CHAPTER 7

Medicine and Nursing

After completing this chapter, you will be able to:

- **Recognize the breadth of multimedia applications in health care for medical training, emergency preparedness, and virtual surgery**
- **Understand how health care professionals in your community should be using multimedia computers to prepare for emergency situations**
- **Find out whether your local health care professionals are taking advantage of online resources, videoconferencing, and interactive diagnostic programs**

When life depends on something, people get serious about it. So it is with multimedia and health care. This chapter surveys applications that promise to provide you with better diagnosis when you get sick, more-efficient treatment, life skills to keep you healthy, and, in an emergency, health care professionals who either know what to do about the situation or who can use a multimedia computer to find out what to do before it is too late.

Medical Training

From the $39.95 *The Doctors Book of Home Remedies* by Compton's NewMedia to the $22,000 *American Heart Association Advanced Cardiac Life Support* training system by Actronics, multimedia computers are providing patients, doctors, and nurses with interactive health care training and medical references. Graphic Education's *Interactive Healthcare Directories* lists nearly 2,000 software titles developed for health-related education and reference. These programs cover both professional and consumer subject matter, including medicine, nursing, allied health, staff development, patient education, and health promotion. With the directory, you can quickly locate software covering anatomy, medical terminology, infection control, diabetes, and surgical procedures. Figure 7-1 shows the search screen. To locate titles on a given topic, you type in a key word or phrase. Clicking Quick Search brings up the titles that have your word or phrase in the title or subject fields. For a longer list of titles, you click Full Search to bring up titles that also contain your key word or phrase in the description of the software program. For more information, follow the *Multilit* Web site link to the *Interactive Healthcare Directories.*

The Interactive Patient is a Web site at Marshall University School of Medicine that simulates an actual patient encounter. This teaching tool for physicians, residents, and

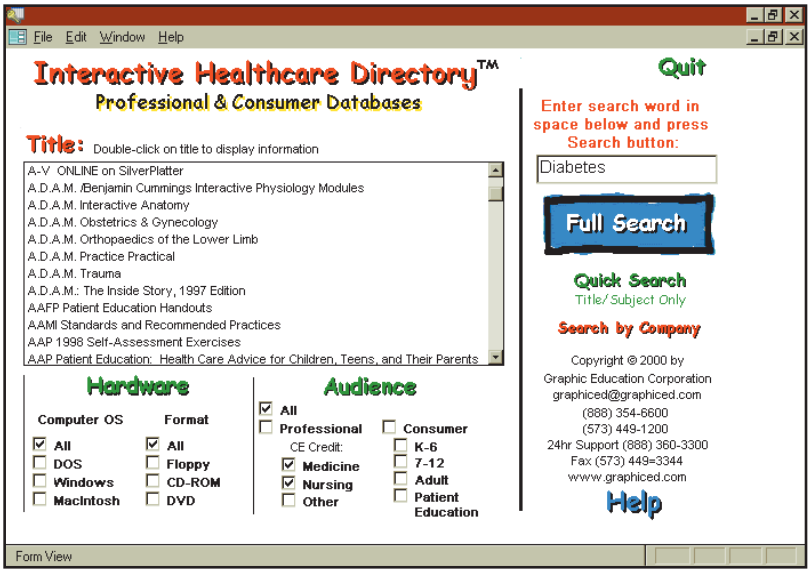

Figure 7-1 Search screen from the *Interactive Healthcare Directories* CD from Graphic Education Healthcare Multimedia.

medical students offers a case with a chief complaint to the user, who must then interact with the patient by requesting additional history, performing a physical exam, and reviewing laboratory data and X rays. After conducting the examination, the user is encouraged to submit a diagnosis and treatment plan. The system promises to evaluate and provide feedback on all submitted answers. To try the case yourself, follow the *Multilit* Web site link to The Interactive Patient.

For more information about nursing online, follow the *Multilit* Web Site links to the Nursing Center, the Sigma Theta Tau International Honor Society of Nursing, and Nurse Practitioner Central.

Anatomy and Physiology

Anatomy and Physiology is a double-sided videodisc from Videodiscovery that comes with a two-volume, 600-page, bar-coded directory. Students can observe the human structure in remarkable detail in the 1,500 3-D animations. Its 3,000 photographs and motion sequences are fully correlated to the nation's best-selling anatomy text. Nine mini-documentaries introduce medical career options and debate various topics. The videodisc also includes the acclaimed Bassett collection of human body dissections. For more information, follow the *Multilit* Web site link to Videodiscovery.

A fascinating place to visit on the Web is the National Library of Medicine's (NLM's) Visible Human Project. The NLM is using body-slicing techniques to create complete, anatomically detailed, 3-D representations of the male and female human body. Transverse CT, MRI, and cryosection images of male and female cadavers have been collected at 1-millimeter intervals. The long-term goal is to produce a system of knowledge structures that will transparently link visual knowledge forms to symbolic knowledge formats such as the names of body parts. To view a sampler of images, follow the *Multilit* Web site link to the Visible Human Project.

