

# HEALTH CARE IN YOUR WORLD

It's all around you every day

By Colleen M. Sauber



# STAYING HEALTHY

Receiving the care that you need when you are sick—or just to stay healthy—is no simple thing! Each time you go to a clinic or emergency room, you become part of a health care system that employs millions of people. They work as medical assistants, nurses, researchers, therapists, lab technicians, paramedics and doctors, to name just a few.


Those professionals and technicians who help you receive the care you need have all completed varying amounts of training, some learning on the job while others go to school for up to eight years or longer.

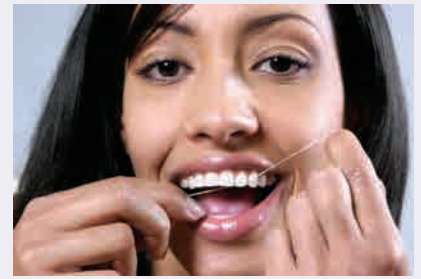
Think about the many ways that you and your family can be impacted by health care. If you visit your grandmother in the nursing home, you see many practitioners in action. If you spend time with your mother and your newborn sibling in the hospital, it's around you. And if you have an accident and need urgent treatment, health care is front and center.

Some health care workers are never seen by patients, such as the person who does the laundry, the engineer who keeps the hospital running smoothly, or the computer expert who makes sure that technical systems work right. In some

cases, they bring care to needy people, such as those who have no health insurance, live in neighborhoods far from a hospital, or do not speak English.

The world of medicine is wide open for exploring career options and tops many lists of hot jobs for today and tomorrow. As the U.S. population ages and as medical technology improves, so will the delivery of health care services change and advance. You and your friends will be the ones who can build careers from the new directions and opportunities that flow from those changes.

Whenever you see health care in action, stop for a moment and think of the many people whose job it is to help care for you when you're sick. They are the caregivers, and their roles are growing more important to us all. 



Your body demands attention every day. Here are some ways to give it what it needs while using health care skills and interacting with caregivers.

- : Eating healthy by snacking on fruit, rather than candy
- : Brushing and flossing your teeth
- : Getting a tetanus booster shot or flu vaccine
- : Taking an x-ray to find a broken bone
- : Getting a new prescription for glasses/contact lenses
- : Icing a sprained ankle
- : Having an annual school physical exam
- : Working with a physical therapist after an injury
- : Having your braces tightened
- : Picking up medication at the drug store and taking it as your doctor ordered
- : Receiving treatment for flu or virus
- : Taking your pet to the veterinarian
- : Testing for blood sugar level if you have diabetes
- : Exercising to keep your muscles strong
- : Wearing a seat belt whenever you're in a car
- : Receiving first aid for a cut or burn



# The Many FASCINATING Fields of HEALTH CARE

**Which health care career suits you best?** By Colleen M. Sauber

Career choices in health care are incredibly varied, and anyone considering this field has a wonderful array of positions to select from. But so many jobs can make it tough to decide which position best matches your interests and aptitude. What to do? Consider your goals and interests. Think about what you want to do, what you're good at and, importantly, what you want to learn about.

Many health care positions serve patients directly, working with individuals, their illness or problem and their family. Yet, taking a job in health care does not automatically mean that you will work one on one with sick people or that you must be able to stand the sight of blood.

Take, for example, the position of clinical laboratory technician or medical records specialist. Much of their work occurs away from the patient. Once a blood sample is taken, it travels to the lab where the technician analyzes it and

**(left) Most health care jobs require excellent written and verbal communications skills because patient care depends upon them.**

reports the results. Once a patient or health care worker supplies information for a medical record, the rest is processed in an office setting.

But if you enjoy talking with people and feel energized by helping someone directly—say, applying a cast, giving medication or teaching how to best manage diabetes and diet—a lab position might not be to your liking. Person-to-person contact may top your list for what's

important in your career, and health care jobs present many fulfilling possibilities.

## Education

Because health care is so diverse, colleges and universities often divide their programs into individual schools. These include schools of medicine, dentistry, nursing, pharmacy, public health, veterinary medicine, and science and engineering. Expertise in biomedicine and health sciences might be combined with computer science and electrical engineering.

There may also be programs specifically geared to the business side of health care, such as hospital administration and human resources. Others may focus on what is called allied health care, which refers to positions that assist doctors and other health specialists and

require far fewer years of education.

Titles in allied health careers often contain the terms technician, technologist,



**Health care settings can vary widely from hospitals and laboratories to homes and the wilderness.**

# PAYCHECKS

The pay scale for jobs in health care differs widely. Here is a sampling of medical professionals and what they were paid in 2004. The good news is that salaries are expected to increase by about 27% between 2004 and 2014.

POSITION	MEDIAN* SALARY IN U.S.
Ambulance driver	\$19,400
Audiologist	\$53,000
Biology teacher, secondary	\$46,100
Biomedical engineer	\$48,503
Chemist	\$57,100
Chiropractor	\$69,910
Clinical laboratory technologist	\$46,700
Counselor, mental health	\$33,400
Dental hygienist	\$59,100
Dental laboratory technician	\$34,600
Dentist	\$129,920
Diagnostic medical sonographer	\$53,600
Dietitian	\$44,400
Embalmer	\$34,700
Epidemiologist	\$52,500
Forensic science technician	\$44,400
Genetic counselor	\$52,380
Health educator	\$39,700
Home health aide	\$18,600
Licensed practical nurse	\$34,700
Medical database administrator	\$61,900
Medical equipment repairer	\$38,600
Medical transcriptionist	\$28,600
Nursing aide, orderly, attendant	\$21,200
Obstetrician and gynecologist	\$145,600+
Occupational therapist	\$55,600
Optometrist	\$88,300
Paramedic	\$25,600
Patent lawyer	\$97,400
Pharmacy aide	\$19,000
Physical therapist assistant	\$38,300
Physician assistant	\$69,200
Psychiatric technician	\$25,700
Psychologist	\$56,400
Radiologic technologist	\$44,700
Registered nurse	\$53,600
Senior government executive	\$141,800
Social worker, child, family	\$35,000
Veterinarian	\$68,300

\*MEDIAN REFERS TO THE SALARY HALF WAY BETWEEN THE HIGHEST AND THE LOWEST SALARIES.  
SOURCE: NATIONAL INSTITUTES OF HEALTH OFFICE OF SCIENCE EDUCATION, SCIENCE.EDUCATION.NIH.GOV/LIFEWORX.NSF/EDUCATION.HTM.



assistant, hygienist, and aide. Although these positions are part of one career group, the schooling, responsibilities and salary among them can be very different.

For example, a high school diploma is needed to become a dental assistant; completion of a technical program is required to become a medical laboratory technician; a two-year associate degree is needed to become a forensic science technician; and a bachelor's degree is a must for a medical technologist.

Whatever schooling you need, financial assistance is a very real possibility. Individual schools and programs can help determine what funds are available.

## Career Fields

Health care careers can be divided into five general groups: therapeutic services, diagnostics services, health informatics, support services, and biotechnology research and development.

Therapeutic services jobs include anesthesiologist assistant, art or music therapist, chiropractor, nurse-midwife, pharmacist and rehabilitation counselor. Diagnostics services feature magnetic resonance technologist, nutritionist, pathology assistant and radiologist. Health care informatics include data analyst, health information coder and medical information technologist.

Support services includes facilities manager, materials management specialist, food service worker, and clinical engineer. Biotechnology research and development,

Many health care positions require a high degree of professionalism and continuous education because science and technology are constantly driving new improvements.

which mostly takes place outside the hospital, includes bioinformatics specialist, cell biologist, quality assurance technician and research associate.

To check out these areas in more detail, visit the National Consortium on Health Science and Technology Education site at [www.nchste.org](http://www.nchste.org) or go to Career Voyages at [www.careervoyages.gov](http://www.careervoyages.gov).

## Training

No skill becomes stale or stays the same in health care! New research findings, technologies and understanding all adds fresh and ever-changing dimensions.

Whichever career catches your attention—one that requires a minimum of a high school diploma, a two-year certification, or a college or advanced degree—your training and your potential for advancement will never stop. Even after you're hired, many positions require a renewable license, certificate or registration. It may mean taking a regular technical or college class, attending seminars, or learning to operate the latest equipment.

But if you're looking for challenge and variety, if you want to feel good about what you do each day and to know that your work makes a difference, you can accomplish all that and more in health care. 🇨🇦



For additional information on health care careers and salaries, check out: Department of Labor Bureau of Labor Statistics, [www.bls.gov/oco](http://www.bls.gov/oco), Career Voyages, [www.careervoyages.gov](http://www.careervoyages.gov).



