours of approved training program</li> <li>• Certification can be obtained from the NREMT</li> </ul>	Above average growth	Salary depends on individual's regular job

Emergency medical technicians **paramedic (EMT-P)** perform all the basic EMT duties plus in-depth patient assessment, provision of advanced cardiac life support (ACLS), ECG interpretation, endotracheal intubation, drug administration, and operation of complex equipment.

## ADDITIONAL SOURCES OF INFORMATION

◆ National Association of Emergency Medical Technicians  
132-A East Northside Drive  
P.O. Box 1400  
Clinton, MS 39060-1400  
Internet address: [www.naemt.org](http://www.naemt.org)

- ◆ National Highway Transportation Safety Administration (NHTSA)  
EMS Division  
400 7th Street SW  
Washington, DC 20590  
Internet address: [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)
- ◆ National Registry of Emergency Medical Technicians  
6610 Busch Boulevard  
P.O. Box 29233  
Columbus, OH 43229  
Internet address: [www.nremt.org](http://www.nremt.org)

## 3:2C INFORMATION



### Medical Careers

Medical careers is a broad category encompassing physicians (doctors) and other individuals who work in any of the varied careers under the supervision of physicians. All such careers focus on diagnosing, treating, or preventing diseases and disorders of the human body.

Places of employment include private practices, clinics, hospitals, public health agencies, research facilities, health maintenance organizations (HMOs), government agencies, and colleges or universities.

Levels include physician, physician assistant, and medical assistant (see table 3-5).

**Physicians** examine patients, obtain medical histories, order tests, make diagnoses, perform surgery, treat diseases/disorders, and teach preventive health. Several classifications are as follows:

◆ **Doctor of Medicine (MD):** Diagnoses, treats, and prevents diseases or disorders; may specialize as noted in table 3-6

◆ **Doctor of Osteopathic Medicine (DO):** Treats diseases/disorders, placing special emphasis on the nervous, muscular, and skeletal systems, and the relationship between the body, mind, and emotions; may also specialize

◆ **Doctor of Podiatric Medicine (DPM):** Examines, diagnoses, and treats diseases/disorders of the feet or of the leg below the knee

◆ **Doctor of Chiropractic (DC):** Focuses on ensuring proper alignment of the spine and optimal operation of the nervous and muscular systems to maintain health

**Physician assistants (PAs)**, working under the supervision of physicians, take medical histories; perform routine physical examinations and basic diagnostic tests; make preliminary diagno-

**TABLE 3-5** Medical Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Physician</b>	<ul style="list-style-type: none"> <li>• Doctoral degree</li> <li>• 3–8 years additional postgraduate training of internship and residency depending on specialty selected</li> <li>• State licensure</li> <li>• Board certification in specialty area</li> </ul>	Above average growth	\$120,000–\$425,500
<b>Physician Assistant (PA), PAC (certified)</b>	<ul style="list-style-type: none"> <li>• 2 or more years of college and usually a bachelor's degree</li> <li>• 2 or more years accredited physician assistant program with certificate, associate's, or bachelor's degree</li> <li>• Registration, certification, or licensure required in all states</li> <li>• Certification can be obtained from National Commission on Certification of Physician's Assistants</li> </ul>	Above average growth	\$49,800–\$104,600
<b>Medical Assistant (MA), CMA (certified), RMA (registered)</b>	<ul style="list-style-type: none"> <li>• 1–2-year HSTE program or associate's degree</li> <li>• Certification can be obtained from American Association of Medical Assistants (AAMA) after graduation from CAAHEP or ABHES accredited medical assistant program</li> <li>• Registered credentials can be obtained from American Medical Technologists (AMT)</li> </ul>	Above average growth	\$18,400–\$46,700

**TABLE 3-6** Medical Specialties

PHYSICIAN'S TITLE	SPECIALTY
<b>Anesthesiologist</b>	Administration of medications to cause loss of sensation or feeling during surgery or treatments
<b>Cardiologist</b>	Diseases of the heart and blood vessels
<b>Dermatologist</b>	Diseases of the skin
<b>Emergency Physician</b>	Acute illness or injury
<b>Endocrinologist</b>	Diseases of the endocrine glands
<b>Family Physician/Practice</b>	Promote wellness, treat illness or injury in all age groups
<b>Gastroenterologist</b>	Diseases and disorders of the stomach and intestine
<b>Gerontologist</b>	Diseases of elderly individuals
<b>Gynecologist</b>	Diseases of the female reproductive organs
<b>Internist</b>	Diseases of the internal organs (lungs, heart, glands, intestines, kidneys)
<b>Neurologist</b>	Disorders of the brain and nervous system
<b>Obstetrician</b>	Pregnancy and childbirth
<b>Oncologist</b>	Diagnosis and treatment of tumors (cancer)
<b>Ophthalmologist</b>	Diseases and disorders of the eye
<b>Orthopedist</b>	Diseases and disorders of muscles and bones
<b>Otolaryngologist</b>	Diseases of the ear, nose, and throat
<b>Pathologist</b>	Diagnose disease by studying changes in organs, tissues, and cells
<b>Pediatrician</b>	Diseases and disorders of children
<b>Physiatrist</b>	Physical medicine and rehabilitation
<b>Plastic Surgeon</b>	Corrective surgery to repair injured or malformed body parts
<b>Proctologist</b>	Diseases of the lower part of the large intestine
<b>Psychiatrist</b>	Diseases and disorders of the mind
<b>Radiologist</b>	Use of X-rays and radiation to diagnose and treat disease
<b>Sports Medicine Surgeon</b>	Prevention and treatment of injuries sustained in athletic events
<b>Surgeon</b>	Surgery to correct deformities or treat injuries or disease
<b>Thoracic Surgeon</b>	Surgery of the lungs, heart, or chest cavity
<b>Urologist</b>	Diseases of the kidney, bladder, or urinary system

ses; treat minor injuries; and prescribe and administer appropriate treatments. *Pathology assistants*, working under the supervision of pathologists, perform both gross and microscopic autopsy examinations.

**Medical assistants (MAs)**, working under the supervision of physicians, prepare patients for examinations; take vital signs and medical histories; assist with procedures and treatments; perform basic laboratory tests; prepare and maintain equipment and supplies; and/or perform secretarial–receptionist duties (figure 3-4). The type of facility and physician determines the kinds of duties. The range of duties is determined by state law. Assistants working for physicians who specialize are called *specialty assistants*. For example, an assistant working for a pediatrician is called a *pediatric assistant*.



**FIGURE 3-4** Medical assistants take vital signs and prepare patients for examinations.



## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Academy of Physician Assistants  
950 N. Washington Street  
Alexandria, VA 22314–1552  
Internet address: [www.aapa.org](http://www.aapa.org)
- ◆ American Association of Medical Assistants  
20 N. Wacker Drive, Suite 1575  
Chicago, IL 60606–2963  
Internet address: [www.aama-ntl.org](http://www.aama-ntl.org)
- ◆ American Chiropractic Association  
1701 Clarendon Boulevard  
Arlington, VA 22209  
Internet address: [www.amerchiro.org](http://www.amerchiro.org)
- ◆ American Medical Association  
515 North State Street  
Chicago, IL 60610  
Internet address: [www.ama-assn.org](http://www.ama-assn.org)
- ◆ American Osteopathic Association  
142 East Ontario Street  
Chicago, IL 60611  
Internet address: [www.osteopathic.org](http://www.osteopathic.org)
- ◆ American Podiatric Medical Association  
9312 Old Georgetown Road  
Bethesda, MD 20814–1621  
Internet address: [www.apma.org](http://www.apma.org)
- ◆ American Society of Podiatric Medical Assistants  
2124 S. Austin Boulevard  
Cicero, IL 60804  
Internet address: [www.aspma.org](http://www.aspma.org)
- ◆ Registered Medical Assistants of the American Medical Technologists  
710 Higgins Road  
Park Ridge, IL 60068  
Internet address: [www.amt1.org](http://www.amt1.org)
- ◆ For information about specific tasks of a medical assistant, ask your instructor for the Guideline for Clinical Rotations in the *Diversified Health Occupations Teacher's Resource Kit*. Additional career information is provided in the Career Highlight Section of Chapter 20 in this textbook.

## 3:2D INFORMATION



### Mental and Social Services Careers

Mental services professionals focus on helping people with mental or emotional disorders or those who are developmentally delayed or mentally impaired. Social workers help people deal with illnesses, employment, or community problems. Workers in both fields try to help individuals function to their maximum capacities.

Places of employment include hospitals; psychiatric hospitals or clinics; home health care agencies; public health departments; government agencies; crisis or counseling centers; drug and alcohol treatment facilities; prisons; educational institutions; and long-term care facilities.

Levels of employment range from psychiatrist (a physician), who diagnoses and treats mental illness, to psychologist and psychiatric technician. There are also various levels (including assistant) employed in the field of social work (see table 3-7).

**Psychiatrists** are physicians who specialize in diagnosing and treating mental illness. Some specialties include child or adolescent psychiatry, geriatric psychiatry, and drug/chemical abuse.

**Psychologists** study human behavior and use this knowledge to help individuals deal with problems of everyday living. Many specialize in specific aspects of psychology, which include child psychology, adolescent psychology, geriatric psychology, behavior modification, drug/chemical abuse, and physical/sexual abuse.

**Psychiatric/mental health technicians**, working under the supervision of psychiatrists or psychologists, help patients and their families follow treatment and rehabilitation plans. They provide understanding and encouragement, assist with physical care, observe and report behavior, and help teach patients constructive social behavior. Assistants or aides who have completed one or more years in an HSTE program are also employed in this field.

**Social workers**, also called *sociologists*, case managers, or counselors (figure 3-5), aid people

**TABLE 3-7** Mental and Social Services Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Psychiatrist</b>	<ul style="list-style-type: none"> <li>• Doctoral degree</li> <li>• 2–7 years postgraduate specialty training</li> <li>• State licensure</li> <li>• Certification in psychiatry</li> </ul>	Average growth	\$95,500–\$297,000
<b>Psychologist PsyD (Doctor of Psychology)</b>	<ul style="list-style-type: none"> <li>• Bachelor’s or master’s degree</li> <li>• Doctor of psychology required for many positions</li> <li>• Licensure or certification required in all states</li> <li>• Certification for specialty areas available from American Board of Professional Psychology</li> </ul>	Above average growth	\$34,900–\$97,800 or \$45,900–\$136,500 with doctorate
<b>Psychiatric/Mental Health Technicians</b>	<ul style="list-style-type: none"> <li>• Associate’s degree</li> <li>• Licensure required in some states</li> <li>• A few states require a nursing degree</li> </ul>	Average growth	\$28,500–\$52,600
<b>Social Workers/Sociologists</b>	<ul style="list-style-type: none"> <li>• Bachelor’s or master’s degree or Doctor of Philosophy or Social Work (DSW)</li> <li>• Licensure, certification or registration required in all states</li> <li>• Credentials available from National Association of Social Workers</li> </ul>	Above average growth	\$33,500–\$76,800
<b>Genetic Counselor (GC)</b>	<ul style="list-style-type: none"> <li>• Master’s degree</li> <li>• Certification can be obtained from the American Board on Genetic Counseling</li> </ul>	Above average growth	\$38,900–\$97,600



**FIGURE 3-5** Social workers help people make life adjustments and refer patients to community resources for assistance.

who have difficulty coping with various problems by helping them make adjustments in their lives and/or by referring them to community resources for assistance. Specialties include child welfare, geriatrics, family, correctional (jail), and occupational social work. Many areas employ assistants or technicians who have one or more years of an HSTE program.