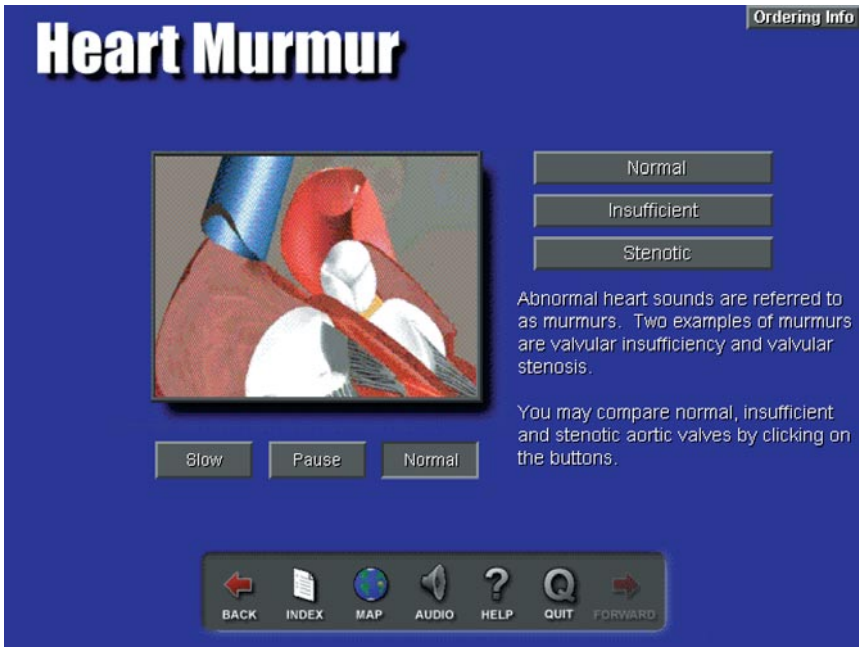

Figure 7-2 The Dynamic Human: The 3D Visual Guide to Anatomy and Physiology by Unk.

The Dynamic Human is a CD-ROM from Wm. C. Brown Publishers containing 3-D anatomical illustrations you can move around, light-up identification for the structures in all 11 body systems, and hundreds of animations showing how your body works. For example, Figure 7-2 shows how you can hear and see the difference between a normal heart and one with a heart murmur. The CD is full of dynamic models like this one, which you can pause at any time or play in slow motion. For a beautifully illustrated overview of the CD's contents and a detailed look at how the CD correlates with anatomy and physiology textbooks, follow the *Multilit* Web site link to *The Dynamic Human.*

Virtual Surgery

Imagine a surgeon using a head-mounted display to rehearse the removal of a brain tumor by moving surgical instruments through a 3-D view of the tumor. Imagine a physician using hand gestures to control tiny robots that swim through your blood vessels and fire lasers to vaporize cholesterol plaques that can cause heart attacks. Imagine being able to take a virtual walk through your body to see how a particular medication acts to prevent an asthmatic attack. According to Merril (1993), all of these scenarios are possible outcomes of current virtual reality research in medical applications. Figures 7-3 and 7-4 show how Merril uses texture mapping to wrap images of actual tissues onto the surface of surgical models.

HT Medical Systems has won many awards for its TELEOS software. TELEOS is the virtual reality authoring system that HT created for producing surgical training

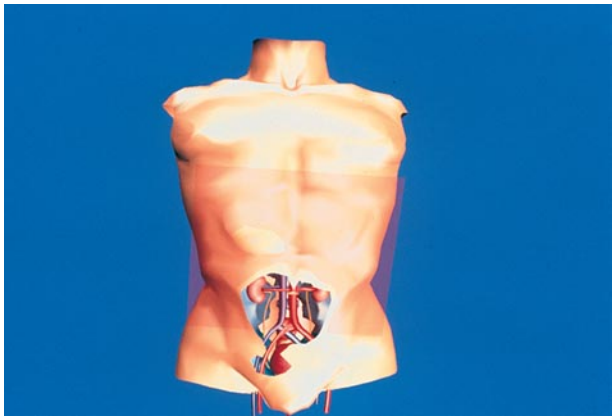

Figure 7-3 Physicians use virtual reality simulations to learn laparoscopic ("belly button") surgery.

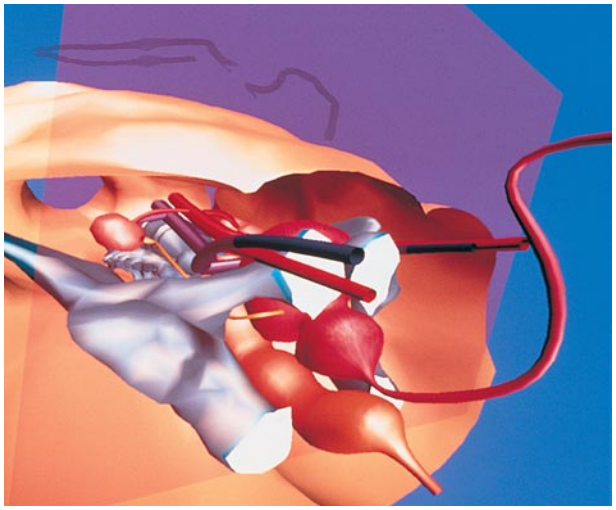

Figure 7-4 Texture mapping wraps images of actual tissues on the surface of surgical models.

simulations. The simulation products include CathSim, a computer-based system for intravenous therapy; PreOp Endoscopy Simulator, a realistic, computer-based system for teaching the motor skills and cognitive knowledge necessary to perform Endoscopy procedures; and the PreOp Endovascular Simulator, which trains clinicians in procedures such as balloon angioplasty, stent placement, and pacemaker leads placement. To get more information and find out what is new, follow the *Multilit* Web site link to HT Medical Systems, and click Products.