There is something for everyone in the

# Health Care Industry

Job titles range so broadly that you are only limited by your imagination

- Anesthesiology Assistant + Art Therapist + Athletic Trainer + Bioinformatics Specialist
- Biomedical Engineer + Cardiologist + **CARDIOVASCULAR TECHNICIAN (20)** + Chiropractor
- Clinical Laboratory Technologist + Counselor + Dental Hygienist + Dentist
- DENTAL LABORATORY TECHNICIAN (21)** + **DIAGNOSTIC MEDICAL SONOGRAPHER (10)** + Dietician
- Emergency Medical Technician + **EPIDEMIOLOGIST (11)** + Ethicist + Exercise Physiologist
- HEALTH EDUCATOR (12)** + Health Information Coder + Histotechnologist
- HOME HEALTH AIDE (13)** + Hospital Administrator + Hospital Maintenance Engineer
- INFORMATICS SPECIALIST (14)** + Intern + **INTERPRETER (15)** + Kinesiologist
- LICENSED PRACTICAL NURSE (16)** + Low Vision Therapist + Medical Assistant + Medical Secretary
- Massage Therapist + Nuclear Medicine Technologist + Occupational Therapist + Orthodontist
- Orthopedic Surgeon + **PARAMEDIC (17)** + Pathologist + **PHYSICAL THERAPIST (18)**
- Physical Therapy Assistant + **PHYSICIAN (19)** + Psychologist + Radiologist + Research Associate
- Social Worker + Speech Pathologist + Surgical Technologist + Therapy Recreation Specialist
- Transcriptionist + Transport Technician + Toxicologist + Unit Coordinator + Urologist +
- Utilization Manager + Vascular Surgeon + Venipuncturist + Veterinarian + **VETERINARY TECHNICIAN (21)**
- Work Force Specialist + Wound Care Nurse + X-Ray Technician + Yoga Instructor + Zoologist

There's never been a better time for you to imagine yourself in a health care career. As you get ready to graduate, the health care industry is facing phenomenal growth that translates to many jobs throughout the field. Demand is so hot for some jobs that many employers and schools are making it easier for students to take and finance training. No matter what your interests are or what your personality type is, there's a place for you in

health care. If you enjoy art, music, or sports, there are jobs that use those interests as therapy for people who are recovering from sickness or injury. Joy in helping others translates into jobs that involve care giving. And a love of technology or science can bring alive advancements that improve and extend life. To keep it real, we present 13 young people in a variety of health care careers who tell you what it's like in their own words.





Something for **EVERYONE**

# Diagnostic Medical Sonographer

## What will I do?

Sonographers, also called ultrasonographers, operate special equipment that uses sound waves to produce images to detect a medical problem or monitor a patient's condition. Ultrasonography during pregnancy is the best-known use of these tests, but sonography is also used to check many other parts of the body.

and colleges offer training in diagnostic medical sonography. Another training option is the Armed Forces. High school graduates with math and science skills are good prospects.

## How can I get it?

Colleges and universities offer two- and four-year degree programs, but two-year programs

Many sonographers work in hospitals, but it is also common for them to work in labs or medical centers.

Sonographers position patients on the exam table to obtain the best view and they often spread a special gel on the skin to help the equipment pick up sound waves. They select what images to show the doctor, they take measurements, and they write a basic report on their findings.

Many sonographers work in hospitals, but it's also common for them to

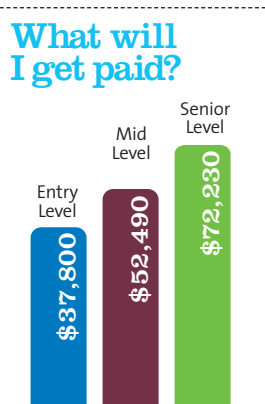
are most common. Sonographers who train in a special area, such as pregnancy ultrasound, often train in other areas as well.

States generally don't require a license for diagnostic medical sonographers, but employers usually hire those who have taken a recognized test that registers them with organizations such as the American Registry for Medical Sonography.

## What will I get paid?

Pay for diagnostic medical sonographers is comparable to other health occupations

requiring a two-year degree. The medium range is about \$52,000 annually. The lowest 10% of salaries were less than \$37,800 while the highest topped out at more than \$72,000.



## What training will I need?

There are several ways to become a sonographer. Many hospitals, vocational-technical schools,



**Ashley Powell, 23**

Cook Children's Medical Center, Fort Worth, Texas

Diagnostic Medical Sonographer

## Q: Why did you select sonography?

**A.** A personal experience got me interested. A close friend had several Pap tests done, and they were all negative. As a precaution, she had an ultrasound done, and it showed a mass on her cervix. A biopsy confirmed it was cancer. The ability of sonography to show the true picture, which enabled the doctor to make an accurate diagnosis, impressed me.

## Q: What training and skills are needed for your job?

**A.** Some states have four-year programs, but I chose a two-year program at El Centro College. Before I could apply, I had to complete certain prerequisites. That took about 12 months. But once I was accepted into the program, it took me about 18 months to finish. Besides formal training, a sonographer needs good communications skills to be able to explain procedures to patients or confer with physicians.

## Q: Describe a typical day in your job.

**A.** I start by reviewing the patient's medical history, lab test results and any previous imaging exams. Once I'm with the patient, I verify the reason for the exam and explain the procedure. Depending on the area being imaged, the exam can take from 15 minutes to an hour. When I'm done, I take the results to the radiologist. We review the ultrasound together in an effort to diagnose the patient's ailment. Conferring with the doctor is really rewarding because I learn something new every time.

PHOTO: TERRY W. WILDER, M.S., COOK CHILDREN'S HEALTH CARE SYSTEM

CHART SOURCE: U.S. DEPT. OF LABOR, BLS



Shannon Doocy, PhD, 27

Johns Hopkins School of Public Health, Baltimore, Md.

Epidemiologist-International Health Specialist

# Epidemiologist

## What will I do?

An epidemiologist is the scientist who identifies outbreaks of disease that can be spread from one person to the next. In this role, the epidemiologist also works to decide what actions are needed to control the disease or outbreak. As a group, epidemiologists are usually divided into two sets:

needs to have at least a master's degree from a school of public health. For certain jobs, the requirement is for a doctorate or medical degree, or about seven to eight years of education. For example, research epidemiologists who perform lab tests often need to be doctors, because patients may need certain drugs.

**Epidemiologists need to be able to work independently and make decisions on their own.**

those who work in research at such places as universities and in schools of public health or medicine, and those who are employed in clinical settings, mainly hospitals. Some epidemiologists who work in hospitals are also doctors.

Epidemiologists need to be able to work independently and make decisions on their own. They use scientific methods and math to solve health problems. They need to listen well and know the right questions to ask.

## What training do I need?

To be an epidemiologist, a person

## How will I get the training?

In the U.S., more than 40 states offer about 140 programs that train people to be an epidemiologist. If a high school

student wants to become an epidemiologist, taking classes in computers and electronics and coursework in biology, math, chemistry and physics is a great step toward that goal.

## What will I get paid?

Typical annual salaries for epidemiologists range from \$45,320 to \$67,160. In 2004, the median salary, or the pay

half way between the highest and lowest salaries, was \$54,800. That year, epidemiologists who earned the highest 10% of salaries made \$82,310.

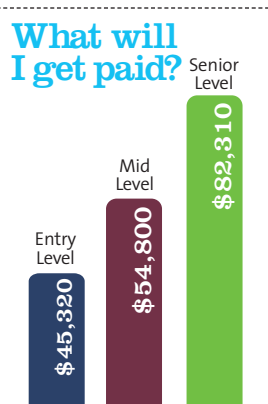


CHART SOURCE: U.S. DEPT. OF LABOR, BLS

## Q: Why did you choose to be an international health specialist?

**A.** When I was in high school, I spent a summer building houses and latrines and fighting public health problems in Costa Rica. The difference between life in rural Latin America and the United States made a big impression on me. I realized how much poverty there was in other countries. I felt that by choosing a career in international health, I would be able to help the most needy people in the world.

## Q: What do you do on a typical day?

**A.** I spend almost half my time traveling in other countries. I work mainly with people who have been adversely affected by wars and disasters. I have worked in Indonesia conducting surveys of people affected by the tsunami, in Sudan looking at nutrition and death rates among semi-nomadic groups, and in Liberia developing safe drinking water systems. When I am not traveling, I teach, write articles, and get ready for new projects.

## Q: What do you like best about your job?

**A.** Knowing that my work helps some of the poorest people in the world is very important to me. I also really enjoy traveling and working with people from all over the world. It's a good reality check.



PHOTO: COURTESY OF SHANNON DOOCY, PHD



Something for **EVERYONE**

# Health Educator

## What will I do?

Public health educators help people and communities adopt healthy lifestyles. They may direct health-related talks at schools, workplaces and community agencies, such as a social services office.

Health educators plan community or agency health programs, set the goals and pick the subjects to be covered. They might test how well a program is doing and make changes to improve it. They also counsel on chronic diseases.

The training of public health educators can vary but typically these educators need a bachelor's degree.