**Genetic counselors** provide information to individuals and families on genetic diseases or inherited conditions. They research the risk for occurrence of the disease or birth defect, analyze inheritance patterns, perform screening tests for potential genetic defects, identify medical options when a genetic disease or birth defect is present, and help individuals cope with the psy-

chological issues caused by genetic diseases. Genetic counselors may specialize in prenatal (before birth) counseling, pediatric (child) counseling, neurogenetics (brain and nerves), cardiogenetics (heart and blood vessels), or genetic influences on cancer.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Board of Genetic Counseling  
9650 Rockville Pike  
Bethesda, MD 20814  
Internet address: [www.abgc.net](http://www.abgc.net)
- ◆ American Psychiatric Association  
1000 Wilson Boulevard, Suite 1825  
Arlington, VA 22209-3901  
Internet address: [www.psych.org](http://www.psych.org)
- ◆ American Psychological Association  
750 1st Street NE  
Washington, DC 20002-4242  
Internet address: [www.apa.org](http://www.apa.org)
- ◆ American Sociological Association  
1307 New York Avenue NW, Suite 700  
Washington, DC 20005  
Internet address: [www.asanet.org](http://www.asanet.org)
- ◆ National Mental Health Information Center  
P.O. Box 42557  
Washington, DC 20015  
Internet address: [www.mentalhealth.org](http://www.mentalhealth.org)
- ◆ National Association of Social Workers  
750 First Street NE, Suite 700  
Washington, DC 20002-4241  
Internet address: [www.naswdc.org](http://www.naswdc.org)

- ◆ National Mental Health Association  
2001 N. Beauregard Street  
Alexandria, VA 22311  
Internet address: [www.nmha.org](http://www.nmha.org)

## 3:2E INFORMATION



### Mortuary Careers

Workers in mortuary careers provide a service that is needed by everyone. Even though funeral practices and rites vary because of cultural diversity and religion, most services involve preparation of the body, performance of a ceremony that honors the deceased and meets the spiritual needs of the living, and cremation or burial of the remains.

Places of employment are funeral homes or mortuaries, crematoriums, or cemetery associations.

Levels include funeral director, embalmer, and mortuary assistant (see table 3-8).

**Funeral directors**, also called *morticians* or *undertakers*, provide support to the survivors; interview the family of the deceased to establish details of the funeral ceremonies or review arrangements the deceased person requested prior to death; prepare the body following legal requirements; secure information for legal documents; file death certificates; arrange and direct all the details of the wake and services; make arrangements for burial or cremation; and direct all business activities of the funeral home. Frequently, funeral directors help surviving individuals adapt to the death by providing post-death counseling and support group activities. Most funeral directors are also licensed embalmers.

**TABLE 3-8** Mortuary Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Funeral Director (Mortician)</b>	<ul style="list-style-type: none"> <li>• 2–4 years in a mortuary science college or associate's or bachelor's degree</li> <li>• Licensure required in all states except Colorado</li> </ul>	Average growth	\$28,600–\$94,700
<b>Embalmer</b>	<ul style="list-style-type: none"> <li>• 2–4 years in a mortuary science college or associate's or bachelor's degree</li> <li>• Licensure required in all states except Colorado</li> </ul>	Average growth	\$22,600–\$71,500
<b>Mortuary Assistant</b>	<ul style="list-style-type: none"> <li>• 1–2 years on-the-job training or 1-year HSTE program</li> </ul>	Average growth	\$14,500–\$26,800

**Embalmers** prepare the body for interment by washing the body with germicidal soap, replacing the blood with embalming fluid to preserve the body, reshaping and restructuring disfigured bodies, applying cosmetics to create a natural appearance, dressing the body, and placing it in a casket. They are also responsible for maintaining embalming reports and itemized lists of clothing or valuables.

**Mortuary assistants** work under the supervision of the funeral director and/or embalmer. They may assist with preparation of the body, drive the hearse to pick up the body after death or to take it to the burial site, arrange flowers for the viewing, assist with preparations for the funeral service, help with filing and maintenance of records, clean the funeral home, and other similar duties.

- ◆ International Conference of Funeral Service Examining Boards  
1885 Shelby Lane  
Fayetteville, AR 72704  
Internet address: [www.cfseb.org](http://www.cfseb.org)
- ◆ National Funeral Directors Association  
13625 Bishop's Drive  
Brookfield, WI 53005  
Internet address: [www.nfda.org](http://www.nfda.org)

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Board of Funeral Service Education  
38 Florida Avenue  
Portland, ME 04103  
Internet address: [www.abfse.org](http://www.abfse.org)

## 3:2F INFORMATION

### Nursing Careers

Those in the nursing careers provide care for patients as directed by physicians. Care focuses on the mental, emotional, and physical needs of the patient.

Hospitals are the major places of employment, but nursing workers are also employed in long-term care facilities, rehabilitation centers, physicians' offices, clinics, public health agencies, home health care agencies, health maintenance organizations (HMOs), schools, government agencies, and industry.

Levels include registered nurse, licensed practical/vocational nurse, and nurse assistant/technician (see table 3-9).

**TABLE 3-9** Nursing Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Registered Nurse (RN)</b>	<ul style="list-style-type: none"> <li>• 2–3-year diploma program in hospital school of nursing, or associate's degree or bachelor's degree</li> <li>• Master's or doctoral for some administrative/educational positions and for some advanced practice nursing positions</li> <li>• Licensure in state of practice</li> </ul>	Above average growth	\$36,500–\$84,600
<b>Licensed Practical/Vocational Nurse (LPN/LVN)</b>	<ul style="list-style-type: none"> <li>• 1–2-year state-approved HSTE practical/vocational nurse program</li> <li>• Licensure in state of practice</li> </ul>	Above average growth	\$25,800–\$52,600
<b>Nurse Assistant Geriatric Aide Home Health Care Assistant Medication Aide Certified Nurse Technician Patient Care Technician (PCT)</b>	<ul style="list-style-type: none"> <li>• HSTE program</li> <li>• Certification or registration required in all states for long-term care facilities—obtained by completing 75–120-hour state-approved program</li> </ul>	Above average growth especially in geriatric or home care	\$14,900–\$29,200

**Registered nurses (RNs)** (figure 3-6), work under the direction of physicians and provide total care to patients. The RN observes patients, assesses patients' needs, reports to other health care personnel, administers prescribed medications and treatments, teaches health care, and supervises other nursing personnel. The type of facility determines specific job duties. Registered nurses with an advanced education can specialize. Examples of advanced practice nurses include:

- ◆ **Nurse practitioners (CRNPs)**: take health histories, perform basic physical examinations, order laboratory tests and other procedures, refer patients to physicians, help establish treatment plans, treat common illnesses such as colds or sore throats, and teach and promote optimal health
- ◆ **Nurse midwives (CNMs)**: provide total care for normal pregnancies, examine the pregnant woman at regular intervals, perform routine tests, teach childbirth and childcare classes, monitor the infant and mother during childbirth, deliver the infant, and refer any problems to a physician



**FIGURE 3-6** Registered nurses (RNs) administer prescribed medications to patients.

- ◆ **Nurse educators**: teach in HSTE programs, schools of nursing, colleges and universities, wellness centers, and health care facilities
- ◆ **Nurse anesthetists**: administer anesthesia, monitor patients during surgery, and assist anesthesiologists (who are physicians)
- ◆ **Clinical nurse specialists (CNSs)**: use advanced degree to specialize in specific nursing areas such as intensive care, trauma or emergency care, psychiatry, pediatrics (infants and children), neonatology (premature infants), and gerontology (elderly individuals)

**Licensed practical/vocational nurses (LPNs/LVNs)**, working under the supervision of physicians or RNs, provide patient care requiring technical knowledge but not the level of education required of RNs. The type of care is determined by the work environment, which can include the home, hospital, long-term care facility, adult daycare center, physician's office, clinic, wellness center, and health maintenance organization. Care provided by LPN/LVNs is also determined by state laws regulating the extent of duties.

**Nurse assistants** (also called nurse aides, nurse technicians, **patient care technicians (PCTs)**, or orderlies) work under the supervision of RNs or LPNs/LVNs. They provide patient care such as baths, bedmaking, and feeding; assist in transfer and ambulation; and administer basic treatments. **Geriatric aides/assistants** acquire additional education to provide care for the elderly in work environments such as extended care facilities, nursing homes, retirement centers, adult daycare agencies, and other similar agencies. **Home health care assistants** are trained to work in the patient's home and may perform additional duties such as meal preparation or cleaning. **Medication aides/assistants** receive special training such as a 40-hour or more state-approved medication aide course to administer medications to patients or residents in long-term care facilities or patients receiving home health care. Most states that have the medication aide program require that the aide be on the state-approved list for nurse or geriatric assistants before taking the medication aide course. In addition, many states require a competency test.

★ Each nursing assistant working in a long-term care facility or home health care is now required under federal law to complete a manda-

tory, state-approved training program and pass a written and/or competency examination to obtain certification or registration. Health workers in these environments should check the requirements of their respective states.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American College of Nurse Practitioners  
1111 19th Street NW, Suite 404  
Washington, DC 20036  
Internet address: [www.acnpweb.org](http://www.acnpweb.org)
- ◆ American Health Care Association  
1201 L Street NW  
Washington, DC 20005  
Internet address: [www.ahca.org](http://www.ahca.org)
- ◆ American Nurses' Association  
8515 Georgia Avenue, Suite 400  
Silver Spring, MD 20910  
Internet address: [www.nursingworld.org](http://www.nursingworld.org)
- ◆ National Association for Home Care and Hospice  
228 Seventh Street SE  
Washington, DC 20003  
Internet address: [www.nahc.org](http://www.nahc.org)
- ◆ National Association for Practical Nurse Education and Service  
P.O. Box 25647  
Alexandria, VA 22313  
Internet address: [www.napnes.org](http://www.napnes.org)
- ◆ National Federation of Licensed Practical Nurses  
605 Poole Drive  
Garner, NC 27529  
Internet address: [www.nflpn.org](http://www.nflpn.org)
- ◆ National League for Nursing  
61 Broadway  
New York, NY 10006  
Internet address: [www.nln.org](http://www.nln.org)
- ◆ For information about specific tasks of a geriatric assistant/technician or nurse assistant/technician, ask your instructor for the Guide-line for Clinical Rotations in the *Diversified Health Occupations Teacher's Resource Kit*. Additional career information is provided in the Career Highlight Section of Chapter 21 in this textbook.

## 3:2G INFORMATION

### Nutrition and Dietary Services Careers

Health, nutrition, and physical fitness have become a way of life. Workers employed in the nutrition and dietary services recognize the importance of proper nutrition to good health. Using knowledge of nutrition, they promote wellness and optimum health by providing dietary guidelines used to treat various diseases, teaching proper nutrition, and preparing foods for health care facilities.

Places of employment include hospitals, long-term care facilities, child and adult daycare facilities, wellness centers, schools, home health care agencies, public health agencies, clinics, industry, and offices.

Levels include dietitian, dietetic technician, and dietetic assistant (see table 3-10).

**Dietitians (RDs)** or *nutritionists* (figure 3-7) manage food service systems, assess patients'/residents' nutritional needs, plan menus, teach others proper nutrition and special diets, research nutrition needs and develop recommendations based on the research, purchase food and equip-



**FIGURE 3-7** Dietitians manage food service systems, assess nutritional needs, and plan menus according to prescribed diets.

