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General Information

A Uniformed Services Career in Medicine

A medical career in the uniformed services is like no other. Matriculation at the F. Edward Hébert School of Medicine of the Uniformed Services University of the Health Sciences (USUHS) involves a commitment to such a career. The practice of medicine as an active-duty officer provides a variety of experiences that offer the opportunity for continuing professional and personal growth.

Although the needs of the services determine specific assignments and places of duty, medical officers have wide latitude in determining the content, direction, and pace of their career development.

Patient care in hospitals and clinics provides specialty training and practice as well as opportunities for clinical investigation. The team concept of medical care in the services permits the physician to practice medicine with the full support of professional paramedical and administrative personnel.

Patient care in peacetime is largely practiced in modern facilities with easy access to colleagues and specialists to consult on problem cases. Although medical officers must be sensitive to the costs of medical care, the care of a patient is never compromised by the patient's inability to pay.

The uniformed services offer many medical career opportunities, including preventive medicine, public health medicine, aerospace medicine, and submarine and diving medicine. Medical officers command most medical units and organizations. The challenge of applying leadership and management skills to medical care and to the

supervision of health care professionals is demanding, yet satisfying. One rewarding aspect of these careers is the opportunity they offer to live and work with the outstanding men and women of the uniformed services.

Uniformed medical officers will find the pay adequate for themselves and their families. Fringe benefits include 30 days of paid vacation annually and a generous noncontributory retirement plan. Medical officers and their families have opportunities to travel, especially during overseas assignments where they may become intimately familiar with new places, foreign cultures, and people.

The decision to become a career uniformed services medical professional should not be made without careful deliberation. Even peacetime assignments can involve substantial personal sacrifice. In wartime, such sacrifices become even greater. Combat requires the exercise of sound medical and military judgment under stress. The School of Medicine does not seek those who expect, or would be satisfied with, an easy professional life.

Above all, successful medical officers must understand the ideals of both the military and the medical profession and see no conflict between them. Only by devoted service to the two professions—medicine and the military—can one gain full satisfaction as a uniformed services physician.

The F. Edward Hébert School of Medicine

History

In 1976 the School of Medicine received provisional accreditation as a four-year medical school from the Liaison Committee on Medical Education (LCME), the accrediting body for all U.S. medical schools, and admitted a charter class of medical students. In 1980, the School of Medicine was given full accreditation and graduated its first class, which comprised 29 students. A full seven-year term of accreditation was awarded to the School by the LCME in 2003.

Since then the medical school has become a national resource, offering challenges unparalleled in health education. The School has attracted outstanding faculty to teach students the knowledge, skills, and attitudes they will require in order to become competent and compassionate medical officers.

By functioning as an educational resource for the uniformed services, the School enables military medical departments to develop graduate level programs in health education. It further enhances the capabilities of the services in developing continuing education programs, contributing to lifelong professional competence. Additionally, through the School of Medicine, military physicians have an opportunity to contribute to academic medicine and research.

Philosophy

The School of Medicine's principal emphasis is on training medical officers for the U.S. Army, U.S. Navy, and U.S. Air Force. Students are selected with the understanding that they will be trained for service to the Nation, including assignments abroad or at sea. Dedication to the idea of service to country must be foremost among an applicant's reasons for coming to the medical school.

Administration

The medical program of the USUHS operates under the Dean of the School of Medicine. The Dean and departmental chairpersons of the School are responsible for working with medical center commanders and the surgeons general of the uniformed services to ensure the adequacy of clinical and investigative programs.

At present, the operational academic elements of the USUHS include the School of Medicine, graduate programs in the basic sciences, and the Graduate School of Nursing; plans allow, however, for the future development of other health sciences programs.

Faculty

The teaching staff of the medical school comprises approximately 2,076 full-time basic and clinical science faculty members; there are 1,433 part-time appointments. The mix of military and civilian faculty varies among departments, and students can expect both military and civilian faculty at all levels of instruction.