## What training do I need?

The training of public health educators can vary, but typically these educators need a bachelor's degree, requiring four years of schooling, or a master's or doctorate degree, which means additional years of education. The health educator may decide to become certified

as a health education specialist, a certificate offered by the National Commission for Health Education Credentialing. Training doesn't stop there: Every five years, the certificate is renewed after the health educator shows proof of completing 75 hours of approved activities in continued education.

## How will I get that training?

More than 250 colleges and universities offer school or community health education degrees in their divisions of public health. While in high school, a student can begin to prepare by taking classes in biology, math, English and computers and electronics. Because this health care career means working with, teaching, talking to and helping people, coursework in psychology and communications can be very valuable.

## What will I get paid?

Salaries range from \$44,900 to \$53,000 yearly. Public health educators making a salary in the top 10% of the pay scale make over \$68,800.

### What will I get paid?

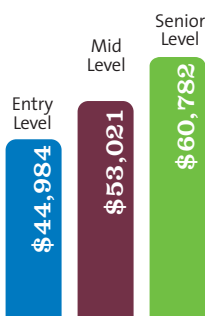
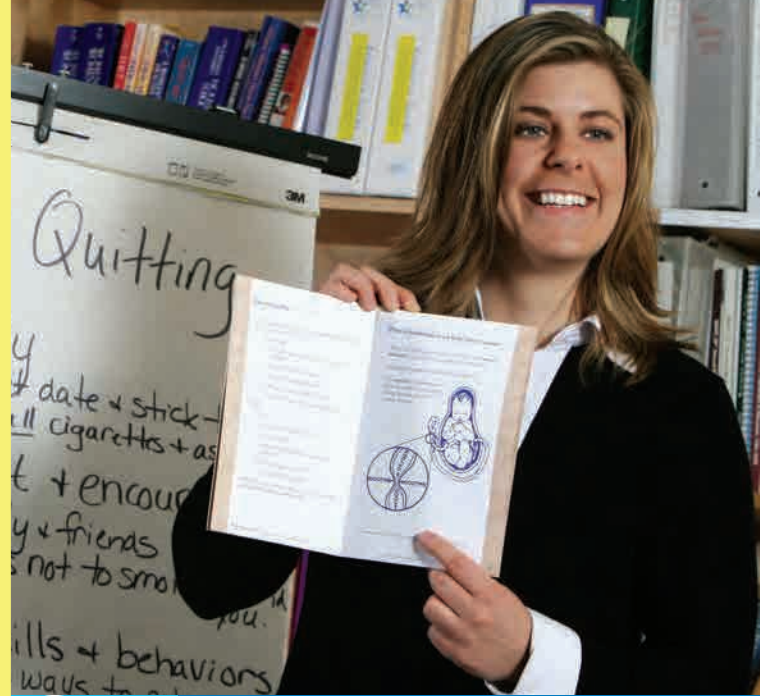


CHART SOURCE: U.S. DEPT. OF LABOR, BLS



**Kate Squire, 33**

Wisconsin Women's Health Foundation, Madison, Wis.

Health Educator

## Q: What do you do at your job?

**A.** I run the First Breath program, which helps pregnant women quit smoking. I travel around the state and meet with the people who counsel pregnant women. They need resources on how to motivate women to make healthy lifestyle choices. One of the challenges our public health nurses and other educators face is how to respond when the client cuts down on smoking but won't quit or she starts smoking again after delivery. We teach our people how to motivate women to stop smoking and how to recognize their successes, such as cutting down from three packs a day to one pack a day.

## Q: Why did you become a health educator?

**A.** Health and wellness have always been interests of mine, and this enables me to learn about many different health issues and how to best communicate them to people. You can work on one issue such as smoking, nutrition or exercise, or you can work on a variety of health issues with a specific group of people. You can work for a corporation, a nonprofit organization or for government. This is a part of health care where you can really find your niche.

## Q: How did you get your training?

**A.** I had never heard about the health education field until after I graduated with a bachelor's degree in biology and chemistry. After three years of working as a lab biologist at a brewery, I went back to school to get my master's degree.

PHOTO: JOHN MANIACI





# Home Health Aide

## What will I do?

Many people who are frail, sick or disabled would prefer to receive their care in the comfort of their homes, rather than a nursing home or medical facility. Comfort is important, but home care also makes good financial sense.

If you are thinking about going into nursing this is a good first step.

Home health care aides are the ones who make it safe and pleasant for patients to stay at home. Under the supervision of nurses or medical staff, home health aides provide basic, yet crucial, health services including checking pulse, respiration and temperature. They also help patients take their medications, bathe and change their position in bed or assist them with moving around the house.

## What training will I need and how can I get it?

Most home health aides are employed by home care agencies. A high

school diploma or equivalent is usually needed, but some agencies hire high school students for part-time jobs. Newly hired aides usually receive classroom training from their employer or they receive on-the-job instruction from licensed nurses or more experienced aides.

Because Medicare covers home care for many patients, the federal government has set a competency test for home health aides. It suggests that training includes at least 75 hours of classroom and practical training supervised by a registered nurse. The National Association for Home Care offers a voluntary national certification for home care aides.

## How much will I earn?

Pay ranges from about \$8.50 per hour to \$10.50 per hour. Home health aides typically get higher pay based on experience and responsibility.

The job can help employees decide if they want to pursue other training as a licensed practical nurse or medical assistant.

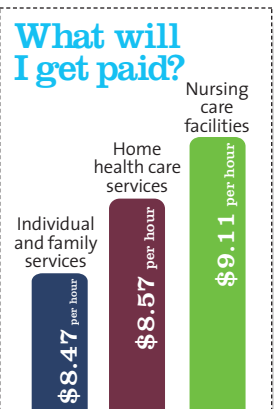


CHART SOURCE: U.S. DEPT. OF LABOR, BLS

PHOTO: SHELLY DONAHUE



## Q: What do you do every day?

A. We go out and see our patients. We do daily baths and oral care and comb hair and take blood pressure, pulses and respirations. Basically, we're doing patient care. On a regular day, we see five or six patients. Most of my patients are elderly, but we also get teenagers and babies. We see people of all ages.

## Q: What training did you do for your job?

A. If you take a certified nursing assistant class through a facility such as a nursing home or a hospice organization it takes about three weeks to a month, full time. We went through courses to learn how to take pulses, respirations and blood pressures. We also learned patient care, getting patients in and out of bed or wheelchair to bed, relocating patients to different areas. We took a CPR [cardiopulmonary resuscitation] class and first aid. A CPR class usually takes a day.

## Q: What do you like most about your job?

A. I like meeting different people every day and the different personalities we come in contact with, and just knowing that you're helping someone, that you're contributing your part. If you are thinking about going into nursing this is a good first step to see if it is something you really like.





Something for **EVERYONE**

# Informatics Specialist

## What will I do?

Informatics is a hard term to pin down, but it basically means turning a vast amount of data into useful information. Informatics specialists then use the information to solve problems or design new technology procedures or products.

**Informatics means turning a vast amount of data into useful information.**

In health care there are two main branches of informatics. One—known as bioinformatics—mainly focuses on molecular topics. The other branch of health care informatics involves larger scale data, such as the study of populations.

Bioinformatics specialists typically work in labs, especially at genetics centers, at universities or for private corporations. An example of the work of specialists in the other type of health care informatics includes detecting cancer trends from a vast collection of medical reports. Another is developing electronic tracking systems or working with financial data.

## What training will I need?

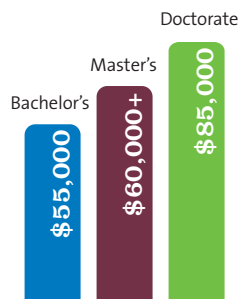
Bioinformatics specialists usually need an advanced degree in a science such as biology or genetics, plus a heavy-duty background in computer languages and programming. A good source for finding schools that offer bioinformatics training is the Bioinformatics Organization, Inc., at [www.bioinformatics.org](http://www.bioinformatics.org).

Students who seek training in the more broad type of health care informatics have several options. Training is available at many ranges for many types of jobs within the field, from technical school degrees to master's degrees and beyond. The American Medical Informatics Association posts a helpful list of training opportunities at [www.amia.org/informatics/acad&training/](http://www.amia.org/informatics/acad&training/).

## What will I get paid?

Solid information on salaries in health care informatics is scarce because the field is so diverse. Pay in both types of informatics generally corresponds to the number of years of schooling and experience.

### What will I get paid?



**Erik Stuckart, 30**

South Carolina Central Cancer Registry, Columbia, S.C.  
**Informatics Specialist**

## Q: How did you become interested in health informatics?

**A.** I was working on a biology degree, and a friend told me about the health informatics degree program at the Medical College of Georgia (MCG). I researched it, and I liked that it included business and computer courses. Plus, I would be able to use my anatomy and biology knowledge.