**TABLE 3-10** Nutrition and Dietary Services Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Dietitian, RD (registered)</b>	<ul style="list-style-type: none"> <li>Bachelor's or master's degree</li> <li>Registration can be obtained from Commission on Dietetic Registration of the American Dietetic Association</li> <li>Licensure, certification, or registration required in many states</li> </ul>	Average growth	\$32,700–\$68,300
<b>Dietetic Technician, DTR (registered)</b>	<ul style="list-style-type: none"> <li>Associate's degree</li> <li>Licensure, certification, or registration required in some states</li> <li>Registration can be obtained from the Commission on Dietetic Registration</li> </ul>	Average growth	\$24,200–\$49,200
<b>Dietetic Assistant</b>	<ul style="list-style-type: none"> <li>6–12 months on the job</li> <li>One or more years HSTE or food service career/technical program</li> </ul>	Average growth	\$13,600–\$24,900

ment, enforce sanitary and safety rules, and supervise and/or train other personnel. Some dietitians specialize in the care of pediatric (child), renal (kidney), or diabetic patients, or in weight management.

**Dietetic technicians (DTs)**, working under the supervision of dietitians, plan menus, order foods, standardize and test recipes, assist with food preparation, provide basic dietary instruction, and teach classes on proper nutrition.

**Dietetic assistants**, also called *food service workers*, work under the supervision of dietitians and assist with food preparation and service, help patients select menus, clean work areas, and assist other dietary workers.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Dietetic Association  
120 South Riverside Plaza, Suite 2000  
Chicago, IL 60606-6995  
Internet address: [www.eatright.org](http://www.eatright.org)
- ◆ Dietary Managers Association  
406 Surrey Woods Drive  
St. Charles, IL 60174  
Internet address: [www.dmaonline.org](http://www.dmaonline.org)
- ◆ Institute of Food Technologists  
525 West Van Buren, Suite 1000

Chicago, IL 60607

Internet address: [www.ift.org](http://www.ift.org)

- ◆ For information about specific tasks of a dietary assistant/food service worker, ask your instructor for the Guideline for Clinical Rotations in the *Diversified Health Occupations Teacher's Resource Kit*.

## 3:2H INFORMATION



### Veterinary Careers

Veterinary careers focus on providing care to all types of animals—from house pets to livestock to wildlife.

Places of employment include animal hospitals, veterinarian offices, laboratories, zoos, farms, animal shelters, aquariums, drug or animal food companies; and fish and wildlife services.

Levels of employment include veterinarian, animal health technician, and assistant (see table 3-11).

**Veterinarians (DVMs or VMDs)** (figure 3-8) work to prevent, diagnose, and treat diseases and injuries in animals. Specialties include surgery, small-animal care, livestock, fish and wildlife, and research.

**Veterinary technologists/technicians (VTs)**, also called *animal health technicians*, work under the supervision of veterinarians, assist with the handling and care of animals, collect

**TABLE 3-11** Veterinary Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Veterinarian (DVM or VMD)</b>	<ul style="list-style-type: none"> <li>• 3–4 years preveterinary college</li> <li>• 4 years veterinary college and Doctor of Veterinary Medicine degree</li> <li>• State licensure required in all states</li> </ul>	Above average growth	\$45,300–\$125,900
<b>Veterinary (Animal Health) Technologist/Technician VTR (registered)</b>	<ul style="list-style-type: none"> <li>• Associate's degree for veterinary technician</li> <li>• Bachelor's degree for veterinary technologist</li> <li>• Registration, certification, or licensure required in most states</li> <li>• Certification for technologists/technicians employed in animal laboratory research facilities can be obtained from the American Association for Laboratory Animal Science (AALAS)</li> </ul>	Above average growth	\$20,200–\$61,800
<b>Veterinary Assistant (Animal Caretakers)</b>	<ul style="list-style-type: none"> <li>• 1–2 years on the job or 1–2-year HSTE program</li> </ul>	Above average growth	\$15,200–\$35,300

specimens, assist with surgery, perform laboratory tests, take and develop radiographs, administer prescribed treatments, and maintain records.

**Veterinary assistants**, also called *animal caretakers*, feed, bathe, and groom animals; exercise animals; prepare animals for treatment; assist with examinations; clean and sanitize cages, examination tables, and surgical areas; and maintain records.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Association for Laboratory Animal Science  
9190 Crestwyn Hills Drive  
Memphis, TN 38125  
Internet address: [www.aalas.org](http://www.aalas.org)
- ◆ American Veterinary Medical Association  
1931 N. Meacham Road, Suite 100  
Schaumburg, IL 60173-4360  
Internet address: [www.avma.org](http://www.avma.org)
- ◆ Animal Caretakers Information  
The Humane Society of the United States  
2100 L Street NW  
Washington, DC 20037  
Internet address: [www.hsus.org](http://www.hsus.org)



**FIGURE 3-8** Veterinarians work to prevent, diagnose, and treat diseases and injuries in animals. (Courtesy Warren, *Small Animal Care and Management*, 1995, Delmar Learning)



- ◆ North America Veterinary Technician Association (NAVTA)  
P. O. Box 224  
Battle Ground, IN 47920  
Internet address: [www.navta.net](http://www.navta.net)
- ◆ For information about specific tasks of a veterinary assistant, ask your instructor for the Guideline for Clinical Rotations in the *Diversified Health Occupations Teacher's Resource Kit*.

### 3:21 INFORMATION



## Vision Services Careers

Workers in the vision services provide care to prevent and treat vision disorders. Places of employment include offices, optical shops, department

stores, hospitals, schools, health maintenance organizations (HMOs), government agencies, and clinics.

Levels include ophthalmologist, optometrist, ophthalmic medical technologist, ophthalmic technician, ophthalmic assistant, optician, and ophthalmic laboratory technician (see table 3-12). Many individuals in this field are entrepreneurs.

**Ophthalmologists** are medical doctors specializing in diseases, disorders, and injuries of the eyes. They diagnose and treat disease, perform surgery, and correct vision problems or defects.

**Optometrists (ODs)**, doctors of optometry, examine eyes for vision problems and defects, prescribe corrective lenses or eye exercises, and in some states, use drugs for diagnosis and/or treatment. If eye disease is present or if eye sur-

**TABLE 3-12** Vision Services Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Ophthalmologist (MD)</b>	<ul style="list-style-type: none"> <li>• Doctoral degree</li> <li>• 2–7 years postgraduate specialty training</li> <li>• State licensure</li> <li>• Certification in ophthalmology</li> </ul>	Average growth	\$108,000–\$248,500
<b>Optometrist (OD)</b>	<ul style="list-style-type: none"> <li>• 3–4 years preoptometric college</li> <li>• Four years at college of optometry for doctor of optometry degree</li> <li>• State licensure</li> </ul>	Average growth	\$62,300–\$125,300
<b>Ophthalmic Medical Technologist COMT (certified)</b>	<ul style="list-style-type: none"> <li>• Associate's or bachelor's degree</li> <li>• Certification can be obtained from the Joint Commission on Allied Health Personnel in Ophthalmology (JCAHPO)</li> </ul>	Average growth	\$28,600–\$68,500
<b>Ophthalmic Technician COT (certified)</b>	<ul style="list-style-type: none"> <li>• Associate's degree</li> <li>• Certification can be obtained from JCAHPO</li> </ul>	Average growth	\$27,500–50,200
<b>Ophthalmic Assistant COA (certified)</b>	<ul style="list-style-type: none"> <li>• Some on-the-job training</li> <li>• One month to 1-year HSTE program</li> <li>• Certification can be obtained from the JCAHPO</li> </ul>	Average growth	\$14,900–31,500
<b>Optician</b>	<ul style="list-style-type: none"> <li>• 2–4 years on the job or 2–4-year apprenticeship or HSTE program or associate's degree</li> <li>• Licensure or certification required in some states</li> <li>• Certification can be obtained from American Board of Opticianry and National Contact Lens Examiners</li> </ul>	Average growth	\$19,400–\$46,500
<b>Ophthalmic Laboratory Technician</b>	<ul style="list-style-type: none"> <li>• 2–3 years on the job or 1-year HSTE certificate program</li> </ul>	Below average growth	\$15,400–\$35,600

gery is needed, the optometrist refers the patient to an ophthalmologist.

**Ophthalmic medical technologists (OMTs)**, working under the supervision of ophthalmologists, obtain patient histories, perform routine eye tests and measurements, fit patients for contacts, administer prescribed treatments, assist with eye surgery, perform advanced diagnostic tests such as ocular motility and binocular function tests, administer prescribed medications, and perform advanced microbiological procedures. In addition, they may perform any tasks that ophthalmic technicians or assistants perform.

**Ophthalmic technicians (OTs)** (figure 3-9) work under the supervision of ophthalmologists and optometrists. Technicians prepare patients for examinations, obtain medical histories, take ocular measurements, administer basic vision tests, maintain ophthalmic and surgical instruments, adjust glasses, teach eye exercises, measure for contacts, instruct patients on the care and use of contacts, and perform receptionist duties.

**Ophthalmic assistants (OAs)** work under the supervision of ophthalmologists, optometrists, and/or ophthalmic medical technologists or technicians. Assistants prepare patients for examinations, measure visual acuity, perform receptionist duties, help patients with frame selections and fittings, order lenses, perform minor adjustments and repairs of glasses, and teach proper care and use of contact lenses.



**FIGURE 3-9** Ophthalmic technicians perform basic vision tests and teach eye exercises. (Courtesy of the American Optometric Association, St. Louis, MO)

**Opticians** make and fit the eyeglasses or lenses prescribed by ophthalmologists and optometrists. Some specialize in contact lenses.

**Ophthalmic laboratory technicians** cut, grind, finish, polish, and mount the lenses used in eyeglasses, contact lenses, and other optical instruments such as telescopes and binoculars.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Optometric Association  
243 N. Lindbergh Boulevard  
St. Louis, MO 63141  
Internet address: [www.aoanet.org](http://www.aoanet.org)
- ◆ Association of Schools and Colleges of Optometry  
6110 Executive Boulevard, Suite 510  
Rockville, MD 20852  
Internet address: [www.opted.org](http://www.opted.org)
- ◆ Commission on Opticianry Accreditation  
8665 Sudley Road, Suite 341  
Manassas, VA 20110  
Internet address: [www.coaccreditation.com](http://www.coaccreditation.com)
- ◆ Joint Commission on Allied Health Personnel in Ophthalmology  
2025 Woodlane Drive  
St. Paul, MN 55125-2995  
Internet address: [www.jcahpo.org](http://www.jcahpo.org)
- ◆ National Federation of Opticianry Schools  
1238 Robinson Point Road  
Mountain Home, AR 72653  
Internet address: [www.nfos.org](http://www.nfos.org)
- ◆ Opticians Association of America  
441 Carlisle Drive  
Herndon, VA 20170  
Internet address: [www.oaa.org](http://www.oaa.org)

## 3:2J INFORMATION

### Other Therapeutic Services Careers

There are many other therapeutic service careers. Some are discussed in this section. Most therapeutic occupations include levels of therapist, technician, and assistant/aide (see table 3-13).