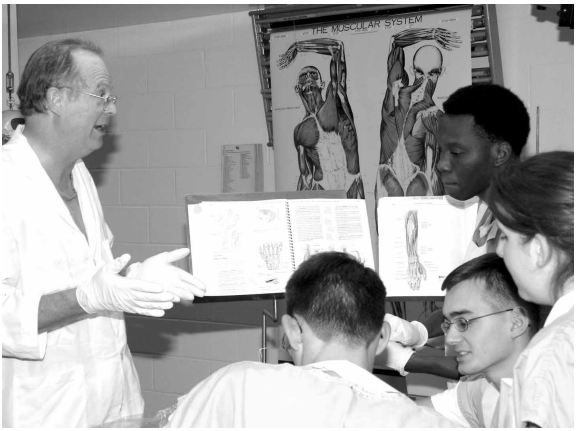
Facilities

The University is located on the grounds of the National Naval Medical Center in Bethesda, Maryland. It is close to major federal health facilities; cooperative agreements between these facilities and the University allow for expanded placements and additional resources that enhance the educational experience of USUHS students.

The university complex, completed in 1979, contains 500,000 square feet of space and has a full range of modern laboratories, teaching halls, seminar rooms, student study areas, and faculty and staff offices. The lecture halls have recently undergone an extensive renovation. In addition, the School has installed state-of-the-art presentation equipment for use by faculty and students.

The Center for Multidisciplinary Services

The Center for Multidisciplinary Services refers to the multidisciplinary laboratory (MDL), a facility that houses a complex of laboratory/teaching rooms in which USUHS students spend a great deal of time during their four years at the School. For example, in most schools, students report to the physiology department for laboratory exercises. At USUHS, every student goes to the MDL for all departmental laboratory exercises; MDL staff members set up the equipment and supplies used in these exercises. In addition, the MDL facility is open 24 hours a day, except when committed for teaching purposes.

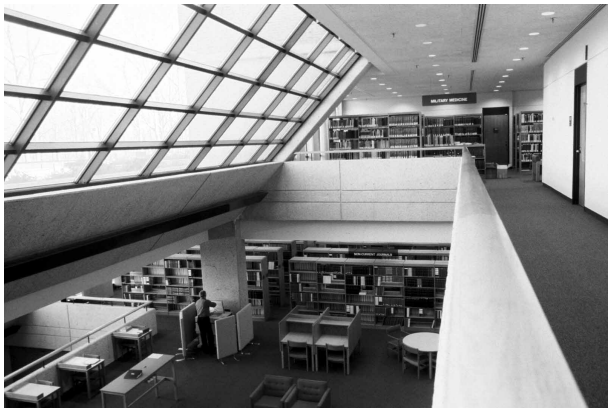


Anatomical Teaching Laboratory

First-year medical students spend a significant amount of time in the Anatomical Teaching Laboratory (ATL), which provides an excellent teaching environment for all anatomy courses. Four students are assigned per cadaver. Students each receive a human skeleton for study. Additional models are available in the ATL for correla-

tion to the dissection being conducted. Each lab bay contains a closed circuit television set for teaching. Computers with anatomical teaching programs and digitized radiographs are also available to students. When anatomy courses are in session, the ATL is open 24 hours a day for study and dissection.

Learning Resource Center



The Learning Resource Center (LRC) supports the information needs of the university community. In keeping with the University's health sciences mission, the LRC houses books, journals, audiovisual materials, a collection on the history of military medicine, and computer resources. Its facilities include computer classrooms and study areas, as well as rooms for small study groups. The LRC webpage (www.lrc.usuhs.mil) provides a guided tour of the center and features its online catalog. Through the LRC site, remote users can access much of the LRC's collection, including electronic books, journals, and indexes, as well as other useful resources for the health sciences professional. Students and faculty receive comprehensive assistance in accessing information through the LRC's mediated literature search and interlibrary loan services through which they can access local, national, and international resources, as well as other information available at U.S. universities and federal agencies. Washington, D.C., has a wealth of science and medical libraries, including the Library of Congress, the National Library of Medicine, and the National Agricultural Library.

Department of Biomedical Informatics

The Biomedical Informatics Department (BID) is the School of Medicine's newest academic department. Organized in 1999, the BID is a focal point for academics related to information technology, education, health care, and research. It has a twofold mission: to promote application of information technology for the betterment of the educational mission of the University and to improve education and research in medical informatics through collaboration and exchange of information.

Biomedical informatics is an increasingly important component of preprofessional and graduate education across the health sciences. Working with the LRC and dean's office, the department introduces students to USUHS information resources. BID personnel also integrate the AAMC's learning objectives for medical informatics across the curriculum.