## Q: What do you do in your job?

**A.** Our office maintains data on all cancer cases diagnosed at hospitals in the state. Large hospitals have their own registries, and they submit data electronically. Small hospitals don't have registries, so they send basic data on diskettes. My job is to make sure everything is added to our central database, which data collectors rely on when they visit the smaller hospitals to flesh out basic data.

## Q: What are your goals for the future?

**A.** I'm working on a master's degree in public health with a concentration in health informatics. When I finish, I want to take on more responsibility on a statistical level. For example, I want to run data through software to create maps and reports that will show which types of cancer occur most often and if the diseases are concentrated in certain communities. The classes I'm taking now in my master's degree program will give me the skills I need. The neat thing about a health informatics degree is that it's flexible.

PHOTO: LOCHLAN K. BASKIN/SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL



# Interpreter

## What will I do?

Medical interpreters listen to what the doctor says and translates that message into the patient's language. In this way, the doctor can ask questions about how the patient feels and the patient can describe what's wrong. An understanding of both cultures

most interpreters have a four-year bachelor's degree. At this time, there is no universal certificate for all interpreters.

## How will I get the training?

Specialized classes are offered at colleges around the country and at training programs in schools other than universities. On-the-job training is very helpful in learning how to share medical information in two languages. Classes will also give training on the culture and its approach to health care.

Medical interpreters listen to what the doctor says and translate that message into the patient's language.

is very important, because a certain expression may mean one thing in one culture and something different in the other. These clues need to be conveyed sensitively.

## What training do I need?

Medical interpreters need to know English plus at least one other language well enough to talk easily in both. To specialize as a medical interpreter, students must learn about medicine, its terms and its tests.

The education to become a medical interpreter can vary, but

## What will I get paid?

Many medical interpreters work in hospitals. Some interpreters are self-employed, meaning that the hospital does not hire the interpreter full time but instead calls when patients need someone who speaks their language. The hospital then pays for the time the inter-

preter gives. Salaries vary from less than \$25,790 to \$43,860. Those interpreters receiving a salary that ranks in the top 10% of salaries make \$57,100.

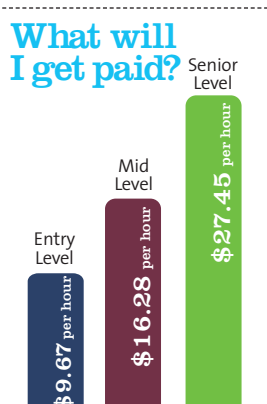


CHART SOURCE: U.S. DEPT. OF LABOR, BLS

## Q: What do you do every day?

A. We are responsible for everything [the patients] need from the moment they arrive in Cleveland. We go to appointments with them and interpret for them. Even if they know the language, we escort them to the appointments. If tests are ordered we make sure they are scheduled. And we tell patients if there's any preparation for the tests. And once the appointments are done, we print their medical records and give copies to them. We carry a pager, and whoever is on call can assist them. If they need a prescription, we help them with the pharmacy.

## Q: What training did you do for your job?

A. Turkish is my native language, and I took English as a Second Language when I moved to the United States. At the Cleveland Clinic, I got training from other employees who had more experience than me. Then, after a year, we had interpreter training for two days and did role-playing, and then we took a test and we got a certificate.

## Q: What do you like most about your job?

A. The best part of my job is helping people. When everything is done, just the look of appreciation on their faces is priceless. I get to meet people and listen to their life stories. It's emotionally satisfying.





Something for **EVERYONE**

# Licensed Practical Nurse

## What will I do?

Licensed practical nurses (LPNs) care for persons who are recovering from a sickness, are disabled or injured or live in a care facility such as a hospital or nursing home. LPNs need to be caring people who are able to make decisions and to observe for, and recognize, signs of health troubles.

LPNs need to be caring people who are able to make decisions and to observe for, and recognize, signs of health troubles.

Wherever they work, LPNs give important basic care. For example, an LPN checks the person's temperature and pulse, draws blood samples and tests them, and helps the person move from a wheelchair to the bed. Also, the LPN adds information to a medical chart and pays attention to written instructions. Usually, LPNs put in 40 hours a week and shifts may include evenings and weekends.

## What training do I need?

An LPN needs a license in nursing. To get this

license means finishing an officially approved program that trains LPNs, which generally takes a year or so, and passing a test on LPN job skills. Classes in chemistry, biology and psychology are usually necessary. Mainly, the focus is on learning basic skills in nursing and knowing how the body works.

## How will I get the training?

About 1,100 centers offer LPN programs. These include technical and vocational schools, community colleges and "junior" colleges that offer degrees for schooling

of about two years. Some high schools and hospitals train students to become LPNs. The schooling involves both class work and clinical training, usually in a hospital.

## What will I get paid?

This area of medicine is expected to grow rapidly as more people become elderly or too ill

to live on their own. In 2002, annual salaries for LPNs paid in the middle of the pay scale ranged from \$26,430 to \$37,050. A low salary was \$22,860; a high salary was about \$44,000.

## What will I get paid?

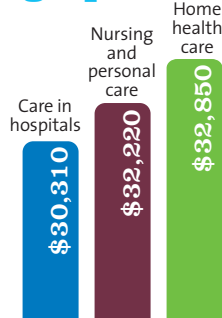


CHART SOURCE: U.S. DEPT. OF LABOR, BLS



**Carlos Camacho, LPN, 20**

Riverside Regional Medical Center, Newport News, Va.

Licensed Practical Nurse



## Q: How did you get interested in nursing?

**A.** Actually I started out in radiology, but I realized right away it wasn't for me. I didn't want to start over, and my mom suggested nursing because there are many areas to specialize in within the field. So I switched to the LPN program at Riverside Regional Medical Center. I liked it immediately, so I knew it was the right move.

## Q: What do you do in your job?

**A.** I work on the orthopedic unit. My duties include taking vital signs, changing dressings, passing out meds, giving massages and assisting doctors as they treat patients. I also help ortho patients with physical therapy. For example, I may go with a patient as he walks around the floor to increase his strength. Or I might teach a patient how to do therapeutic exercises in bed.

## Q: What training did you get for your job?

**A.** I completed an 11-month program that included classroom instruction, lab work and ongoing clinical rotations. In the labs, I worked with dummy patients and classmates who pretended to be patients.

## Q: What are your goals for the future?

**A.** Currently, I'm working on becoming a registered nurse. After that, I plan to get a bachelor's degree in nursing. Eventually, I plan to get a master's degree in anesthesia because I'd like to specialize as a nurse anesthetist.

PHOTO: RICK COVEY



Shaun White, NREMT-P, 26

Hennepin County Medical Center, Minneapolis, Minn.

Paramedic

# Paramedic

## What will I do?

Working closely with emergency medical technicians (EMTs), paramedics manage the health of patients until they can be examined by a doctor to get further help. On any shift, their patients might be a woman having a heart

Paramedics manage the health of patients until they can be examined by a doctor to get further help.

attack, a man who broke a bone in a car accident and a child struggling to breathe.

First paramedics check the patient's overall condition. Then they work quickly to stabilize the patient by stopping bleeding or giving fluids into the patient's vein or using tools to restore a heartbeat. Both paramedics and EMTs follow set rules for medical care.

Paramedics work both indoors and outdoors. Because health care must be available 24 hours of every day and doesn't stop when a work shift ends, paramedics may spend 45 to 60 hours a week on the job.

## What training do I need?

Usually, a paramedic student first becomes an EMT. An EMT has between 110 and 400 hours of training, a paramedic has 1,000 hours or more. A paramedic student must be able to handle the physical parts of the job. Also, they may be registered or certified through different groups.

## How will I get the training?

Paramedic training is offered at many places, such as community colleges, hospitals, technical schools and fire and police academies. Some programs are designed to be part of the schooling for a bachelor's degree of science, or EMT and paramedic training may be rolled into one program.

## How much will I be paid?

Most paramedic jobs pay between \$20,000 and \$33,200.

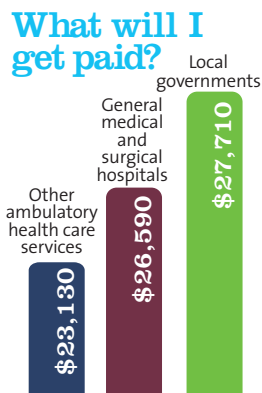


CHART SOURCE: U.S. DEPT. OF LABOR, BLS

Paramedics who were paid a salary in the lowest 10% of wages for this work received about \$15,500; those paid among the highest 10% got about \$42,000.

## Q: Why did you become a paramedic?

A. I'm also a part-time volunteer firefighter for a suburb of Minneapolis. A few years ago, I took an emergency medical technician course and realized there was so much more to learn. So I did a few ride alongs. That's where you ride with an ambulance team to see if paramedicine is something you might be interested in pursuing. I decided it was, so I enrolled in a two-year program in paramedicine.