**Occupational therapists (OTs)** (figure 3-10) often work under the direction of a physia-

**TABLE 3-13** Other Therapeutic Services Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Occupational Therapist (OT) OTR (registered)</b>	<ul style="list-style-type: none"> <li>• Master's degree and internship</li> <li>• Licensure required in all states</li> <li>• Certification can be obtained from American Occupational Therapy Association</li> </ul>	Above average growth	\$43,900–\$93,600
<b>Occupational Therapy Assistant COTA (certified)</b>	<ul style="list-style-type: none"> <li>• Associate's degree or certificate and internship</li> <li>• Licensure or certification required by most states</li> <li>• Certification can be obtained from American Occupational Therapy Association</li> </ul>	Above average growth	\$32,500–\$56,600
<b>Pharmacist (PharmD)</b>	<ul style="list-style-type: none"> <li>• 5–6-year college program with Doctor of Pharmacy degree plus internship</li> <li>• Licensure required in all states</li> </ul>	Above average growth	\$56,800–\$103,500
<b>Pharmacy Technician</b>	<ul style="list-style-type: none"> <li>• 1 or more years on the job or 1–2-year HSTE program or associate's degree</li> <li>• Licensure required in many states</li> <li>• Certification can be obtained from the Pharmacy Technician Certification Board</li> </ul>	Above average growth	\$17,300–\$36,400
<b>Physical Therapist (PT)</b>	<ul style="list-style-type: none"> <li>• Master's or doctoral degree</li> <li>• Licensure required in all states</li> </ul>	Above average growth	\$48,400–\$108,300
<b>Physical Therapist Assistant (PTA)</b>	<ul style="list-style-type: none"> <li>• Associate's degree plus internship</li> <li>• Licensure required in most states</li> </ul>	Above average growth	\$23,500–\$54,900
<b>Massage Therapist</b>	<ul style="list-style-type: none"> <li>• 3-month to 1-year accredited Massage Therapy Program</li> <li>• Certification, registration, or licensure required in many states</li> <li>• Certification can be obtained from the National Certification Board for Therapeutic Massage and Bodywork (NCBTMB)</li> </ul>	Above average growth	\$22,400–\$46,500
<b>Recreational Therapist (TR) Certified Therapeutic Recreation Specialist (CTRS)</b>	<ul style="list-style-type: none"> <li>• Possibly associate's but usually bachelor's degree plus internship</li> <li>• Licensure or certification required in a few states</li> <li>• Certification can be obtained from National Council for Therapeutic Recreation Certification (NCTRC)</li> <li>• Registration can be obtained from Association for Rehabilitation Therapy</li> </ul>	Average growth	\$26,800–\$54,500
<b>Recreational Therapist Assistant (Activity Director)</b>	<ul style="list-style-type: none"> <li>• 1–2-year HSTE certificate program or associate's degree</li> <li>• Certification can be obtained from National Council for Therapeutic Recreation Certification</li> </ul>	Average growth	\$14,700–\$32,800
<b>Respiratory Therapist, RTRRT (registered)</b>	<ul style="list-style-type: none"> <li>• Associate's or bachelor's degree</li> <li>• Licensure required in most states</li> <li>• Registration can be obtained from National Board for Respiratory Care</li> </ul>	Above average growth	\$32,800–\$66,300
<b>Respiratory Therapy Technician (RTT) CRTT (certified)</b>	<ul style="list-style-type: none"> <li>• 1–2-year HSTE program or associate's degree</li> <li>• Licensure or certification required in most states</li> <li>• Certification can be obtained from National Board for Respiratory Care</li> </ul>	Above average growth	\$23,400–\$49,800

*(continued)*

**TABLE 3-13** Other Therapeutic Services Careers (*Continued*)

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Speech–Language Therapist/Pathologist and/or Audiologist</b>	<ul style="list-style-type: none"> <li>• Master’s degree and 9 months postgraduate clinical experience</li> <li>• Licensure required in most states</li> <li>• Clinical doctoral degree common for audiologists</li> <li>• Audiologists may obtain certification from the American Board of Audiology</li> <li>• Certificate of Clinical Competence in Speech–Language Pathology (CCC–SLP) or Audiology (CCC–A) can be obtained from American Speech-Language-Hearing Association (ASHA)</li> </ul>	Above average growth	\$40,100–\$82,500
<b>Surgical Technician/Technologist CST (certified)</b>	<ul style="list-style-type: none"> <li>• 1–2-year HSTE program</li> <li>• Certificate, diploma, or associate’s degree</li> <li>• Certification can be obtained from Liaison Council on Certification for Surgical Technologists</li> </ul>	Above average growth	\$24,800–\$48,500
<b>Art, Music, Dance Therapist</b>	<ul style="list-style-type: none"> <li>• Bachelor’s or master’s degree</li> <li>• Certification for art therapist can be obtained from American Art Therapy Association</li> <li>• Registration for music therapist can be obtained from National Association of Music Therapy and American Association for Music Therapy</li> <li>• Registration for dance therapist (DTR) can be obtained from American Dance Therapy Association</li> <li>• Registration for art therapist (ATR) can be obtained from the Art Therapy Credentials Board</li> </ul>	Average growth	\$25,700–\$64,500
<b>Athletic Trainer ATC (certified)</b>	<ul style="list-style-type: none"> <li>• Bachelor’s or master’s degree</li> <li>• Licensure required in some states</li> <li>• Most states require certification</li> <li>• Certification can be obtained from National Athletic Trainers Association</li> </ul>	Above average growth	\$35,000–\$73,800
<b>Dialysis Technician</b>	<ul style="list-style-type: none"> <li>• Varies with states</li> <li>• Some states require RN or LPN license and state-approved dialysis training</li> <li>• Other states require 1–2-year HSTE state-approved dialysis program or associate’s degree</li> <li>• Certification can be obtained from National Association of Nephrology Technicians/Technologists</li> </ul>	Average growth	\$18,700–\$56,800
<b>Perfusionist Certified Clinical Perfusionist (CCP) Extracorporeal Circulation Technologist</b>	<ul style="list-style-type: none"> <li>• Bachelor’s degree</li> <li>• Specialized extracorporeal circulation training and supervised clinical experience</li> <li>• Licensure required in some states</li> <li>• Certification can be obtained from American Board of Cardiovascular Perfusion</li> </ul>	Above average growth	\$51,600–\$112,800



**FIGURE 3-10** Occupational therapists (OTs) help patients with disabilities to overcome, correct, or adjust to the disabilities.

trist, a physician specializing in physical medicine and rehabilitation. OTs help people with physical, developmental, mental, or emotional disabilities to overcome, correct, or adjust to their particular problems. The occupational therapist uses various activities to assist the patient in learning skills or activities of daily living (ADL), adapting job skills, or preparing for return to work. Treatment is directed toward helping patients acquire independence, regain lost functions, adapt to disabilities, and lead productive and satisfying lives.

**Occupational therapy assistants (OTAs)**, working under the guidance of occupational therapists, help patients carry out programs of prescribed treatment. They direct patients in arts and crafts projects, recreation, or social events; teach and help patients carry out rehabilitation activities and exercises; use games to develop balance and coordination; assist patients trying to master the activities of daily living; and inform therapists of patients' responses and progress.

**Pharmacists (PharmDs)** (figure 3-11) dispense medications per written orders from physicians, dentists, and other health care pro-



**FIGURE 3-11** Pharmacists dispense medications and provide information on drugs. (Courtesy of the Michigan Pharmacists Association and the Michigan Society of Pharmacy Technicians)

fessionals authorized to prescribe medications. They provide information on drugs and correct ways to use them; order and dispense other health care items such as surgical and sickroom supplies; recommend nonprescription items to customers/patients; ensure drug compatibility; maintain records on medications dispensed; and assess, plan, and monitor drug usage. Pharmacists can also either be entrepreneurs or work for one of the many drug manufacturers involved in researching, manufacturing, and selling drugs.

**Pharmacy technicians**, working under the supervision of pharmacists, help prepare medications for dispensing to patients, label medications, perform inventories and order supplies, prepare intravenous solutions, help maintain records, and perform other duties as directed by pharmacists.

**Physical therapists (PTs)** (figure 3-12) often work under the direction of a physiatrist, a physician specializing in physical medicine and rehabilitation. PTs provide treatment to improve mobility and prevent or limit permanent disability of patients with disabling joint, bone, muscle, and/or nerve injuries or diseases. Treatment may



**FIGURE 3-12** Physical therapists (PTs) provide treatment to improve mobility of patients with disabling injuries or diseases.

include exercise, massage, and/or applications of heat, cold, water, light, electricity, or ultrasound. Therapists assess the functional abilities of patients and use this information to plan treatment programs. They also promote health and prevent injuries by developing proper exercise programs and teaching patients correct use of muscles. Some physical therapists are entrepreneurs.

**Physical therapist assistants (PTAs)**, working under the supervision of physical therapists, help carry out prescribed plans of treatment. They perform exercises and massages; administer applications of heat, cold, and/or water; assist patients to ambulate with canes, crutches, or braces; provide ultrasound or electrical stimulation treatments; inform therapists of patients' responses and progress; and perform other duties, as directed by therapists.

**Massage therapists** usually work under the supervision of physicians or physical therapists. They use many variations of massage, bodywork (manipulation or application of pressure to the muscular or skeletal structure of the body), and therapeutic touch to muscles to provide pain relief for chronic conditions (such as back pain)

or inflammatory diseases, improve lymphatic circulation to decrease edema (swelling), and relieve stress and tension. Some massage therapists are entrepreneurs.

**Recreational therapists (TRs)**, or *therapeutic recreation specialists*, use recreational and leisure activities as forms of treatment to minimize patients' symptoms and improve physical, emotional, and mental well-being. Activities might include organized athletic events, dances, arts and crafts, musical activities, drama, field trips to shopping centers or other places of interest, movies, or poetry or book readings. All activities are directed toward allowing the patient to gain independence, build self-confidence, and relieve anxiety. Some recreational therapists are entrepreneurs.

**Recreational therapy assistants**, also called *activity directors*, work under the supervision of recreational therapists or other health care professionals. They assist in carrying out the activities planned by therapists and, at times, arrange activities or events. They note and inform therapists of patients' responses and progress.

**Respiratory therapists (RTs)**, under physicians' orders, treat patients with heart and lung diseases by administering oxygen, gases, or medications; using exercise to improve breathing; monitoring ventilators; and performing diagnostic respiratory function tests (figure 3-13). Some respiratory therapists are entrepreneurs.

**Respiratory therapy technicians (RTTs)** work under the supervision of respiratory therapists and administer respiratory treatments, perform basic diagnostic tests, clean and maintain



**FIGURE 3-13** Respiratory therapists (RTs) provide treatments to patients with heart and lung diseases.

equipment, and note and inform therapists of patients' responses and progress.

**Surgical technologists/technicians (STs)**, also called *operating room technicians* (figure 3-14), working under the supervision of RNs or physicians, prepare patients for surgery; set up instruments, equipment, and sterile supplies in the operating room; and assist during surgery by passing instruments and supplies to the surgeon. Although most surgical technologists/technicians work in hospital operating rooms, some are employed in outpatient surgical centers, emergency departments, urgent care centers, physicians' offices, and other facilities.

**Speech-language pathologists**, also called *speech therapists* or *speech scientists*, identify, evaluate, and treat patients with speech and language disorders. They help patients communicate as effectively as possible, and also teach patients to cope with the problems created by speech impairments.

**Audiologists** provide care to individuals who have hearing impairments. They test hearing, diagnose problems, and prescribe treatment, which may include hearing aids, auditory training, or instruction in speech or lip reading. They also test noise levels in workplaces and develop hearing protection programs.