BID maintains and publishes a range of information resources, including:

- Information about upcoming events—local, national and international—in informatics
- Technical reports and documents from informatics groups
- Technical reports from the LRC and other U.S. Department of Defense components
- Support for the USUHS medical personal digital assistant (PDA) initiative.

Prospective students can visit BID on the web at www.cim.usuhs.mil or use the link on the USUHS homepage under "Academics."

Center for Environmental Health and Occupational Safety

The Center for Environmental Health and Occupational Safety (EHS) is tasked with ensuring all faculty, staff, students, and visitors to the University learn and work in a safe and comfortable environment. As part of this responsibility they further ensure that the University remains in compliance with all federal, state, local, and U.S. Department of Defense regulations regarding environmental matters, so that both the University and the community are not adversely affected by USUHS operations.

The center is manned by eleven navy, army, and air force personnel and four civilian staff members who operate three divisions: Radiation Safety; Industrial Hygiene, Safety, and Environmental; and Occupational Medicine. The Radiation Safety division is responsible for the safe use of radioactive materials in the University and manages the University Broad Scope License with the Nuclear Regulatory Commission (NRC). The Industrial Hygiene, Safety, and Environmental division manages the University's chemical hygiene plan, safety training, indoor air quality evaluations, laboratory safety, and hazardous materials and environmental pollution. The Occupational Medicine division monitors numerous medical surveillance programs, immunizations, on-the-job injury documentation, and other related programs.

The various programs managed by the EHS center are not restricted to the School of Medicine but are university-wide in scope and include other responsibilities, such as maintaining an emergency response capability for radioactive and chemical material accident/incidents as well as providing the cadre of support personnel for all university field exercises.

Information Services Management Center

The Information Services Management Center provides computer support for all university information services (UIS). The UIS center comprises the Customer Support and the Operations divisions.

Customer Support includes the Help Desk Services branch, which has direct responsibility for microcomputer systems and desktop software support, and the Information Engineering branch, which conducts systems analysis and software development.

The Operations division manages the local area network (LAN), including several file servers, electronic mail, and mainframe operations. The University's network infrastructure and Internet connectivity is managed by the Telecommunications branch, which has implemented a state-of-the-art infrastructure that provides high-speed Internet access and focuses on overall connectivity performance issues.

The UIS center manages many other administrative projects, such as technical training of incoming students, employees, and staff. In addition, it oversees many technical contracts for computer hardware and software support and contracts providing for the upgrades of desktop computers within the University through a government-wide leasing program.

Clinical Facilities

Students receive part of their clinical training at four main teaching hospitals affiliated with the University: Walter Reed Army Medical Center, the National Naval Medical Center, and Malcolm Grow USAF Medical Center, all in the Washington, D.C., metropolitan area, and Wilford Hall USAF Medical Center, in San Antonio, Texas. These institutions are recognized as among the military's finest.

Other health resources of the federal government provide additional complementary education in the basic and clinical sciences. These resources include:

- Naval hospitals at Portsmouth (Virginia), Pensacola (Florida), and Jacksonville (Florida)
- USAF regional hospitals at Eglin (Florida), Keesler (Mississippi), Travis (California), and Wright-Patterson (Ohio) Air Force bases
- Army medical centers at Brooke (Texas), Eisenhower (Georgia), DeWitt (Virginia), Martin (Georgia), Tripler (Hawaii), and Womack (North Carolina)
- The National Institutes of Health (Bethesda, Maryland) and the Centers for Disease Control (Atlanta, Georgia)
- The Naval Medical Research Institute, Walter Reed Army Institute of Research, Armed Forces Institute of Pathology, Armed Forces Radiobiology Research Institute, and the U.S. Army Medical Research Institute of Infectious Diseases (Washington, D.C., metropolitan area)

Elective courses are offered in clinical and research facilities in this country and in areas of the world where diseases rarely seen in the United States exist.

Residency programs in all major specialties are offered at these medical centers. Affiliated with the University through joint faculty appointments and common teaching and research activities, these centers have sizable outpatient workloads and together have more than 3,000 teaching beds.

Recreational and Social Activities

Washington, D.C., the Nation's capital, is a city of magnificent monuments and museums, all a short drive or subway ride from the University. The historical cities of Williamsburg, Annapolis, Alexandria, Gettysburg, Philadelphia, Richmond, Baltimore, and Fredericksburg are within three hours or less driving distance for those interested in our country's colonial heritage.