## Q: What do you do on a typical day?

A. I work the night shift, from 9:30 p.m. to 9:30 a.m. On a typical night, we get between two and 12 calls. A busy night might consist of a couple of heart attacks, a shooting, a car accident, a stroke and a few assaults. My job is to quickly assess the situation and provide emergency treatment to help keep the patient alive until he or she can be seen by a doctor. I'm the front line in emergency care.

## Q: What do you like best about your job?

A. The variety. I play such a vital role in people's care and in their lives. Yet at the same time, I get to drive around a lot. I get to be outside during the summer. I see people on their worst day, and it's really cool if I can help bring a smile to their face.



PHOTO: COURTESY OF HENNEPIN COUNTY MEDICAL CENTER



Something for **EVERYONE**

# Physical Therapist

## What will I do?

Physical therapists help people with mobility problems get on their feet again after sickness or injury. They use exercises and special equipment to help patients get stronger and move better. The goal is for people to take care of themselves in their homes and, if possible, return to their regular activities.

**Physical therapists help people get on their feet again.**

Physical therapists note progress and change the routine as needed. Physical therapists work closely with doctors, nurses and other medical experts. Physical therapists mainly work in hospitals, clinics and nursing homes. Others do most of their work with athletes, kids, people with heart problems or older people.

## What training will I need and how can I get it?

In high school, science and physical education are a good background for a future physical therapist. Because physical therapists must communicate

with many people about a patient's progress, writing and speech are also good courses to take. Some teens volunteer to help their school athletic trainers.

Becoming a physical therapist requires a bachelor's degree, followed by a master's degree in physical therapy. Students start with basic classes such as biology and chemistry. As they progress, they take classes about diseases, how to examine a patient and how to work with patients. At the end of training, students must pass a national exam to get their physical therapy license.

## What will I get paid?

Starting salaries for physical therapists are higher than many other health jobs. The average salary for a physical therapist is about \$60,000. The lowest 10% of salaries are less than \$42,000 and the highest 10% are more than \$88,000. Salary sometimes depends on where the physical therapist works. Those who work for home health care services make slightly more than those who work in hospitals, clinics or nursing homes.

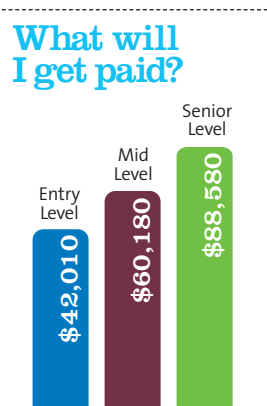


CHART SOURCE: REDMAN-BENTLEY D. JOURNAL OF PHYSICAL THERAPY EDUCATION



**Katie Baick, PT, DPT, 26**

R Adams Cowley Shock Trauma Center, Baltimore, Md.

**Physical Therapist**

## Q: What do you do on a typical day?

**A.** I start my day by reviewing my caseload. After that, I spend the entire day seeing patients. Because I work with patients who have brain and spinal cord injuries, I work with them mostly on functional mobility. I help my patients work on getting out of bed, regaining balance and navigating stairs.

## Q: What do you find most rewarding about your job?

**A.** The relationships I build with my patients. Trauma patients are typically young and most often have been involved in some type of accident—car, motorcycle, diving. The patients I see usually have a traumatic brain injury or spinal cord injury. I see them in the critical state and through rehab. To see where they've been and where they are after therapy is a humongous reward for me. To know I played a part in their recovery is the best part about my job.

## Q: How did you get interested in your field?

**A.** When I was in college, I needed extra money for spring break. So I got a job as a physical therapy aide in an outpatient orthopedic physical therapy office. I was in pre-med at the time. While working there, I realized that doctors have such a brief relationship with their patients, whereas physical therapists can spend weeks, even months with their patients. I knew then that I wanted to spend time with patients.

PHOTO: COURTESY OF MEMMS



# Physician

## What will I do?

Physicians are on the front line of health care. Patients turn to physicians first when they are sick or injured. They depend on their doctors to identify the right clues, order the right tests and, ultimately, make the diagnosis.

Not every doctor can be an expert on every condition, so they often turn to their specialist colleagues when surgery is needed or when more

## Physicians are on the front line of health care.

detailed diagnosis and treatment are needed for a certain part of the body. Doctors also specialize according to the age of the patients that they treat or a specific type of problem, such as mental illness.

## What training will I need?

If you want to be a doctor, doing very well in science and math will help prepare you to take pre-med courses in college. Students typically get a bachelor's degree that includes the pre-med courses, and then they apply to medical school.

## How do I get it?

Medical school takes four years to complete. There are two types of medical schools. The most common ones offer the traditional M.D. degree. There are about 20 medical schools that offer osteopathic training that emphasizes the musculoskeletal system, along with disease and injury prevention. During the first two years medical students take advanced courses in science, diseases, examining patients, ethics and laws. During the last two years they do a broad range of "rotations," under the supervision of their instructors, in hospitals and clinics. After medical school, new doctors must complete an internship and residency that lasts from three to eight years.

## How much will I earn?

Physicians are among the highest-paid medical professionals. Their earnings depend on many factors; among them are specialty,

years of training, hours worked, skill and geographic area. For a new physician, salary ranges from \$137,119 for family medicine to \$259,948 for anesthesiology.

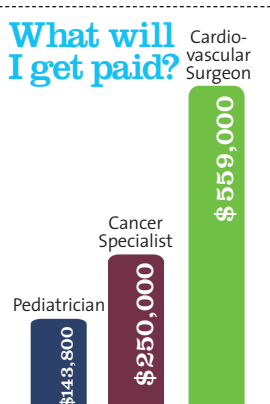


CHART SOURCE: PHYSICIANS SEARCH, ANAHEIM, CALIF.



Kara Odom, MD, 28

San Francisco General Hospital, San Francisco, Calif.

Family Medicine Physician

## Q: What do you do every day?

**A.** Family medicine is pretty diverse, so we do everything from delivering and taking care of babies to taking care of people in our clinic. A typical day might be going into the office at about 8 a.m. and seeing about 10 patients in the morning. Usually, at the lunch hour, we'll have a lecture by various doctors in the community, and in the afternoon, it's usually very similar, we see more patients.

## Q: What training did you need for your job?

**A.** Usually, people go to a four-year college, where most people major in the sciences, but you can major in just about anything you want these days. In college, you take your pre-med courses. Then medical school is four years, and then you enter a residency. Residency is your postgraduate training, and it can range from two years up to 10 years.

## Q: What do you like most about your job?

**A.** My favorite part of my job is that I'm always helping people and teaching them about their health, and trying to work with families and kids to make sure they're living the healthiest life they can. A lot of my job is teaching, and a lot of it is interpreting the science that I know so that it's relevant to my patients.





# Technician

## What will I do?

Technician opportunities in health care offer exciting positions at the front lines of medicine that can usually be had with a two-year degree from a community college. Careers as cardiovascular technicians and veterinary technicians are two examples. Cardiovascular technicians help physicians with certain tests and treatments that involve surgery. They are

hospitals and clinics require a two-year degree; a few schools offer four-year degrees. Those who graduate from cardiovascular technology programs are required to take a certification test. Veterinary technicians may also need to pass a state exam after their training.

On the other hand, medical equipment technicians typically receive their training on the job, though more community colleges are offering specialized training. While certification is not always mandatory for these jobs, employers sometimes prefer to hire those who have passed such tests.

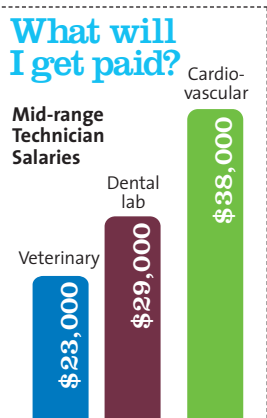
## Most jobs for technicians in hospitals or clinics require a two-year degree.

also trained to independently perform tests that do not involve surgery. Veterinary technicians do many procedures on animals and teach their owners how to keep them healthy.

Then there are the technicians who work in medical equipment laboratories, away from patient settings. These technicians play important roles in making dentures and other custom-made dental fittings, as well as other items that patients depend on.

## What training do I need and how do I get it?

Most jobs for technicians in



technicians make roughly \$29,000, while medical appliance technicians make about \$25,700 and those who work with eyeglasses and contacts make about \$22,000.

## What will I get paid?

A mid-range salary for a veterinary technician is about \$23,000; for a cardiovascular technician, the average salary is about \$38,000. Among laboratory technicians, those who work in dentistry average more per year than those in other medical equipment fields. Dental laboratory



**Kelly Metroka, 24**

Sentara Heart Hospital, Norfolk, Va.

**Cardiovascular Technician**

## Q: What do you do every day?

**A.** We do cardiac catheterization on individuals who come in and possibly have heart disease. At Sentara, cardiovascular technicians work in three different roles with the cardiologists. We pass sterile equipment and help them do the procedure. We monitor and chart the vital signs and the hemodynamics [blood circulation]. We also hand off sterile equipment and give medication under the doctor's orders.