**Art, music, and dance therapists** use the arts to help patients deal with social, physical, or emotional problems. Therapists usually work with individuals who are emotionally disturbed, mentally retarded, or physically disabled, but they may also work with adults and children who have no disabilities in an effort to promote physical and mental wellness.



**FIGURE 3-14** Surgical technologists assist by passing instruments and supplies to the surgeon.

**Athletic trainers (ATCs)** prevent and treat athletic injuries and provide rehabilitative services to athletes. The athletic trainer frequently works with a physician who specializes in sports medicine. Athletic trainers teach proper nutrition, assess the physical condition of athletes, give advice regarding a physical conditioning program to increase strength and flexibility or correct weaknesses, put tape or padding on players to protect body parts, treat minor injuries, administer first aid for serious injuries, and help carry out any rehabilitation treatment prescribed by sports medicine physicians or other therapists.

**Dialysis technicians**, also called *renal dialysis technicians*, *hemodialysis technicians*, or *nephrology technicians*, operate the kidney hemodialysis machines used to treat patients with limited or no kidney function. Careful patient monitoring is critical during the dialysis process. The dialysis technician must also provide emotional support for the patient and teach proper nutrition (because many patients must follow restricted diets).

**Perfusionists**, also called *extracorporeal circulation technologists*, are members of open-heart surgical teams and operate the heart-lung machines used in coronary bypass surgery (surgery on the coronary arteries in the heart). This field is expanding to include new advances such as artificial hearts. Monitoring and operating these machines correctly is critical because the patient's life depends on the machines. During surgery, the perfusionist monitors blood gases and vital signs; administers blood products, anesthetic agents, and/or drugs as needed; and induces hypothermia (low body temperature) to decrease the body's need for oxygen. After the surgery, the perfusionist must restore normal body circulation when the heart starts beating and wean the patient from the extracorporeal machine.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Alliance for Health, Physical Education, Recreation, and Dance  
1900 Association Drive  
Reston, VA 22091-1598  
Internet address: [www.aahperd.org](http://www.aahperd.org)

- ◆ American Art Therapy Association  
1202 Allanson Road  
Mundelheim, IL 60060-3808  
Internet address: [www.arttherapy.org](http://www.arttherapy.org)
- ◆ American Academy of Audiology  
11730 Plaza America Drive, Suite 300  
Reston, VA 20190  
Internet address: [www.audiology.org](http://www.audiology.org)
- ◆ American Association for Respiratory Care  
9425 N. MacArthur Boulevard, Suite 100  
Irving, TX 75063-48706  
Internet address: [www.aarc.org](http://www.aarc.org)
- ◆ American Association of Colleges of Pharmacy  
1426 Prince Street  
Alexandria, VA 22314  
Internet address: [www.aacp.org](http://www.aacp.org)
- ◆ American Dance Therapy Association  
10632 Little Patuxent Parkway  
Columbia, MD 21044  
Internet address: [www.adta.org](http://www.adta.org)
- ◆ American Massage Therapy Association  
820 Davis Street, Suite 100  
Evanston, IL 60201-4444  
Internet address: [www.amtamassage.org](http://www.amtamassage.org)
- ◆ American Music Therapy Association  
8455 Colesville Road  
Silver Spring, MD 20910  
Internet address: [www.musictherapy.org](http://www.musictherapy.org)
- ◆ American Pharmacists Association  
2215 Constitution Avenue NW  
Washington, DC 20037-2985  
Internet address: [www.aphanet.org](http://www.aphanet.org)
- ◆ American Physical Therapy Association  
1111 N. Fairfax Street  
Alexandria, VA 22314-1488  
Internet address: [www.apta.org](http://www.apta.org)
- ◆ American Occupational Therapy Association  
4720 Montgomery Lane, P. O. Box 31220  
Bethesda, MD 20824-1220  
Internet address: [www.aota.org](http://www.aota.org)
- ◆ American Society of Extracorporeal Technologists  
2209 Dickens Road  
P.O. Box 11086  
Richmond, VA 23230-1086  
Internet address: [www.amsect.org](http://www.amsect.org)
- ◆ American Speech-Language-Hearing Association  
10801 Rockville Pike  
Rockville, MD 20852  
Internet address: [www.asha.org](http://www.asha.org)
- ◆ American Therapeutic Recreation Association  
1414 Prince Street, Suite 204  
Alexandria, VA 22314  
Internet address: [www.atra-tr.org](http://www.atra-tr.org)
- ◆ Associated Bodywork and Massage Professionals  
1271 Sugarbush Drive  
Evergreen, CO 80439-9766  
Internet address: [www.abmp.com](http://www.abmp.com)
- ◆ Association of Surgical Technologists  
6 W. Dry Creek Circle  
Littleton, CO 80120  
Internet address: [www.ast.org](http://www.ast.org)
- ◆ Massage and Bodywork Resource Center  
Internet address: [www.massageresource.com](http://www.massageresource.com)
- ◆ National Athletic Trainers Association  
2952 Stemmons Freeway  
Dallas, TX 75247  
Internet address: [www.nata.org](http://www.nata.org)
- ◆ National Therapeutic Recreation Society  
22377 Belmont Ridge Road  
Ashburn, VA 20148  
Internet address: [www.nrpa.org](http://www.nrpa.org)
- ◆ Pharmacy Technician Certification Board  
2215 Constitution Avenue NW  
Washington, DC 20037-2985  
Internet address: [www.ptcb.org](http://www.ptcb.org)
- ◆ For information about specific tasks of a pharmacy technician/assistant, physical therapy assistant/technician, or respiratory therapy assistant/technician, ask your instructor for the Guideline for Clinical Rotations in the *Diversified Health Occupations Teacher's Resource Kit*. Additional career information for physical therapy is provided in the Career Highlight Section of Chapter 22 in this textbook.

### 3:3 INFORMATION

#### Diagnostic Services Careers

Diagnostic service workers are involved with creating a picture of the health status of a patient at a single point in time. They perform tests or evaluations that aid in the detection, diagnosis, and



treatment of disease, injury, or other physical conditions.

Many workers are employed in hospital laboratories, but others work in private laboratories, outpatient centers, doctors' offices, clinics, public health agencies, pharmaceutical (drug) firms, and research or government agencies. In some occupations, individuals are entrepreneurs, owning and operating their own businesses.

Many careers fall under the designation of diagnostic services. Some of the more common ones are discussed in this chapter. There are various levels of workers in most fields (table 3-14).

**Electrocardiograph (ECG) technicians** operate electrocardiograph machines, which record electrical impulses that originate in the heart. Physicians (especially cardiologists) use the electrocardiogram (ECG) to help diagnose

**TABLE 3-14** Diagnostic Services Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Cardiovascular Technologist</b>	<ul style="list-style-type: none"> <li>• Associate's or bachelor's degree</li> <li>• Certification or registration can be obtained from Cardiovascular Credentialing International</li> </ul>	Above average growth	\$27,500–\$58,600
<b>Registered Diagnostic Vascular Technologist (RDVT)</b>	<ul style="list-style-type: none"> <li>• Registration can be obtained from the American Registry of Diagnostic Medical Sonographers</li> </ul>		
<b>Electrocardiograph (ECG Technician) Certified Cardiographic Technician (CCT)</b>	<ul style="list-style-type: none"> <li>• 1–12 months on-the-job or 6–12-month-HSTE program</li> <li>• Certification can be obtained from Cardiovascular Credentialing International</li> </ul>	Below average growth	\$17,300–\$32,800
<b>Electroencephalographic (EEG) Technologist</b>	<ul style="list-style-type: none"> <li>• Few have 1–2-years on-the-job</li> <li>• Most have 1–2-year HSTE certification program or associate's degree</li> <li>• Registration can be obtained from American Board of Registration of Electroencephalographic and Evoked Potential Technologists</li> </ul>	Below average growth	\$22,300–\$46,200
<b>Electroneurodiagnostic Technologist</b>	<ul style="list-style-type: none"> <li>• 1–2-year program usually leading to associate's degree</li> <li>• Registration can be obtained from the American Board of Electroencephalographic and Evoked Potential Technologists</li> <li>• Polysomnographic technologists can obtain registration from the Association of Polysomnographic Technologists</li> </ul>	Above average growth	\$35,800–\$56,200
<b>Medical (Clinical) Laboratory Technologist (MT) Certified Medical (Clinical) Laboratory Technologist (CMT) Registered Medical (Clinical) Laboratory Technologist (RMT)</b>	<ul style="list-style-type: none"> <li>• Bachelor's or master's degree</li> <li>• Licensure or registration required in some states</li> <li>• Certification can be obtained from the American Medical Technologists Association and the National Credentialing Agency for Laboratory Personnel</li> </ul>	Average growth	\$35,800–\$66,900

(continued)

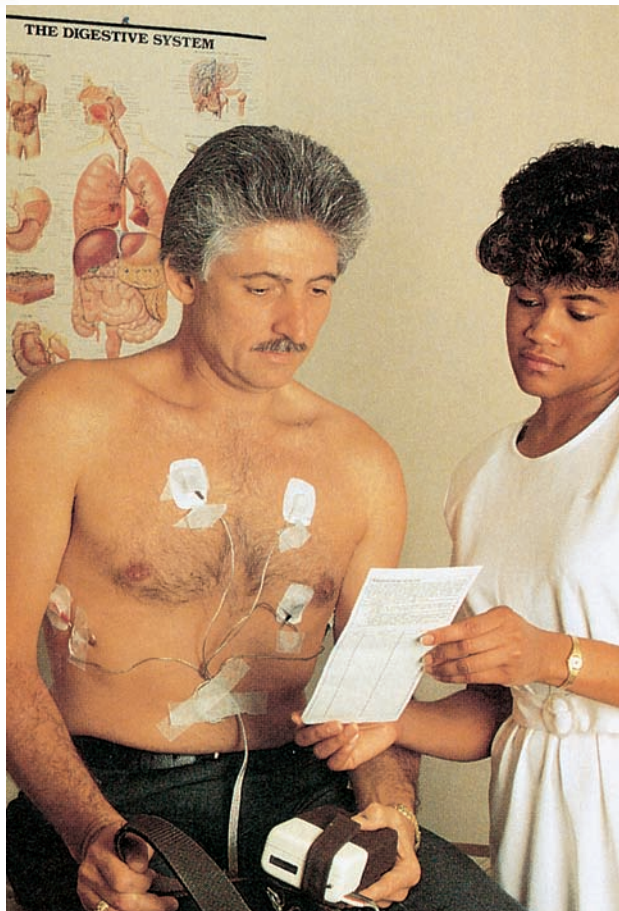
**TABLE 3-14** Diagnostic Services Careers (Continued)

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Medical (Clinical) Laboratory Technician (MLT) Certified Laboratory Technician (CLT)</b>	<ul style="list-style-type: none"> <li>• 2-year HSTE certification program or associate's degree</li> <li>• Licensure or registration required in some states</li> <li>• Certification can be obtained from the American Medical Technologists Association and the National Credentialing Agency for Laboratory Personnel</li> </ul>	Average growth	\$26,300–\$48,900
<b>Medical (Clinical) Laboratory Assistant</b>	<ul style="list-style-type: none"> <li>• 1–2-year HSTE program or on-the-job training</li> <li>• Certification can be obtained from the Board of Certified Laboratory Assistants</li> </ul>	Below average growth	\$14,500–\$26,300
<b>Phlebotomist</b>	<ul style="list-style-type: none"> <li>• 1–2 years on the job or HSTE program or 100–300 hour certification program</li> <li>• Certification can be obtained from the National Credentialing Agency for Laboratory Personnel and the American Society of Phlebotomy Technicians</li> </ul>	Average growth	\$14,600–\$28,300
<b>Radiologic Technologist ARRT (Registered)</b>	<ul style="list-style-type: none"> <li>• Associate's or bachelor's degree</li> <li>• Licensure required in most states</li> <li>• Registration can be obtained from American Registry of Radiologic Technologies (ARRT)</li> </ul>	Above average growth	\$28,900–\$68,600

heart disease and to note changes in the condition of a patient's heart. ECG or *cardiographic technicians* with more advanced training perform stress tests (which record the action of the heart during physical activity), Holter monitorings (ECGs lasting 24–48 hours, figure 3-15), thallium scans (a nuclear scan after thallium is injected), and other specialized cardiac tests that frequently involve the use of computers. An associate's or bachelor's degree leads to a position as a **cardiovascular technologist**. These individuals assist with cardiac catheterization procedures and angioplasty (a procedure to remove blockages in blood vessels), monitor patients during open-heart surgery and the implantation of pacemakers, and perform tests to check circulation in blood vessels. Some specialize in using ultrasound (high-frequency sound waves) to assess heart function and diagnose heart conditions and are called *echocardiographers* or *cardiac sonographers*. Others use ultrasound to diagnose disorders of blood vessels by checking blood pressure, oxygen saturation, and circulation of blood throughout the body. They are called *vascular technologists* or *vascular sonographers*.