The John F. Kennedy Center for the Performing Arts, Ford's and National Theaters, Arena Stage, and Constitution Hall are nationally known for providing the finest in music, theater, dance, and opera entertainment.

Area military posts and bases offer a wide variety of recreational and social activities for students and their families. Facilities include gymnasiums, golf courses, officers' clubs, tennis courts, craft shops, movie theaters, indoor swimming pools, and bowling lanes.

The USUHS offers competitive athletic opportunities in conjunction with the base's extensive sports program, with club-level teams in a number of sports. These include various running clubs, men's/women's basketball, men's/women's rugby, men's/women's/coed volleyball, hockey, soccer, and ultimate Frisbee. The University also has its own exercise room with equipment available for student and staff use.

Major professional and college sporting events take place in the Washington metropolitan area throughout the year.

The geographic location of the USUHS provides something for every outdoor interest, including ocean beaches for sun lovers and mountains for skiing, camping, and climbing.

The USU Alumni Association

The USU Alumni Association was created in 1978 by students interested in building a special network for uniformed physicians, nurses, and scientists by providing opportunities for USUHS graduates to build relationships with colleagues, to represent alumni views, and to encourage alumni goodwill and intentions to further strengthen USUHS, its faculty, and student body.

The USU Alumni Association sponsors alumni reunions, and provides support for various student activities including graduation ceremonies. It operates the Alumni Store (tel.: 301-295-3686; fax: 301-295-6879; website: www.usualumnibookstore.org), which sells specialized USUHS clothing and variety items as well as reference books for students, faculty, and alumni. The association also aids in providing information for the Class Notes section of the *USU Medicine* magazine.

Research Facilities and Programs

Research at USUHS is administered through the Office of Research or by grant agreements with the Henry M. Jackson Foundation for the Advancement of Military Medicine or other not-for-profit foundations.

The USUHS Office of Research

The Office of Research (REA) reviews and monitors all matters dealing with research at the University. These functions include identification of potential funding sources; pre-award administration; post-award administration; grant award and receipt; administration of the Program for the Protection of Human Participants in Research (PPHPR), including Institutional Review Board (IRB) review and approval; and monitoring of compliance with all federal regulations regarding the conduct of research. Thus the research office staff members serve three communities: faculty and student investigators, the University, and the approximately 80 funding organizations that support university research. The roughly 500 active research protocols at USUHS cover a variety of scientific areas, including basic biomedical areas central to the mission of the Military Health System, such as:

- Mechanisms and control of a wide range of infectious diseases
- Treatment of sepsis
- Topics in combat casualty care, operational medicine, and health education and promotion
- Defense women's health issues
- Projects funded through Triservice Nursing Research
- Warfighter performance factors
- Responses to the various stresses of military life.

The University's intramural grant program is administered through the Office of Research, including staffing support for the School of Medicine's Research Merit Review committee, which reviews faculty applications for intramural funds. In FY03, faculty research under the USUHS intramural program consisted of 87 militarily relevant protocols, 72 clinical research awards, and seven educational projects. Student research awards during the 2002–2003 academic year supported the work of six medical students, 47 Ph.D. candidates and 39 students in graduate nursing. Student applications are reviewed by faculty in the student's division and the appropriate dean, and are administered jointly by the research office and the graduate program offices.

The research office's homepage (www.usuhs.mil/research) provides pertinent, up-to-date, user-friendly information on both intramural and extramural grant opportunities as well as a range of downloadable application and assurance forms. Through the Research Development program, the research office offers support to both new and senior researchers in search of new funding opportunities, assistance with grant writing, and contact with other USUHS investigators with similar interests. The Research Development program also provides access to ResearchResearch®, a database listing hundreds of funding opportunities worldwide available to faculty, postdoctoral fellows, clinical fellows, and students. In addition, ResearchResearch® includes tips on grantsmanship, from matching research interests with a wide range of appropriate funding agencies to writing successful applications.

PPHPR administration also falls under the Office of Research. The Director of PPHPR serves as Executive Secretary to the University's IRB, which is charged with ensuring that all research conducted at the University, involving University investigators, or supported by University-administered funds, comply with federal regulations regarding research with human subjects. In FY03, the program reviewed and approved 202 new research protocols involving human participants and provided ongoing review of more than 200 others.