## Q: What training did you do for your job?

**A.** My program was 18 months, but they've shortened it to 12 months. It's a little bit different than going to a university, where you pick your classes. It's all structured for you. You do classroom work and get hands-on experience.

## Q: What do you like most about your job?

**A.** I love the people I work with. I also love the challenge. Every patient is different. Every case is different. Everybody reacts differently to medications. Everybody's anatomy is different.

## Q: What kind of personality types do best in this job?

**A.** I think you definitely have to be outgoing. You have to be able to communicate well, because sometimes things happen suddenly in the lab. You also have to be quick on your feet. I used to waitress, and it reminds me of that. You have to be able to multitask and do everything.

PHOTO LEFT: STEVE MORRISSETTE; PHOTO RIGHT: MARK JACKSON; PHOTO TOP RIGHT: JEFF MYRICK





**Evan Jaroslow, 19**

Precision Ceramics Dental Laboratory, Montclair, Calif.

Dental Laboratory Technician

**Q: How did you get interested in becoming a dental lab technician?**

**A.** I have a friend in the industry, and he arranged for me to visit several labs. What I discovered is that dental technicians blend science, technology and art to create prostheses. I'm pretty artistic, and I was looking for a career where I could create something useful from nothing. So becoming a dental tech seemed like a good idea. Plus the technology they use is pretty amazing.

**Q: What do dental lab technicians do?**

**A.** They create dental prostheses like tooth implants, porcelain crowns, bridges and dentures. The first step is to create a coping, which is the base for the prosthesis. The coping moves through various departments—model, waxing, casting, porcelain, metal finishing and others—to become a finished product. It's actually a complex process that requires highly skilled technicians. What's really great is that most labs provide on-the-job training so a tech can gain those skills.

**Q: What's a day at work like for you?**

**A.** Right now I'm working on a special project that's sort of hush-hush. It involves testing new, digital manufacturing technology that makes copings. I'm working closely with the manufacturer to fine-tune certain elements. The great thing about the technology is that it enables a technician to produce many more copings in a shorter time frame. Once it's released, it's going to revolutionize the industry.



**Kayla Ehling, RVT, 25**

Gardner Animal Hospital, Gardner, Kan.

Veterinary Technician

**Q: What's the most interesting thing you do?**

**A.** Educating clients about how to care for their pets. A lot of people think being a vet tech means working with animals only, but I actually work with people more.

**Q: What do you do on a typical day?**

**A.** We see appointments in the morning, which range from routine vaccinations to yearly exams to sick patients. I take the animal's health history and temperature if needed. I also pull up any meds that are necessary and help restrain the animal during treatment. And I pull blood for lab work and heartworm tests. Of course, I also do a lot of nail trims, ear cleanings, x-rays and lab tests. After morning appointments, I assist the vet with surgery. I prep the surgical site, hook the patient up to an EKG machine and monitor the animal. After surgery, we see more appointments.

**Q: What is the most rewarding part of your job?**

**A.** I really like orthopedic surgery. When an animal comes in with a badly broken leg, I love to help repair it and then over time watch the patient recover and walk again. I also love to see puppies and kittens become healthy adults. It's really exciting to see them turn out so well and know that we played a part.

# 5 Hot Tech Trends in Health Care

## What do nanos, chips and robotics have to do with medicine?

By Lisa Schnirring

**D**o you feel a special thrill when you see newer cell phones and music players getting smaller and lighter? Do you love playing on your computer? Are you someone who thinks robots are really cool?

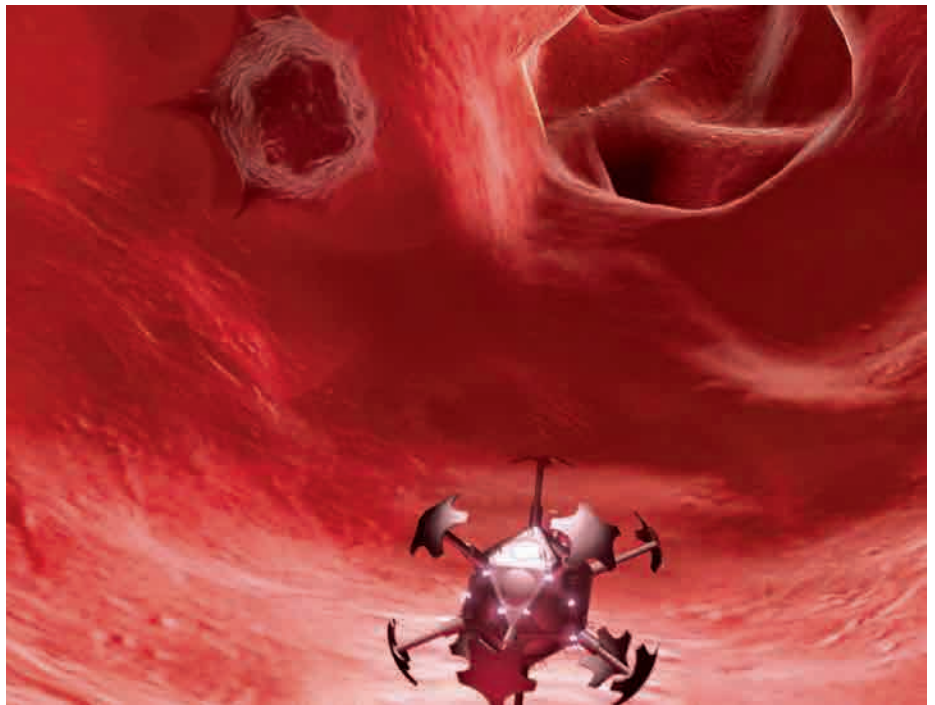
Answering yes to any of these questions is the first step toward picturing yourself in a high-tech setting that is not only fun and challenging but also brings an extra bonus: the warm feeling you get from making people healthier and living longer. That setting is called health care.

Advances in technology are a big reason why the number of health care jobs has exploded over the past decade. New

technology means that doctors can do more for their patients. And the spark that triggered this explosion will promote even more growth across other health care job sectors. Below are five technology areas to consider as you start to think about your health career choices.

### Genetics

Genetics has been in the news a lot. Over the last 13 years scientists have mapped out every gene



in the body. They can now compare the genes of people who are sick with those who are well and identify mutations that may have caused their disease. That technology makes it more likely that researchers will find a cure for many illnesses, from cancer to the common cold.

A whole range of health care jobs involves genetics. There are genetic counselors who work with patients who have concerns about genetic disorders or syndromes. Bioinformatics specialists use sophisticated computer methods to

A nanotechnology diagnostic device may soon be coursing through patient arteries as a new generation of medical instruments are developed and perfected.

explore genetic patterns. Genetic engineers use genes to create new vaccines and other medical therapies.

### Nanotechnology

Science that involves structures the size of atoms or small molecules is called *nanotechnology*. This field has led to exciting new developments in nearly all areas of



PHOTO OF DNA: JOHN HARWOOD/GETTY IMAGES; PHOTO OF NANOBOT: IMMERSION STUDIOS, INC.

life. In medicine, researchers are using these molecular building blocks to create gene therapy and make better drugs that have fewer side effects. Scientists are exploring ways to use nanotechnology to build an artificial red blood cell, which could enhance many surgical procedures and may even be used for battlefield wound treatment.

Most people who have jobs in nanotechnology have advanced college degrees in medicine, biochemistry, microbiology or physics.

## Devices

Traditional medical devices such as pacemakers keep getting smaller and more versatile. New devices are being developed to relieve back pain and even to control overeating. A new class of micro-mini electronic chip is set to dramatically improve and speed the diagnosis of medical problems. One device—called a “lab on a chip”—incorporates nanotechnology and will allow doctors to instantly analyze body fluids, cells and even DNA right in the clinic office. Other microchip uses may involve identifying brain, kidney or liver disorders.

The demand for new products will create many new jobs in the medical device field. Many of these jobs will require college degrees in engineering, though there are several jobs at device manufacturers for mechanical people who are detail oriented and have good dexterity.

## Informatics

Every day in health care, an astonishing amount of information is constantly being collected—details that tally everything from births to blood pressures to sensors in a pacemaker. Advances in computer technology have made it possible to better manage, analyze and make use of all this health data. This has produced a new field broadly known as medical informatics.

“To compare the size of a nanoparticle to the size of a typical cell, think of a grain of sand on a football field.”

—JAMES R. BAKER JR., MD

Director, Michigan Nanotechnology Institute, Ann Arbor



Researchers use specialized computer programs to track disease outbreaks or identify cancer patterns. Others work in research labs and use powerful computers to analyze DNA sequences.

Some entry-level jobs in health informatics require a college degree in computer science. Those who specialize in a certain areas such as public health often seek advanced degrees. Specialists in bioinformatics usually have advanced degrees in one of the sciences plus a strong computer background.