An **electroencephalographic (EEG) technologist** operates an instrument called an *electroencephalograph*, which records the electrical activity of the brain. The record produced, called an *electroencephalogram*, is used by a variety of physicians, especially neurologists (doctors specializing in nerve and brain diseases), to diagnose and evaluate diseases and disorders of the brain, such as brain tumors, strokes, toxic/metabolic disorders, epilepsy, and sleep disorders. Advanced training leads to a position as an **electroneurodiagnostic technologist (END)**. In addition to performing EEGs, these individuals perform nerve conduction tests, measure sensory and physical responses to specific stimuli, perform evoked potential (EP) tests that measure brain response when specific nerves are stimulated, and operate other monitoring devices. Technologists who specialize in administering sleep disorder evaluations are called *polysomnographic technologists*.

**Medical (clinical) laboratory technologists (MTs)** work under the supervision of doctors called *pathologists*. They study tissues, fluids, and cells of the human body to help determine



**FIGURE 3-15** Cardiographic technicians assist with Holter monitorings of the heart.

the presence and/or cause of disease. They perform complicated chemical, microscopic, and automated analyzer/computer tests (figure 3-16). In small laboratories, technologists perform many types of tests. In larger laboratories, they may specialize. Examples of specialization include:

- ◆ **Biochemistry:** chemical analysis of body fluids
- ◆ **Blood bank technology:** collection and preparation of blood and blood products for transfusions
- ◆ **Cytotechnology:** study of human body cells and cellular abnormalities
- ◆ **Hematology:** study of blood cells
- ◆ **Histology:** study of human body tissue
- ◆ **Molecular biology:** complex protein and nucleic acid testing on cell samples



**FIGURE 3-16** Medical laboratory technologists perform computerized blood analysis tests. (Photo by Marcia Butterfield, courtesy of W. A. Foote Memorial Hospital, Jackson, MI)

- ◆ **Microbiology:** study of bacteria and other microorganisms

**Medical (clinical) laboratory technicians (MLTs)**, working under the supervision of medical technologists or pathologists, perform many of the routine tests that do not require the advanced knowledge held by a medical technologist. Like the technologist, the technician can specialize in a particular field or perform a variety of tests.

**Medical (clinical) laboratory assistants**, working under the supervision of medical technologists, technicians, or pathologists, perform basic laboratory tests; prepare specimens for examination or testing; and perform other laboratory duties such as cleaning and helping to maintain equipment.

**Phlebotomists** (figure 3-17), or venipuncture technicians, collect blood and prepare it for testing. In some states, they perform blood tests under the supervision of medical technologists or pathologists.

**Radiologic technologists (RTs)**, working under the supervision of doctors called radiologists, use X-rays, radiation, nuclear medicine, ultrasound, and magnetic resonance to diagnose and treat disease. Most techniques are noninvasive, which means examining or treating the internal organs of patients without entering the body. In many cases, recent advances in this field have eliminated the need for surgery and, therefore, offer less risk to patients. Radiologic tech-



**FIGURE 3-17** Phlebotomists collect blood and prepare it for testing.

nologists use different types of scanners to produce images of body parts. Examples include X-ray machines, fluoroscopes, ultrasonic scanners, computerized tomography (CT) scanners (formerly known as computerized axial tomography [CAT] scanners), magnetic resonance imagers (MRI), and positron emission tomography (PET) scanners. Many radiologic technologists also provide radiation treatment. Specific job titles exist for technologists who specialize:

- ◆ *Radiographers:* (figure 3-18) take X-rays of the body for diagnostic purposes.
- ◆ *Radiation therapists:* administer prescribed doses of radiation to treat disease (usually cancer).
- ◆ *Nuclear medicine technologists:* prepare radioactive substances for administration to patients. Once administered, these professionals use films, images on a screen, or body specimens such as blood or urine to determine how the radioactive substances pass through or localize in different parts of the body. This information is used by physicians to detect abnormalities or diagnose disease.
- ◆ *Ultrasound technologists or diagnostic medical sonographers:* use equipment that sends high-frequency sound waves into the body. As the sound waves bounce back from the part being examined, an image of the part is viewed on a screen. This can be recorded on a print-out strip or be photographed. Ultrasound is frequently used to examine the fetus (developing infant) in a pregnant woman and can reveal the sex of the unborn child. Ultrasound is also used for neurosonography (the brain),



**FIGURE 3-18** Radiologic technologists take X-rays used in the diagnosis of disease. (Photo by Marcia Butterfield, courtesy of W. A. Foote Memorial Hospital, Jackson, MI)

- vascular (blood vessels and blood flow), and echocardiography (the heart) examinations.
- ◆ *Mammographer:* uses a special mammography machine to produce images of the breast. The mammograms are used to assist in the early detection and treatment of breast cancer.
- ◆ *Computer tomography technologists:* use a special X-ray machine called a computerized axial tomography (CT or CAT) scanner to obtain cross-sectional images of body tissues, bones, and organs. CT scans help locate tumors and other abnormalities.
- ◆ *Magnetic resonance imaging (MRI) technologists:* use superconductive magnets and radio-waves to produce detailed images of internal anatomy. The information is processed by a computer and displayed on a videoscreen. Examples of MRI use include identifying multiple sclerosis and detecting hemorrhaging (bleeding) in the brain.
- ◆ *Positron emission tomography (PET) technologists:* inject a slightly radioactive substance into the patient and then operate the PET scanner, which uses electrons to create a

three-dimensional image of body parts and scan the body for disease processes. This allows physicians to see an organ or bone from all sides, similar to a model.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ Alliance of Cardiovascular Professionals  
4356 Bonney Road, Suite 103  
Virginia Beach, VA 23452-1200  
Internet address: [www.acp-online.org](http://www.acp-online.org)
- ◆ American College of Radiology  
1891 Preston White Drive  
Reston, VA 22091  
Internet address: [www.acr.org](http://www.acr.org)
- ◆ American Medical Technologists  
710 Higgins Road  
Park Ridge, IL 60068  
Internet address: [www.amt1.com](http://www.amt1.com)
- ◆ American Registry of Radiologic Technologists  
1255 Northland Drive  
St. Paul, MN 55120-1155  
Internet address: [www.arrt.org](http://www.arrt.org)
- ◆ American Society for Clinical Laboratory Science  
6701 Democracy Boulevard, Suite 300  
Bethesda, MD 20814  
Internet address: [www.ascls.org](http://www.ascls.org)
- ◆ American Society of Electroneurodiagnostic Technologists  
426 W. 42nd Street  
Kansas City, MO 64111  
Internet address: [www.aset.org](http://www.aset.org)
- ◆ American Society of Radiologic Technologists  
15000 Central Avenue SE  
Albuquerque, NM 87123-3917  
Internet address: [www.asrt.org](http://www.asrt.org)
- ◆ Association of Schools of Allied Health Professions  
1730 M Street, Suite 500  
Washington, DC 20036  
Internet address: [www.asahp.org](http://www.asahp.org)
- ◆ Cardiovascular Credentialing International (CCI)  
1500 Sunday Drive, Suite 102  
Raleigh, NC 27607  
Internet address: [www.cci-online.org](http://www.cci-online.org)
- ◆ International Society for Clinical Laboratory Technology  
917 Locust Street, Suite 1100  
St. Louis, MO 63101
- ◆ National Accrediting Agency for Clinical Laboratory Sciences  
8410 West Bryn Mawr Avenue, Suite 670  
Chicago, IL 60631-3415  
Internet address: [www.naacls.org](http://www.naacls.org)
- ◆ National Credentialing Agency for Laboratory Personnel  
P.O. Box 15945-289  
Lenexa, KS 66285  
Internet address: [www.nca-info.org](http://www.nca-info.org)
- ◆ Society of Diagnostic Medical Sonography  
2745 Dallas Parkway, Suite 350  
Dallas, TX 75093-8730  
Internet address: [www.sdms.org](http://www.sdms.org)
- ◆ For information about specific tasks of a medical laboratory assistant/technician and a radiology assistant/technician, ask your instructor for the Guideline for Clinical Rotations in the *Diversified Health Occupations Teacher's Resource Kit*. Additional career information for medical laboratory assistants/technicians is provided in the Career Highlight Section of Chapter 19 in this textbook.

## 3:4 INFORMATION



### Health Informatics Careers

Health informatics workers are involved with documentation of patient records and health information. There are many different types of health workers at all levels. Some examples of careers in health informatics include health information administrators or technicians, health educators, medical transcriptionists, admitting office personnel, epidemiologists, medical illustrators, photographers, writers, and librarians (see table 3-15). Computer technology is used in almost all the careers.

Places of employment include hospitals, clinics, research centers, health departments, long-term care facilities, colleges, law firms, health maintenance organizations (HMOs), and insurance companies.