Many of the University's workshops and symposiums on research-related issues are offered through the Office of Research. Three to four times each year the Vice President for Research offers a 12-week grant-writing workshop for new investigators. The research office also sponsors IRB 101, a full-day course that combines lectures and small-group workshops for investigators who perform research involving human volunteers. Other workshops, panels, and speakers sponsored by the research office have

addressed topics in military research, effective communication of scientific hypotheses and results, technology transfer, military medicine, and emerging issues regarding the protection of the human participants in research.

Faculty Senate Research Day, conducted each year in conjunction with the Graduate Student Colloquium, is also coordinated through the Office of Research. This two-day event includes more than 100 faculty and student poster presentations, several panel discussions featuring a mix of USUHS investigators and investigators from outside the University, and two nationally prominent keynote speakers.

The USUHS Research Program

The University's research program is administered through the Office of Research, in conjunction with the Henry M. Jackson Foundation and other not-for-profit foundations. It covers a range of clinical and other topics important to both the military and public health. Infectious diseases, trauma medicine, health maintenance, and cancer are areas of particular strength. Researchers are also making important new efforts in state-of-the-art fields that cut across disciplines, such as genomics, proteomics, and drug-delivery mechanisms.

Infectious Diseases

USUHS researchers conduct protocols on infectious diseases here in the U.S. and across the globe, developing effective treatments, vaccines, and other preventive measures to contend with an array of pathogens. Technological advances by university researchers have made possible accurate prediction of mosquito population level and transmission risk for a wide variety of mosquito-borne diseases. By using satellite imaging and remote sensing devices, these researchers assist health-related government agencies around the world in predicting and containing high-risk conditions for malaria and similar diseases. Disease-control programs also include work on Venezuela equine encephalitis (VEE), leishmaniasis, and bartonellosis. Basic science investigations of the mechanics of common bacterial infections, such as *E. coli* and *H. pylori,* are uncovering new information about their virulence genes, invasion mechanisms, and countermeasures. Larger, long-range programs focus on understanding and managing HIV, developing effective vaccines for a variety of pathogens, and combating the development and spread of hepatitis C. These programs are funded through a recent, highly competitive National Institutes of Health (NIH) process and by direct federal legislation; they involve collaborations with researchers both within the University and at other research institutions across the country.

Trauma Care

Investigators at USUHS and its affiliated treatment facilities are working on a wide range of advances in trauma care for both combat casualties and accidental injuries here in the U.S. Most efforts fall into one of five areas: (1) control of hemorrhage and attendant shock; (2) blood preservation and delivery (e.g., the effects of cross-linked hemoglobin in traumatic brain injury, global and local responses to profound hemodilution; the effects of various environmental hazards on heme regulation); (3) treatment of nerve injuries and neural healing (e.g., low-power laser irradiation on nerve regeneration *in vivo*; the role of neurocytokines and plasticity in injury and healing in sensory nerves); (4) the mechanisms, treatments, and preventive strategies for endotoxic shock; and (5) wound healing and sepsis control (e.g., characterization of inflammation and its intracellular mediators, and the use of prophylactic intravenous antibiotics for penetrating eye injuries). The larger, long-range programs in trauma care include a congressionally funded program, administered at the University, on the diagnosis and treatment of injuries to the head, neck, brain, and spinal column (Defense Brain and Spinal Cord Injury Program or DBSCIP)

Health Maintenance and Enhancement

University research on effective means of maintaining and enhancing health status focuses on military operational medicine as well as Tricare and civilian concerns about proper exercise, diet, and sleep habits. Behavioral and psychological research also falls