## Robotics

In health care, robots are already a reality. They're not replacing surgeons, but they are helping doctors do more precise procedures that require smaller cuts, produce less blood loss and help patients

recover quicker. Surgeons can use robotic devices to assist with heart bypass, kidney transplant and a growing number of other surgeries. Other uses of robotics in health care are getting closer to reality. Last year the Department of Defense awarded a \$12 million contract to develop a “trauma pod.” It will allow offsite surgeons to stabilize soldiers just minutes after injury. Robotic products that are still in the lab include exoskeleton devices that may someday help provide strength and mobility to people who have physical disabilities.

Jobs in medical robotics often require combined training in computers, engineering or biological sciences. The settings for jobs in robotics include research labs and manufacturing facilities. +

Surgical robotic devices are helping doctors complete more complex and precise procedures, thus speeding patient recovery time by reducing invasive procedures.



# New Products, New Practices

By Fran Howard



**H**ealth care is a field filled with entrepreneurs. Doctors, dentists and veterinarians who open their own offices are demonstrating the spirit of entrepreneurship. Yet, entrepreneurial activity is more often thought of as having a strong element of innovation. That is, entrepreneurs don't just set up shop. They typically set up a different type of business, develop a new service or product, or create a whole new dimension within a field.

Innovative entrepreneurial activity is much less obvious in health care than in other fields, but it does exist. In health care, entrepreneurial activity is

**Entrepreneurial activity is more often thought of as having a strong element of innovation.**

particularly strong in biotechnology, gene therapy, pacemakers and other medical devices and drugs.

TelaDoc, based in Dallas, is an entrepreneurial health care services company. Started to provide low-cost medical care, TelaDoc is part of the movement toward quick and easy access to health care. TelaDoc patients pay a

joining fee, a monthly fee, and a fee each time they use the service. That guarantees a return call from a doctor within three hours. Round-the-clock services provided by TelaDoc are limited to simple conditions for which a treatment can be prescribed over the phone.

Another entrepreneurial company, Preferred Medical Devices, Boca Raton, Fla., recently created a portable urinal, the first innovation in urine collection in 50 years. The device is known as the UrAssist. It is about the size of a small briefcase and will be marketed to people confined to wheelchairs, bedridden in nursing homes, and seriously ill hospital patients. The device replaces bedpans and diapers and consists of a urine holder, hose, bag system and a battery-operated pump.

One of the biggest challenges any entrepreneur faces is funding. Loans from family, friends, and banks are often the main source of funding for early-stage businesses. For-profit companies can also seek funding from investors. The UrAssist device took four years and \$1 million in investment money to create.


UrAssist inventor Edgar A. Otto, 76, was the recipient of the Ernst & Young Entrepreneur of the Year Award in 1997 for an earlier invention. Otto often says of his accomplishments: "Not bad for a kid who finished in the bottom 10% of his high school class." He came up with his idea for the UrAssist while lying in a hospital bed with a life-threatening infection. He knew then that the bedpan could be improved. He imagined a better solution, and then he created it. 

PHOTO OF X-RAY: MALVINA MENDIL / PHOTO RESEARCHERS, INC.; PHOTO OF HEARING AIDE: PHANIE / PHOTO RESEARCHERS, INC.; PHOTO OF FACEMAKER: SCOTT CAMAZINE / PHOTO RESEARCHERS, INC.



# SOLVING MEDICAL MYSTERIES

Wait, don't faint!  
We've got work to do.

By Colleen M. Sauber

**B**y now, millions of people in the United States have seen one or more of the popular TV programs about forensic sciences. The characters in *CSI* and *Crossing Jordan* make almost miraculous discoveries from usually gruesome crime scenes. Such forensic miracles do happen, it's true, but the day-to-day work of forensic specialists is usually more common, not quite as rapid or dazzling, and not backlit by blue light.

Still, crime does happen, and these TV programs have made viewers' imaginations run fast and envious. As they present the intrigue of medical mystery and missing clues, the shows have spurred a notable increase in the number of students considering a career in the forensic sciences.

## Latin Roots

The word forensic comes from the Latin term *forensis*, which refers to "public forum," where the law courts of ancient Rome took place. The field of forensics,

then, is the use of science to assist in legal proceedings. Forensic pathologists and their colleagues work directly with law enforcement officials to detect whether foul play was a factor in an accident or death. Many are state or county medical examiners and regularly testify in court.


Forensics touch on many areas of

science, including cytology (the study of cells like those in blood, muscle and skin) and toxicology (a study that measures alcohol, drugs and other chemicals that might be

found in someone who has died or been injured). A dentist specializing in forensic odontology (the study of teeth as a way to identify a crime victim) may be needed to identify the person who committed a crime if, for example, a bite wound is part of the investigation.

Forensic anthropologists help determine a person's age, sex, height, ancestry and, perhaps, unique features from skeletal remains. Therefore, their expertise is valued when the remains are unidentifiable. Psychologists with forensics training may also be called in to evaluate the mental state of a suspect or to testify on such high-risk behavior as violent aggression.

Sometimes, computer operators help an investigation. When, for instance, a victim's face is partially decomposed, a computer graphics person may fill in missing characteristics by building from the features that are still present. Or a photograph of a young person last seen years ago can be altered to create an image of how he or she might look today.

Anyone who works in the forensic sciences needs to be law-abiding and trustworthy and must have high standards of ethics, conduct and professionalism. So here's a case question that only you can solve: Could a forensic sciences career be a part of your future? 

## MEDICAL SCIENCE & MYSTERIES

Investigate online the Medical Mysteries site, created by the Center for Technology in Teaching and Learning at Rice University, Houston, Texas. It offers interactive adventures in learning as the player takes on the work of scientist, historian and detective. Find it at [medmyst.rice.edu/html](http://medmyst.rice.edu/html).

## Resources on Forensic Sciences

American Academy of Forensic Sciences, [www.aafs.org](http://www.aafs.org)  
 American Board of Forensic Anthropology, [www.csuchico.edu/anth/ABFA](http://www.csuchico.edu/anth/ABFA)  
 American Board of Forensic Odontology, [www.abfo.org](http://www.abfo.org)  
 American Board of Forensic Psychology, [www.abfp.com](http://www.abfp.com)  
 Society of Forensic Toxicology, [www.soft-tox.org](http://www.soft-tox.org)



# Fun Facts

## About Health Care

### 1. How much sleep should a teen get, and how many hours do U.S. teens typically sleep each night?

**Answer:** Sleep helps your body grow, repair and stay healthy. It also keeps your mind sharp. To stay alert all day, most teens need between nine and 10 hours of sleep. However, U.S. teens typically sleep for only six hours a night.

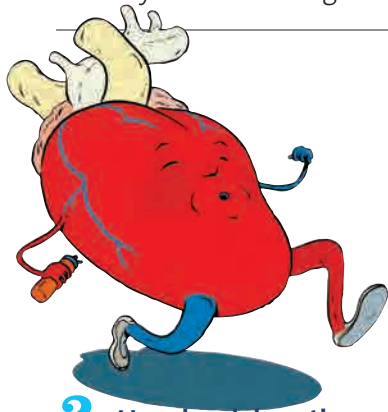


### 8. How might a scientist learn the inner temperature of a mountaineer?

**Answer:** Medical researchers have had climbers swallow a thermal radio pill equipped with a battery, communication coils and temperature sensors. The pill then passed through the climber the same way food does.

### 9. What's the importance of sunscreen?

**Answer:** Sunscreen helps protect skin from getting burned and damaged by the sun's rays and, in doing so, helps cut the risk of skin cancer. To get the most protection, choose a sunscreen with an SPF rating of 15 or higher and apply often.



### 2. How hard does the heart work?

**Answer:** The heart beats about 100,000 times a day, pumping 1,900 gallons of blood, which travels 12,000 miles—or four times the distance from the East Coast to the West Coast. The pressure of a single heartbeat is like the pressure you feel when you give a firm, hard squeeze to a tennis ball.

### 3. Some days, my head feels almost too heavy for my neck. How heavy is it anyway?

**Answer:** The average brain weighs 3 pounds and the average head 8 pounds.

### 4. What does a high-speed Internet connection have in common with an exam of your throat and stomach?

**Answer:** Fiber optics technology. Doctors sometimes use a long, flexible tube with a light and tiny camera to see into the throat and stomach. That tube contains the same type of glass fibers that run through phone lines to bring the Web to your home.

### 5. What is a quarantine and why is it helpful?

**Answer:** Quarantines are meant to protect the public's health and safety by keeping sick people away from healthy ones in order to prevent a contagious disease from spreading. The first quarantine on record occurred in A.D. 549. Since September 11, 2001, 18 quarantine stations have been set up in airports and other places of entry into the U.S.