**Health information (medical records) administrators (RAs)** develop and manage the systems for storing and obtaining information

**TABLE 3-15** Health Informatics Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Health Information (Medical Records) Administrator Registered (RRA)</b>	<ul style="list-style-type: none"> <li>Bachelor's or master's degree</li> <li>Registration can be obtained from American Health Information Management Association (AHIMA)</li> </ul>	Above average growth	\$41,400–\$88,700
<b>Health Information (Medical Records) Technician Registered (RHIT)</b>	<ul style="list-style-type: none"> <li>Associate's degree</li> <li>Registration can be obtained from the American Health Information Management Association (AHIMA) after passing a written examination</li> </ul>	Above average growth	\$22,700–\$52,300
<b>Medical Transcriptionist Certified Medical Transcriptionist (CMT)</b>	<ul style="list-style-type: none"> <li>1 or more years career or technical education program, on-the-job training, or associate's degree</li> <li>Certification can be obtained from American Association for Medical Transcription</li> </ul>	Above average growth	\$18,700–\$37,400
<b>Admitting Officer or Clerk</b>	<ul style="list-style-type: none"> <li>1–2 year HSTE or business/office career/ technical education</li> <li>Admitting manager may require bachelor's degree</li> <li>Few have on-the-job training</li> </ul>	Average growth	\$15,300–\$36,800
<b>Unit Secretary Ward Clerk Health Unit Coordinator Medical Records Clerk</b>	<ul style="list-style-type: none"> <li>1 or more years career or technical education program</li> <li>Some have on-the-job training</li> </ul>	Average growth	\$14,200–\$34,300
<b>Epidemiologist</b>	<ul style="list-style-type: none"> <li>Master's or doctoral degree in environmental health, public health, or health management sciences</li> </ul>	Above average growth	\$55,000–\$96,500
<b>Medical Interpreter/Translator</b>	<ul style="list-style-type: none"> <li>Associate's, bachelor's, or master's degree</li> <li>Certification for translators can be obtained from the American Translators Association</li> <li>Certification for sign language interpreters can be obtained from the National Association of the Deaf and the Registry of Interpreters for the Deaf</li> </ul>	Above average growth	\$31,800–\$76,300
<b>Medical Illustrator</b>	<ul style="list-style-type: none"> <li>Bachelor's or master's degree</li> <li>Certification can be obtained from Association of Medical Illustrators</li> </ul>	Average growth	\$43,700–\$132,500
<b>Medical Librarian</b>	<ul style="list-style-type: none"> <li>Master's degree in library science</li> </ul>	Average growth	\$41,600–\$136,300

from records, prepare information for legal actions and insurance claims, compile statistics for organizations and government agencies, manage medical records departments, ensure the confidentiality of patient information, and supervise and train other personnel. Because computers are used in almost all aspects of the job, it is essential for the medical records admin-

istrator to be able to operate and use a variety of computer programs.

**Health information (medical records) technicians**, (figure 3-19), organize and code patient records, gather statistical or research data, record information on patient records, monitor electronic and paper-based information to ensure confidentiality, and calculate bills using



**FIGURE 3-19** Health information (medical records) technicians organize and code patients' records.

health care data. Computers have simplified many of the duties and are used to organize records, compile and report statistical data, and perform similar tasks. Computer operation is an important part of the education program for health information technicians. Medical records departments also employ clerks, who organize records. Clerks typically complete a 1- or 2-year career/technical program, or are trained on the job.

**Medical transcriptionists** use a computer and word processing software to enter data that has been dictated on recorder by physicians or other health care professionals. Examples of data include physical examination reports, surgical reports, consultation findings, progress notes, and radiology reports.

**Admitting officers/clerks** work in the admissions department of a health care facility. They are responsible for obtaining all necessary information when a patient is admitted to the facility, assigning rooms, maintaining records, and processing information when the patient is discharged. An *admitting manager* is a higher level of worker in this field, usually having an associate's or bachelor's degree. The admitting manager is responsible for supervising staff, developing and implementing policies and procedures for the department, monitoring performance standards, and coordinating the operation of the department with other departments in the health care facility.

**Unit secretaries, ward clerks, or health unit coordinators** are employed in hospitals,

extended care facilities, clinics, and other health facilities to record information on records; schedule procedures or tests; answer telephones; order supplies; and work with computers to record or obtain information.

**Epidemiologists** identify and track diseases as they occur in a group of people. They determine risk factors that make a disease more likely to occur, evaluate situations that may cause occupational exposure to toxic substances, develop methods to prevent or control the spread of new diseases, and evaluate statistics and data to help governments, health agencies, and communities deal with epidemics and other health issues. Some may specialize in areas such as cancer, cardiovascular (heart and blood vessels) diseases, occupational diseases, infectious or communicable (spread rapidly from person to person) diseases, and/or health care research.

**Medical interpreters/translators** assist cross-cultural communication processes by converting one language to another. Interpreters convert the spoken word while translators convert written material. Medical interpreters/translators must be proficient at translating words, relaying concepts and ideas between languages, practicing cultural sensitivity, editing written language, and determining that the communication has been comprehended. *Sign language interpreters* facilitate communication for individuals who are deaf or hard of hearing.

**Medical illustrators** use their artistic and creative talents to produce illustrations, charts, graphs, and diagrams for health textbooks, journals, magazines, and exhibits. Another related field is a *medical photographer*, who takes photographs or records videotapes of surgical procedures, health education information, documentation of conditions before and after reconstructive surgery, and legal information such as injuries received in an accident.

**Medical librarians**, also called *health sciences librarians*, organize books, journals, and other print materials to provide health information to other health care professionals. They use computer technology to create information centers for large health care facilities or to provide information to health care providers. Some librarians specialize in researching information for large pharmaceutical companies, insurance agencies, lawyers, industry, and/or government agencies.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Association for Medical Transcription  
100 Sycamore Avenue  
Modesto, CA 95354-0550  
Internet address: [www.aamt.org](http://www.aamt.org)
- ◆ American Health Information Management Association  
233 N. Michigan Avenue, Suite 2150  
Chicago, IL 60601-5800  
Internet address: [www.ahima.org](http://www.ahima.org)
- ◆ American Medical Association Commission on Accreditation of Allied Health Education Programs  
515 N. State Street  
Chicago, IL 60610  
Internet address: [www.ama-assn.org](http://www.ama-assn.org)
- ◆ American Translators Association  
225 Reinekers Lane, Suite 590  
Alexandria, VA 22314  
Internet address: [www.atanet.org](http://www.atanet.org)
- ◆ Association for Professionals in Infection Control and Epidemiology  
1275 K Street NW, Suite 1000  
Washington, DC 20005  
Internet address: [www.apic.org](http://www.apic.org)
- ◆ Association of Medical Illustrators  
P.O. Box 1897  
Lawrence, KS 66044  
Internet address: [www.ami.org](http://www.ami.org)
- ◆ Medical Library Association  
65 East Wacker Plaza, Suite 1900  
Chicago, IL 60602  
Internet address: [www.mlanet.org](http://www.mlanet.org)
- ◆ Registry of Interpreters for the Deaf  
333 Commerce Street  
Alexandria, VA 22314  
Internet address: [www.rid.org](http://www.rid.org)

**TABLE 3-16** Support Services Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Health Care Administrator</b> <b>Health Services Manager</b>	<ul style="list-style-type: none"> <li>• Usually master's or doctoral, but smaller facilities may accept a bachelor's degree</li> <li>• Licensure required for long-term care facilities</li> <li>• Certification can be obtained from American College of Health Care Executives</li> </ul>	Above average growth	\$48,500–\$196,000
<b>Biomedical (Clinical) Engineer</b>	<ul style="list-style-type: none"> <li>• Bachelor's or master's degree</li> <li>• Licensure required in some states</li> <li>• Certification available from the International Certification Commission for Clinical Engineering and Biomedical Technology</li> </ul>	Above average growth	\$48,500–\$108,600
<b>Biomedical Equipment Technician (CBET-Certified)</b>	<ul style="list-style-type: none"> <li>• Associate's or bachelor's degree</li> <li>• Certification can be obtained from the International Certification Commission for Clinical Engineering and Biomedical Technology of the Association for the Advancement of Medical Instrumentation</li> </ul>	Above average growth	\$26,300–\$58,600
<b>Central/Sterile Supply Technician</b>	<ul style="list-style-type: none"> <li>• On-the-job training or 1–2-year HSTE program</li> </ul>	Average growth	\$12,200–\$23,500
<b>Housekeeping Worker Sanitary Manager</b>	<ul style="list-style-type: none"> <li>• On-the-job training or 1-year career/technical program</li> </ul>	Above average growth	\$12,200–\$24,700



## 3:5 INFORMATION



### Support Services Careers

Support services workers are involved with creating a therapeutic environment to provide direct or indirect patient care. Any hospital or health care facility requires workers to operate the support departments such as administration, the business office, the admissions office, central/sterile supply, plant operations, equipment maintenance, and housekeeping. Each department has workers at all levels and with varying levels of education (see table 3-16).

Places of employment include hospitals, clinics, long-term care facilities, HMOs, and public health or governmental agencies.

**Health care administrators**, also called *health care executives* or *health services managers* plan, direct, coordinate, and supervise delivery of health care and manage the operation of health care facilities. They are frequently called chief executive officers (CEOs). A health care administrator may be responsible for personnel, supervise department heads, determine budget and finance, establish policies and procedures, perform public relations duties, and coordinate all activities in the facility. Duties depend on the size of the facility.

**Biomedical (clinical) engineers** combine knowledge of engineering with knowledge of biology and biomechanical principles to assist in the operation of health care facilities. They design and build sensor systems that can be used for diagnostic tests, such as the computers used to analyze blood; develop computer systems that can be used to monitor patients; design and produce monitors, imaging machines, surgical instruments, lasers, and other similar medical equipment; design clinical laboratories and other units in a health care facility that uses advanced technology; and monitor and maintain the operation of the technologic systems. They frequently work with other health team members such as physicians or nurses to adapt instrumentation or computer technology to meet the specific needs of the patients and health care team.

**Biomedical equipment technicians (BETs)** work with the many different machines used to diagnose, treat, and monitor patients. They install, test, service, and repair equipment such as patient monitors, kidney hemodialysis units, diagnostic imaging scanners, incubators,



**FIGURE 3-20** Central/sterile supply workers prepare all the equipment and supplies used by other departments in a health care facility.

electrocardiographs, X-ray units, pacemakers, sterilizers, blood-gas analyzers, heart-lung machines, respirators, and other similar devices. Lives depend on the accuracy and proper operation of many of these machines, so constant maintenance and testing for defects is critical. Some biomedical equipment technicians also teach other staff members how to use biomedical equipment.

**Central/sterile supply workers** (figure 3-20) are involved in ordering, maintaining, and supplying all the equipment and supplies used by other departments in a health care facility. They sterilize instruments or supplies, maintain equipment, inventory materials, and fill requisitions from other departments.

**Housekeeping workers/sanitary managers**, also called *environmental service workers*, help maintain the cleanliness of the health care facility to provide a pleasant, sanitary environment. They observe all principles of infection control to prevent the spread of disease.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American College of Health Care Administrators  
300 N. Lee Street Suite 301  
Alexandria, VA 22314  
Internet address: [www.achca.org](http://www.achca.org)
- ◆ American College of Healthcare Executives  
One North Franklin Street, Suite 1700

Chicago, IL 60606-4425  
 Internet address: [www.ache.org](http://www.ache.org)

- ◆ American Health Care Association  
 1201 L Street NW  
 Washington, DC 20005  
 Internet address: [www.ahca.org](http://www.ahca.org)
- ◆ American Hospital Association  
 1 North Franklin Street  
 Chicago, IL 60606-3421  
 Internet address: [www.aha.org](http://www.aha.org)
- ◆ Association for the Advancement of Medical Instrumentation  
 3330 Washington Boulevard, Suite 400  
 Arlington, VA 22201-4598  
 Internet address: [www.aami.org](http://www.aami.org)
- ◆ Biomedical Engineering Society  
 8401 Corporate Drive, Suite 110  
 Landover, MD 20785  
 Internet address: [www.bmes.org](http://www.bmes.org)

### 3:6 INFORMATION



## Biotechnology Research and Development Careers

Biotechnology career workers are involved with using living cells and their molecules to make useful products. They work with cells and cell products from humans, animals, plants, and microorganisms. Through research and development, they help produce new diagnostic tests, forms of treatment, medications, vaccines to prevent disease, methods to detect and clean up environmental contamination, and food products. The potential for the use of biotechnology is unlimited.

Places of employment include pharmaceutical companies, chemical companies, agricultural facilities, research laboratories, colleges or universities, government facilities, forensic laboratories, hospitals, and industry. There are many career opportunities at all levels (table 3-17).