under this category. The University has a nationally recognized, interdepartmental research program for the study and treatment of post-traumatic stress disorder (PTSD), which includes studies of endocrine and physiologic responses in addition to behavioral and psychological investigations. A separate interdepartmental program includes investigations of neurological stress and dysfunction, novel treatments for seasonal affective disorder (SAD), and psychological consequences of physiological stressors such as cardiac surgery. The Human Performance Laboratory, part of the department of Military and Operational Medicine, uses human performance models to investigate the physiological consequences of exercise and physical stress, several endocrine factors that affect performance, and environmental factors such as temperature and pressure (e.g., functional consequences of operations in mountainous regions, deep-sea diving, or prolonged immersion in cold or warm water). Several projects designed to identify and analyze deployment stressors and similar issues related to maintaining and deploying troops are conducted by the Graduate School of Nursing as well as the School of Medicine's departments of Medical and Clinical Psychology, Preventive Medicine and Biometrics, and Military and Emergency Medicine. Long-term programs, often conducted in collaboration with investigators at USUHS affiliates in the Washington, D.C., area, include several projects under congressionally funded efforts, the Triservice Nursing Research Program (TSNRP) and the Coronary Artery Disease Reversal (CADRe) Program, both administered through the University. CADRe consists of an array of studies on the promotion of healthy behavior and lifestyle changes to reduce coronary artery disease and related health problems.

Cancer

The University boasts many cancer-related studies, primarily in the basic sciences but also on the clinical level in conjunction with Walter Reed Army Medical Center. Major programs administered by the University include the Center for Prostate Disease Research, the Clinical Breast Care Project, and the Military Cancer Institute, all of which also fund investigators across the Nation. University investigators conduct basic research in the genomics, proteomics, and other basic science aspects of cancer development, diagnosis, and treatment for multiple forms of cancer, including lymphoma, stomach cancer, thyroid cancer, kidney and liver cancer, melanomas, and cancer of the brain.

Henry M. Jackson Foundation for the Advancement of Military Medicine

The Henry M. Jackson Foundation is a private, not-for-profit organization chartered by Congress in 1983 to support medical research and education at the USUHS and throughout the military medical community. The foundation was named in honor of Sen. Henry M. "Scoop" Jackson (1912–1983; D-Washington).

The foundation administers more than 150 research and clinical investigation projects in collaboration with University academic departments. To assist investigators, foundation staff members identify funding sources and prepare proposals, purchase supplies and equipment, hire research personnel, and provide financial reports and projections. The foundation employs nearly 200 personnel who work at the University directly on research grants and other programs.

The foundation also drafts and negotiates research and licensing agreements and assists with identifying and patenting intellectual property. Technology transfer provides support for additional research and development while promoting the development of new medical technologies. The foundation may also offer the University and its faculty financial rewards and recognition.

To help support medical education and training at the University, the foundation secures and administers funds from private sources to meet special nonbudgeted needs. The foundation has more than 50 special project funds and 30 endowment funds established for the University's benefit. These funds foster graduate and continuing medical education by supporting visiting speakers, seminars, and other events.

The foundation supports research and education at the University and at more than 60 military medical facilities and research institutions across the country. Any qualified researcher may become a foundation guest scientist and have access to its services. All University faculty members are considered guest scientists.

National Capital Area Medical Simulation Center

The National Capital Area Medical Simulation Center uses modern technologies such as computers and simulated patients to teach clinical problem-solving techniques to medical and nursing students, postgraduate trainees, and practicing physicians. Opened in 1999, the 11,000-square-foot center supports USUHS and the three military medical facilities located in the Washington metropolitan area. The center is the first single location to integrate the use of virtual reality (VR) technology, computer-controlled mannequins, and human simulated patients under one roof.

The medical simulation center is divided into four functional areas: the Administrative Area, the Clinical Assessment Laboratory, the Computer Laboratory, and the Surgical Simulation Laboratory. Each can sustain its own educational activities and, when necessary, can integrate the operations of the entire center for a more comprehensive approach. Each functional area has been designed to maximize students' access to clinical experience in a state-of the-art learning environment.

Students enrolled in the Surgical Skills Practicum of the Advanced Trauma Life Support Center use computer-based simulators and plastic models rather than anesthetized animals or cadavers.

Administrative Area

The Administrative Area is the hub of the National Capital Area Medical Simulation Center. It houses the center's administrative offices, including those of the center's director, deputy director, and simulated patient trainer, and the video teleconference (VTC) room. Daily operations, such as personnel, budgeting, and resource allocation, are conducted from this area.

The VTC room is equipped with modern video and teleconferencing equipment. Video signals from anywhere in the medical simulation center can be routed through the VTC room and sent to connected sites anywhere in the world. This allows individuals in remote sites to participate and review many of the exercises that take place in the center.