Also linked to the *Multilit* Web site is Laparoscopy.com, which uses a multimedia gallery full of sound, graphics, and video to demonstrate numerous types of laparoscopic surgery. You can even watch surgeries live through CUSeeMe videoconferencing.

Videoconferencing Network

Klinck (1993) describes how the Voluntary Hospitals of America (VHA), the nation's largest alliance of hospitals, is building a videoconferencing network to connect its 900 nonprofit hospitals. Based on VTEL Corporation's PC-based videoconferencing technology, the system will enable health care professionals at different hospitals to use videoconferencing for patient diagnosis and treatment. The equipment can capture videotape transmissions of medical images and clinical procedures, which is ideal for providing continuing medical education to physicians and other health care professionals. Doctors can annotate test results, allowing a more personal and immediate diagnosis. The system also permits the use of stethoscopes, EKG units, X rays, teleradiology systems, sonograms, and other medical devices. In time-sensitive cases, VTEL's system can allow for quick decisions vital to saving a patient's life. Figure 7-5 shows how the VTEL videoconferencing for health care model is designed to roll quickly from room to room as needed in a hospital.

For more information about the VHA project and many other health care videoconferencing applications, follow the *Multilit* Web site link to VTEL Online and click the option to see industries and customer profiles.

Figure 7-5 VTEL's HS2000 rollabout videoconferencing system allows for movement between surgical units, and to conference rooms or classrooms.

Online Resources

To allow physicians speedy access to the latest clinical research, the American Association for the Advancement of Science publishes the electronic *Online Journal of Current Clinical Trials.* The National Library of Medicine has endorsed this new online journal by including it in its MEDLINE database and its *Index Medicus.*

MEDLINE is the primary tool for searching medical information relating to health care administration, biomedical research, medicine, surgery, dentistry, and nursing, dating back to 1966. MEDLINE is online at the National Library of Medicine (NLM). Follow the Multimedia Literacy Web site link to the NLM Web site, where you can take MEDLINE for a free test drive, but after that you must pay a subscription fee for continued access.

In 1996, Jim Clark, founder of Silicon Graphics, Inc. (SGI) and Netscape Communications, created a new Internet business called Healtheon, with the goal of using the World Wide Web to help companies link together all of the institutions of care, including hospitals, health insurance companies, doctors' offices, medical labs, and patients' homes. Clark said: "We are providing a standard health care community interface, using the Internet as a medium, and providing services to health care providers" (*New York Times* 6/18/96: C4). Blue Cross & Blue Shield of Massachusetts became the first health care provider to sign on with Healtheon (*Wall Street Journal* 6/26/96: B6).

Just three years later in 1999, Healtheon merged with WebMD. With backing from more than 70 strategic partners, including DuPont, UnitedHealth Care, Merck-Medco, HealthSouth, Microsoft, Intel, CNN and Reader's Digest, Healtheon/WebMD launched its Web site, which is called WebMD.com. Its goal is to lead the evolution of health care and empower its participants by delivering revolutionary improvements to the way

Figure 7-6 Shows how WebMD has portals for consumers, physicians, nurses, health teachers, and administrators.

physicians, consumers, and healthcare institutions communicate, share information, and conduct transactions. Figure 7-6 shows how WebMD has logons for consumers, physicians, nurses, health teachers, and administrators. To visit the site that aims to become the leading Internet-based healthcare network, follow the *Multilit* Web site link to WebMD.

The *Multilit* Web site also links to several other online medical resources, including the National Institutes of Health, the C. Everett Koop Institute, the Harvard Medical Web, HealthWeb, Healthfinder, Yahoo's Health Care Index, and the Medical Matrix, which is an extensive guide to Internet clinical medicine resources.

exercises

1. Your life or that of a loved one could depend on the extent to which your local health care provider uses multimedia in preparing its staff to handle medical situations correctly. Find out whether your local health care facility knows about the *Interactive Healthcare Directories;* ask how many of the interactive video training programs are in place and how many staff members have completed the training.

2. Is your doctor connected to the Internet? Ask about this during your next appointment. Find out how your doctor uses the network to stay current and learn about new procedures, such as by reading the *Online Journal of Clinical Trials.* Ask if your doctor subscribes to WebMD and logs on regularly. If not WebMD, what other online service does your doctor use to keep current with treatments that could one day save your life?

3. List three ways multimedia computers can help you maintain your personal health today. What other ways do you foresee technology being used to help improve your health in the future?