**TABLE 3-17** Biotechnology Research and Development Careers

OCCUPATION	EDUCATION REQUIRED	JOB OUTLOOK TO YEAR 2012	AVERAGE YEARLY EARNINGS
<b>Biological or Medical Scientists</b>	<ul style="list-style-type: none"> <li>• Bachelor's, master's, or doctoral degree</li> <li>• Licensure required in some states</li> </ul>	Average growth	\$52,600–\$110,500
<b>Biotechnological Engineers (Bioengineers)</b>	<ul style="list-style-type: none"> <li>• Bachelor's or master's degree</li> <li>• Licensure required in some states</li> </ul>	Average growth	\$48,600–\$82,700
<b>Biological Technicians</b>	<ul style="list-style-type: none"> <li>• Associate's or bachelor's degree</li> <li>• Certification can be obtained from the National Credentialing Agency for Laboratory Personnel</li> </ul>	Average growth	\$32,300–\$62,500
<b>Process Technicians</b>	<ul style="list-style-type: none"> <li>• Associate's degree</li> <li>• Some have bachelor's degree</li> </ul>	Average growth	\$32,300–\$59,400
<b>Forensic Science Technicians</b>	<ul style="list-style-type: none"> <li>• Associate's, bachelor's, or master's degree</li> <li>• Most states do not have licensing or certification requirements</li> <li>• Must meet proficiency levels established by national accreditation associations for criminal laboratories</li> <li>• Certification can be obtained from the American Society for Clinical Pathology</li> </ul>	Above average growth	\$38,600–\$67,300

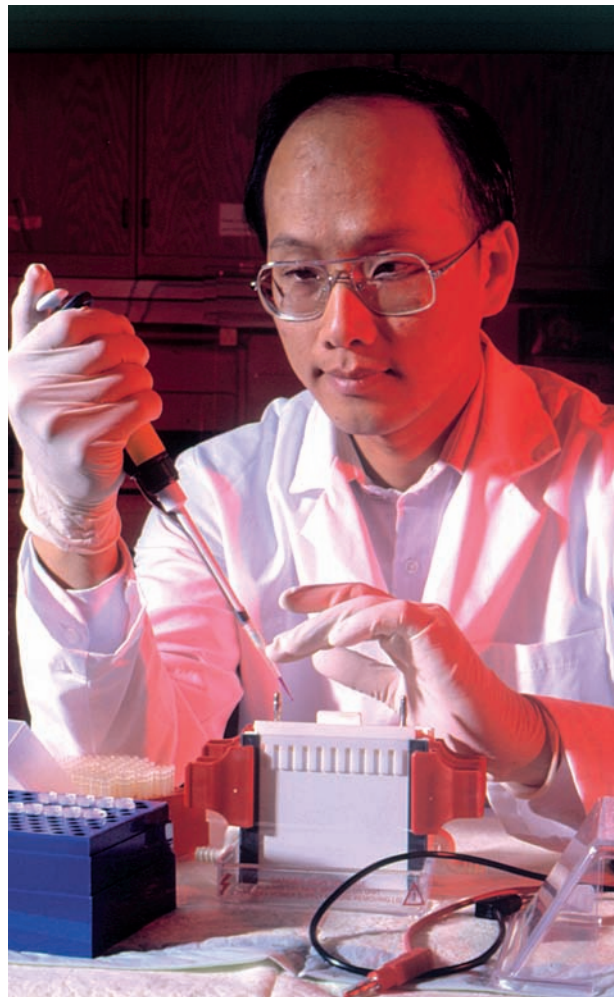
**Biological or medical scientists** study living organisms such as viruses, bacteria, protozoa, and other infectious substances. They assist in the development of vaccines, medicines, and treatments for diseases; evaluate the relationships between organisms and the environment; and administer programs for testing food and drugs. Some work on isolating and identifying genes associated with specific diseases or inherited traits, and perform research to correct genetic defects. Some specialties include:

- ◆ *Biochemists*: study the chemical composition of living things
- ◆ *Microbiologists*: investigate the growth and characteristics of microscopic organisms
- ◆ *Physiologists*: study the life functions of plants and animals
- ◆ *Forensic scientists*: study cells, fibers, and other evidence to obtain information about a crime
- ◆ *Biophysicists*: study the response and interrelationship of living cells and organisms to the principles of physics, such as electrical or mechanical energy

Most biological or medical scientists use research associates and assistants. These associates or assistants must have high-level math and science skills, computer technology proficiency, effective written and oral communication skills, knowledge of aseptic techniques, and laboratory skills.

**Biotechnological engineers (bioengineers)** use engineering knowledge to develop solutions to complex medical problems. They develop devices such as cardiac pacemakers, blood oxygenators, and defibrillators that aid in the diagnosis and treatment of disease; research various metals and other biomaterials to determine which can be used as implants in the human body; design and construct artificial organs, such as hip replacements, kidneys, heart valves, and artificial hearts; and research the biomechanics of injury and wound healing.

**Biological technicians**, working under the supervision of biological scientists or biotechnological engineers, assist in the study of living organisms. They perform many of the laboratory experiments used in medical research on diseases such as cancer and acquired immune deficiency syndrome (AIDS). They also assist in the development, testing, and manufacturing of pharmaceuticals or medications (figure 3-21).



**FIGURE 3-21** Biological technicians perform many of the laboratory experiments used for medical research. (Courtesy of CDC Public Health Image Library/James Gathany)

Biological technicians must be proficient in the use of clinical laboratory equipment and computers. They must also be adept at compiling statistics and preparing research reports to document experiments.

**Process technicians**, working under the supervision of biological scientists or research physicians, operate and monitor the machinery that is used to produce biotechnology products. They may install new equipment, monitor the operation process of the equipment, assess quality control of the finished product, and enforce environmental and safety regulations. For example, a process technician manufacturing drugs for a pharmaceutical company may prepare and measure raw materials, load the raw materials into the machinery, set the controls, operate the machinery, take test samples for quality control,

## TODAY'S RESEARCH: TOMORROW'S HEALTH CARE

### *A robot that performs heart surgery?*

Open-heart surgery is a major surgery. To correct heart defects or blocked blood vessels in the heart, surgeons must saw the breastbone in two, pull back the ribs, and open the thoracic (chest) cavity with an incision that is usually about 1 foot long. In addition, open-heart surgery requires a team of surgeons and other personnel.

Researchers have developed surgical robots that can perform this surgery with less trauma to the patient. A physician makes just three small incisions, called *ports*, into the chest. A tiny video camera is attached to one arm of a robot and inserted into one port. Surgical instruments, such as a scalpel (knife) or forceps, are attached to other arms on the robot and inserted into the other two ports as needed. The physician sits in front of a computer screen showing the images from the camera inside the patient. The physician then uses joystick-like controls to direct the actions of the robotic arms that hold the instruments. The robot never gets tired as physicians do during long and delicate surgeries. Its hands never “tremble” and its movements are exact. It simply follows the physician’s instructions to perform the surgery. The patient recovers quickly and is usually sent home in one or two days.

Currently, robotic heart surgery is still being researched. Different types of robots are being evaluated. Researchers are trying to instill more artificial “intelligence” in the robots being used. However, the future of robotic surgery is promising. Patients with heart defects or disease may no longer have to dread open-heart surgery. A few small incisions in the chest will allow a blocked blood vessel to be replaced and a heart condition cured.

and record required information. Process technicians must use aseptic techniques and follow all safety and environmental regulations during the manufacturing process.

**Forensic science technicians**, also called *criminalists*, investigate crimes by collecting and analyzing physical evidence. Examples of physical evidence include weapons, clothing, shoes, fibers, hair, body tissues, blood, body fluids, fingerprints, chemicals, and even vapors in the air. After the physical evidence is analyzed and preserved, the forensic science technician works with other investigative officers such as police detectives to reconstruct a crime scene and find the individual who committed the crime. Forensic science technicians must be proficient in the use of laboratory equipment and computers. They must also be adept at preparing reports, compiling statistics, and testifying in trials or hearings.

## ADDITIONAL SOURCES OF INFORMATION

- ◆ American Academy of Forensic Sciences  
P.O. Box 669  
Colorado Springs, CO 80901  
Internet address: [www.aafs.org](http://www.aafs.org)
- ◆ American Institute of Biological Sciences  
1444 I. Street NW, Suite 200  
Washington, DC 20005  
Internet address: [www.aibs.org](http://www.aibs.org)
- ◆ Biotechnology Industry Organization  
1225 Eye Street, NW, Suite 400  
Washington, DC 20005  
Internet address: [www.bio.org](http://www.bio.org)
- ◆ Biotechnology Institute  
1840 Wilson Boulevard, Suite 202  
Arlington, VA 22201  
Internet address: [www.biotechinstitute.org](http://www.biotechinstitute.org)
- ◆ Pharmaceutical Research and Manufacturers of America  
1100 Fifteenth Street, NW  
Washington, DC 20005  
Internet address: [www.phrma.org](http://www.phrma.org)

**STUDENT:** Go to the workbook and complete the assignment sheet for Chapter 3, *Careers in Health Care*.

## CHAPTER 3 SUMMARY

More than 250 different careers in health care provide individuals with opportunities to find occupations they enjoy. Each health care career differs somewhat in the type of duties performed, the education required, the standards that must be met and maintained, and the salary earned.

This chapter has described some of the major health care careers. For each career group, levels of workers, basic job duties, educational requirements, anticipated need for workers through the year 2012, and average yearly salaries were provided. Use this chapter to evaluate the different health careers, and request additional information on specific careers from sources listed at the end of the respective career sections. In this way, you can research various occupational opportunities and determine which health care career is most appropriate for your interests and abilities.

## INTERNET SEARCHES

Use the suggested search engines in Chapter 12:4 of this textbook to search the Internet for additional information on the following topics:

1. *National Health Care Skill Standards (NHCSS)*: review the history and development of health care skill standards, and search for additional information on the health science career cluster.
2. *Health care careers*: Search for information on specific careers by entering the name of the career.
3. *Career organizations*: Contact organizations at web addresses listed in each career cluster to determine the purpose of the organization, health careers it promotes, and advantages of membership.
4. *Accreditation Agencies*: Search the Commission on Accreditation of Allied Health Education Programs (CAAHEP) at [www.caahep.org](http://www.caahep.org) and the Accrediting Bureau of Health Education Schools (ABHES) at [www.abhes.org](http://www.abhes.org) to determine which health career programs are accredited by each agency. Research schools in your area that meet accreditation standards.

5. *Schools*: Search for technical schools, colleges, and universities that offer educational programs for a specific career. Evaluate entrance requirements, financial aid, and programs of study.

## REVIEW QUESTIONS

1. Explain the differences and similarities between secondary and post-secondary health care education?
2. For each of the post-secondary degrees listed, state how many years of education are required to obtain the degree. For each degree, give three (3) examples of specific health care careers that require the degree for entry-level workers.
  - a. Associate's degree
  - b. Bachelor's degree
  - c. Master's degree
  - d. Doctorate
3. Differentiate between certification, registration, and licensure.
4. What are CEUs? Why are they required in many health care careers?
5. Name at least four (4) specific careers within each cluster of the National Health Care Skill Standards.
6. What is an entrepreneur? Identify five (5) examples of health care careers that may be an entrepreneur.
7. Choose one health care career in which you have an interest. Use references or search the Internet to list ten (10) specific tasks performed by personnel in the career.
8. Choose one health care career in which you have an interest. Use references or search the Internet to identify three (3) different schools that offer accredited programs in the career.