A telecommuting conference table in the VTC room allows up to twelve students, faculty, or visitors to connect laptops to any of the twelve local area network (LAN) ports for high-speed Internet access. The table is also outfitted with sixteen headphone ports, allowing various audio exercises that permit instructors and students to sample the same audio files simultaneously for review and discussion. As a standard conference room, it is also equipped with slide-to-video converter, document camera, and VCR.

Clinical Assessment Laboratory

The Clinical Assessment Laboratory is designed for teaching and evaluating students in their basic clinical skills: history taking, physical examination, communication, and interpersonal skills. Here, simulated patient encounters provide an ideal transition from the classroom to contact with actual patients. The Clinical Assessment Laboratory also prepares students for the U.S. Medical Licensing Examination. This facility consists of four subsections: the orientation room, an area with clinical exam rooms, the monitoring area, and the standardized patient lounge.

The orientation room is used to brief students. A ceiling-mounted drop screen and LCD projector are used to display PowerPoint and/or video presentations for orientation and registration and to brief students on specific event protocols. Here students are registered for clinical events through a login process that tracks them throughout their activities.

The clinical exam-room area features 12 exam rooms that simulate the clinical environment. There are ten regular exam rooms (120 net square feet or NSF) and two large rooms (220 NSF) with hospital beds, which can be used for inpatient and/or critical care simulation. The large rooms are also suited for trauma simulation and small group instruction.

In the clinical exam area, students encounter live patients (termed "standardized patients") who have been hired and trained to simulate scripted clinical cases in specific outpatient, inpatient, and critical care settings. These clinical cases may be simulated using performance, make-up, or real conditions and sometimes a combination of all three.

Each exam room is equipped with two video cameras and microphones so encounters can be recorded for subsequent analysis. Each room also contains a computer for each patient and a wall-mounted computer located outside of the room; students refer to these for pre- and post-encounter documentation.

Typically, clinical exams are designed in keeping with a directive to achieve specific educational goals. The standardized patient trainers and the medical director collaborate with faculty members to create projects that meet educational goals.

The monitoring area is at the center of the clinical exam area and allows the standardized patient trainer and faculty instructors to monitor the progress of clinical exams. A specialized video router controls 24 videotape decks, which track students as they move from room to room. A touch-screen control panel permits cameras to be positioned for optimal imaging. Faculty and students are able to view recorded tapes as if they were in the room, allowing for more detailed observation and more dynamic feedback. The monitoring area is also used for training simulated patients.

The standardized patient lounge is a staging area for simulated and standardized patients to prepare and relax. This area is required as patients often use theater makeup to simulate traumatic injuries or other conditions.

Computer Laboratory

The Computer Laboratory has two sections—the lab itself and an adjacent control room—and two primary functions. The first function is to identify, develop, and/or use medical education software that improves clinical or medical readiness skills. The second role is to provide an environment in which computer-based, interactive clinical examinations can be administered.

The laboratory has sixteen Internet-accessible workstations that run various medical educational CD-ROMs. Eight overhead cameras and a one-way mirror between the lab and the control room ensure that examinations are properly monitored when the lab is used for testing. Students use the computer laboratory to work with interactive software programs that may be linked to activities elsewhere in the Simulation Center.

Additionally, students can prepare for the National Board of Medical Examiners (NMBE) exam by practicing test questions from several test-prep software packages available in the center. The computer lab meets or exceeds the NBME testing-site requirements. Students and faculty may also use the computers to conduct independent studies or view university mail or class schedules.

The control room, adjacent to the computer lab, is the nerve center of the medical simulation center. All data, voice, and video signals are fed through the control room and can be routed to other areas accordingly. The control room also houses several departmental servers that handle the center's needs.

During testing, the control room operates as a monitoring station for instructors, allowing overall viewing of the computer lab through the one-way-mirrored window or

any of the workstations individually from the overhead camera. Plans are also under way for a high-speed fiber-optic link between the medical simulation center and the National Library of Medicine. The computer control room will house one end of this link. The link will provide the medical simulation center with access to Internet II, which is still in the development stage. This link will be used to test and develop streaming video and other high-bandwidth/high-reliability applications.

Surgical Simulation Laboratory

The Surgical Simulation Laboratory uses VR and a full-scale operating room (OR) mock-up to provide highly realistic scenarios for surgical training. This area is the first site approved to investigate instruction in the surgical skills practicum of the Advanced Trauma Life Support course by using computer-based simulators and plastic models rather than anesthetized animals or cadavers.