### 6. What does it take to get rid of a tattoo?

**Answer:** In tattooing, ink soaks into skin cells when the skin is pierced. Getting rid of a tattoo is costly, difficult, and painful, because it requires treatment that takes off the layers of skin that contain the ink.



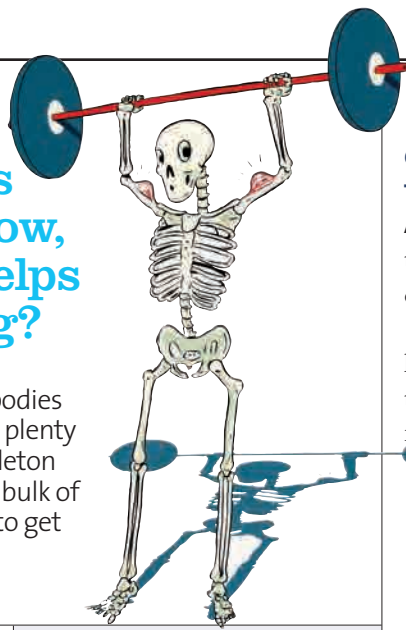
### 7. Colds seem to spread really quickly at school. Why is that?

**Answer:** The average cough comes out of your mouth at 60 miles per hour. A sneeze averages 103 m.p.h. Each time you cough or sneeze you send germs into the area around you, exposing everyone to your cold.



# 10.

How much does a teen's skeleton grow, and what helps it get strong?



**Answer:** By the time girls are 18 years old and boys 19, their bodies contain about 90% of their total bone mass. Besides getting plenty of calcium and vitamin D in food, we can strengthen our skeleton by exercising while on our feet. As we stand, walk or run, the bulk of our upright body puts weight on our skeleton, prompting it to get stronger in order to better carry the weight.

16. How many steps does a person typically take in a day?

**Answer:** The average person takes up to 10,000 steps each day, which adds up to about 115,000 miles over a lifetime—or the equivalent to walking around the globe more than four times.



11. How many students attend medical schools in the United States?

**Answer:** About 67,000 men and women attend U.S. medical schools. In 2005, more than 37,300 students applied to medical school, and of this number, half were men and half were women.

12. What wound treatment was used centuries ago?

**Answer:** Maggots were and still are used to clean wounds and help them heal. These hungry fly larvae eat dead tissue, exposing the healthy tissue underneath, which causes the wound to heal quicker.

13. On days when I feel blue, what can I do to feel better?

**Answer:** Going for a walk often and regularly is one way. The act of laughing and smiling also helps you feel less sad. Children seem to know that laughter is good medicine: usually, they laugh about 150 times a day!



14. Why do some of my friends have many pimples and others have hardly any?

**Answer:** Pimples develop when skin pores, or the small holes in skin, become clogged with dirt and germs. This can happen when skin produces more oil than it needs.

15. My tongue has many little bumps on it. What are these?

**Answer:** They are taste buds, which live about 10 days. They help you know whether a food is salty, sweet, sour, or spicy.

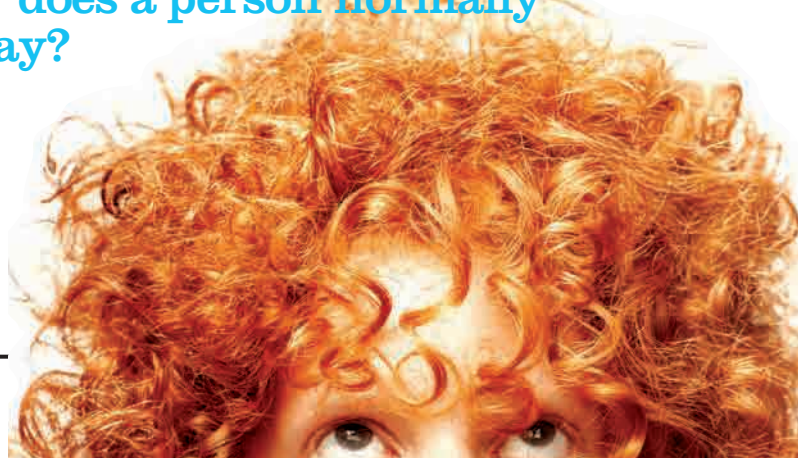
17. Who was the first woman doctor in the United States and when did she become a physician?

**Answer:** Elizabeth Blackwell was the first woman to receive her medical degree, which she accomplished in 1849.

# 18.

My hair is always falling out and often clogs the bathroom drain. How much hair does a person normally lose in a day?

**Answer:** Each of us loses up to 100 strands of hair every day. And every strand tells something about us. From a single strand of hair, scientists can learn details about the person who lost it, including his or her ethnic background.



# Health Care CROSSWORD



## ACROSS

- Cardiopulmonary Resuscitation
- The application of the principles of engineering and technology to the life sciences

- The branch of medicine that deals with injuries or illnesses resulting from participation in sports and athletic activities



- A period of time when people with certain diseases are kept away from healthy people

- A person trained and certified to appraise and initiate the administration of emergency care for victims of trauma or acute illness before or during transportation of the victims to a health care facility via ambulance or aircraft

13

15



- Test used to diagnose for cancer

- Kinesiology is the study of...

- Health professionals sometimes work in a...

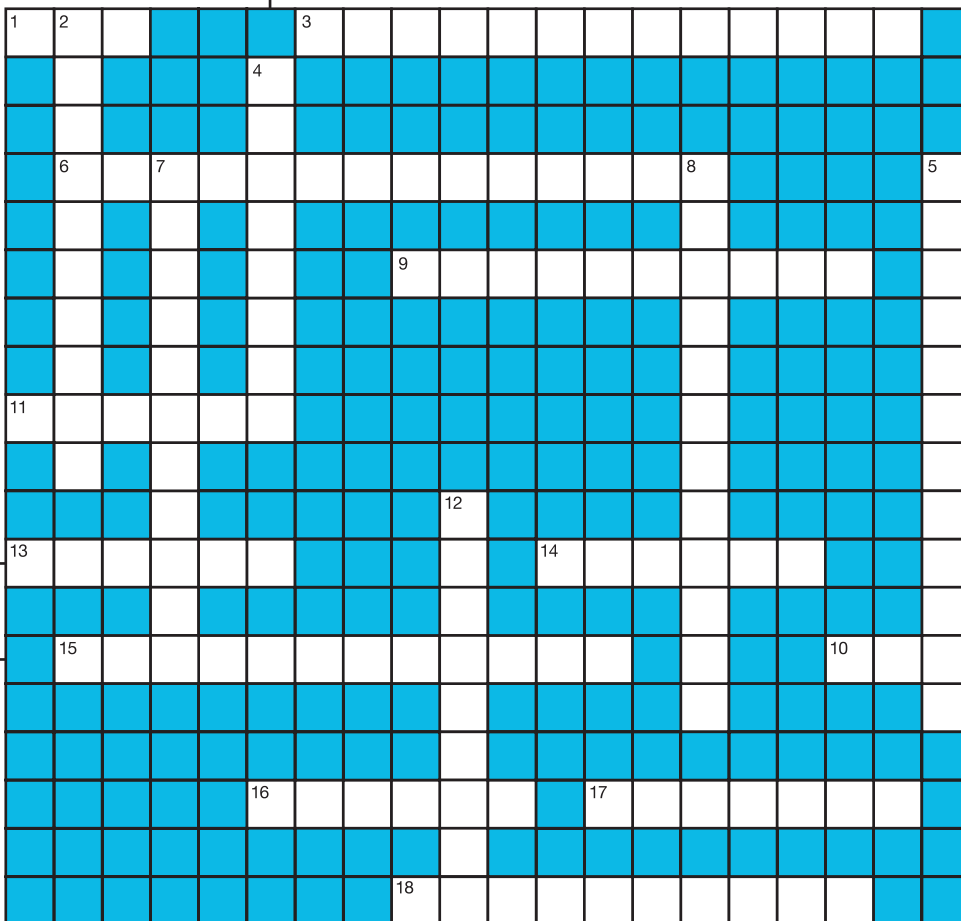
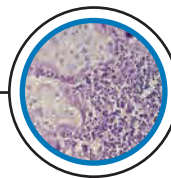
- Type of physician that deals with the care of women during pregnancy, childbirth, and the recuperative period following delivery

- Category of highly skilled health care practitioners who support, facilitate, and compliment the roles of doctors and nurses

- The human body

- Diagnostic or therapeutic test used to image an internal body structure, monitor a developing fetus, or generate a localized deep heat to the tissues

4



## DOWN

- Artificial device used to replace a missing body part, such as a limb, tooth, eye, or heart valve

17



- Study of cells like those in blood, muscle and skin

- The science and art of promoting health, preventing disease and prolonging life through organized efforts of society

- Prevention or correction of injuries or disorders of the skeletal system and associated muscles, joints, and ligaments.

- A person who organizes, operates, and assumes the risk for a business venture

- Last name of the first woman doctor in the United States



10