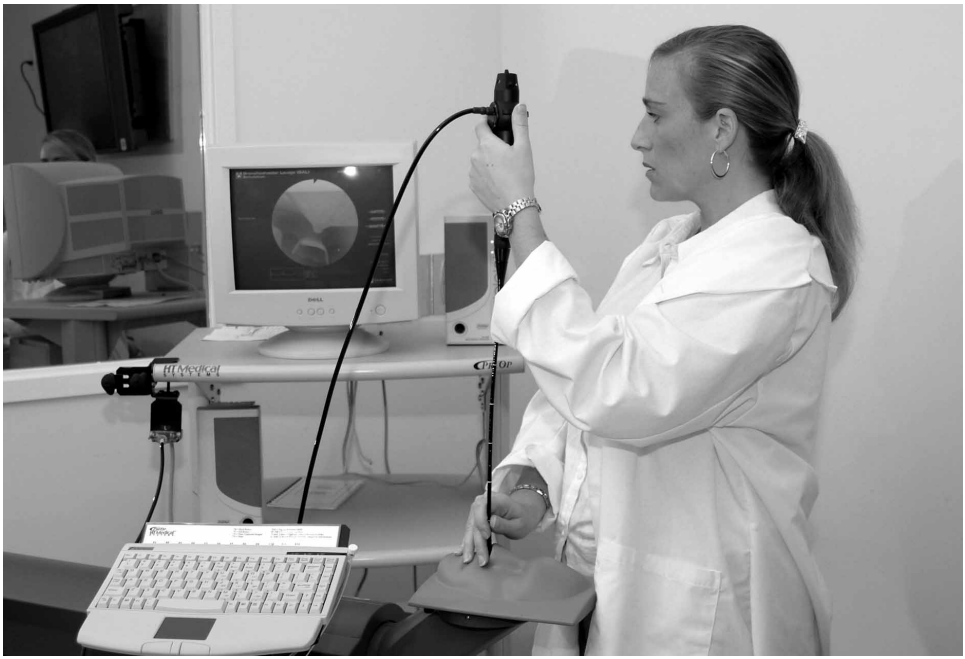
The OR is furnished to look and feel like a typical operating room. In addition to typical OR equipment, the room holds intravenous catheterization, endoscopy, and diagnostic ultrasound simulators. The OR can be configured to match the conditions of a standard OR, an emergency room, or an intensive care unit. Here, a single human patient simulator responds to various drugs and interventions.

Driven by two computers, the human patient simulator can be preprogrammed with patient characteristics or variables, such as age, anatomy, and physiology, depending on the training event. Students are faced with real-life situations as the human simulator breathes out CO^2 and breathes in various gases, depending upon the scripted clinical procedure. The simulator has five palpable pulse areas and exhibits the appropriate physiologic reactions in response to various intravenous or inhaled agents. Presently, there is a capability for 80 different drugs to be “virtually” administered by various computer microchips. The simulator responds to the type and amount of these drugs according to instructor-determined, pre-programmable patient variables.

In the OR control room, a two-way headset and one-way mirror into the OR allow instructors to communicate with the OR coordinator. In the control room, the coordinator can change patient variables on the computer and even speak into a hidden microphone feed on the simulated patient in order to bring more realism to the scene.

Virtual Reality Laboratory

The VR laboratory, a separate facility co-located within the medical simulation center, is funded, in part, by the Association of Military Surgeons of the United States (AMSUS). Its purpose is to develop computer-based surgical simulators to meet the educational objectives of the medical simulation center. Research that advances simulation procedures is also a fundamental directive, as is harnessing the capabilities of existing technologies.



In the VR lab, state-of-the-art computer-based equipment enables students to view medical objects in two or three dimensions. A haptic interface (i.e., a computer-generated tactile experience) permits users to touch, feel, manipulate, create, and alter simulated 3-D anatomic structures in a virtual environment. Here students can teach themselves at their own pace and can feel comfortable about making mistakes as well as repeating an exercise. The VR lab is equipped with simulators for vascular anastomosis, pericardiocentesis, a diagnostic peritoneal lavage unit, and a hand-immersive environment for ongoing research. Both the pericardiocentesis and diagnostic peritoneal lavage simulators were developed in the VR Lab. These two simulators are the first of their kind and are unique to the National Capital Area Medical Simulation Center.