

## War and peace

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**D**uring this century a major task for surgeons of all Western nations has been the care of the soldiers and civilians wounded in wars waged against great cities and entire populations. If this be the century of trauma, surely the wars waged over the surface of the earth these past 80 years have been responsible for some of the most difficult problems in human injury. At the same time they have been associated with remarkable advances in the biosciences and in clinical surgery and medicine.

One would hope that the next two decades and the century to follow will somehow witness a diminution in national conflict as a cause of human injury and suffering. However, to rely on any such hope would be an illusion of false expectations hardly fostered by the headlines of today and everyday.

The maintenance of peacetime military medical capability relates not only to the care of the wounded — combat readiness — but also to the maintenance of the health and morale of our Armed Forces and their families. Peacetime military medicine and surgery, therefore, have a double mission: casualty management and health care.

At the present time our Armed Forces number approximately two million men and women in uniform, and a somewhat larger number of dependents and retirees. This segment of our population (about four to 4.5 million people) requires regular medical care, as does any other. But this care must often be provided in remote places and sometimes in unusual physical or psychological environments. In addition, there is a strategic aspect. Military preparedness relates not only to arms balance and weapons, but also to a clinical understanding of the nature of injury inflicted by current tactical and strategic weapons, and to the education and skill of those entrusted with the care of the wounded and the health maintenance of the Armed Forces in adversity.

In May of 1980 the first class graduated from our first federal medical school, the Uniformed Services University of the Health Sciences School of Medicine. The Army,

Navy, and Air Force now enjoy a steady flow of medical officers, young men and women from all over the country, dedicated to a career in Armed Forces medicine. This flow will be further enriched by officers emerging from the Health Professions Scholarship Program, which operates throughout the medical schools of the United States.

### Changing nature of wartime injury

Predictions of the nature of military casualties in future wars are notoriously unreliable. Anticipating widespread use of poison gas, World War II military officials issued millions of gas masks to the European population, including babies in perambulators. Their apprehensions, gladly, were not realized. The same may turn out to be true for predictions of atomic, chemical, or biological warfare. But we cannot count on this. The same uncertainty holds for a new generation of weapons: high-energy beams and other physical devices of the laser group. We can hope for but we certainly cannot rely on their desuetude.

If, at this time, one were to predict something entirely new to be thrust upon the trauma surgeon by future military action, a possible scenario would be the occurrence of mixed physical and radiation injury, or mixed physical and toxicological injury. Although practical clinical experience in this area is slim, there is enough on hand to tell us that sublethal irradiation together with sublethal physical injury is often lethal. We can be certain that such problems will be a severe challenge to the surgeon and will make the anaerobic infections of World I or the renal failures of World War II seem relatively pale by comparison. The trauma surgeon is going to add nuclear physics, hematology, and molecular immunology to his armentarium.

The ratio of soldiers killed to those wounded in land battle dropped slightly in the Korean and Vietnam actions because, very early after injury, many men who in earlier wars would have died on the battlefield from their wounds were brought to surgical

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care by helicopter. The high survival rate achieved by our military surgeons working with the Army, Navy, Air Force, and Marine Corps was remarkable. It was a tribute, pure and simple, to helicopter evacuation, advanced resuscitation, and prompt definitive surgery.

Helicopter evacuation during the years 1953 to 1973 depended not only on air superiority but also on a virtual air monopoly, which can never be assured again. Some of the old problems of a long-term lapse between injury and formal care may return, and new kinds of whole-body injury may surface.

#### **Collaborative research**

A notable advance of World War II was the establishment of active forward-area research units to deal with battlefield epidemiology, the nature and distribution of casualties, the definition of new or unsolved problems in casualty management, and the development of new surgical methods or practical resuscitative aids for the care of the wounded. Such initiatives went directly from the front lines to the home front and back again.

Simultaneous research on the same topics could be conducted in both places and constantly updated by joint meetings between the civilian and military establishments. These meetings were sponsored by various defense agencies and the National Research Council, and made possible by modern communication and transport. In many instances the work from "up front" identified clinical problems, whereas the work from "out back," in the continental United States, used animal models, which were unobtainable in forward areas, to develop new analytic methods.

American innovation in battlefield military surgical research and related collaboration with the civilian establishment continued during the Korean and Vietnam wars. Much of the early work was supported by the Office of Scientific Research and Development, which was later absorbed into the National Institutes of Health. It was also supported by the Army Medical Research and Develop-

ment Command and the Bureau of Medicine and Surgery of the Navy, which later became the Office of Naval Research.

New concepts in the biology of injury were given early trial at the practical clinical level and suitably modified to achieve the best field results. Theater bloodbanking, the epidemiology of hepatitis, delayed primary closure of wounds, the use of antibiotics and plasma fractions, vascular prostheses, the definition and management of renal failure, and the application of new interventions in respiratory failure all developed over the years 1943 to 1973 as the result not only of wartime pressures but also of this unique concept of joint civilian-military trauma research during war.

Many of the professors of that era, Fellows of this College, fostered this collaboration. Especially prominent in this remarkable development were Dr. E. D. Churchill, Dr. Isidore Ravdin, Dr. Elliott Cutler, Dr. Fiorindo Simeone, and Dr. Henry Beecher, to mention but a few. During the Korean War, Dr. John Howard and his group accomplished the same kind of collaboration, and during Vietnam, Dr. Ben Eiseman and several associates worked with the same objective in mind.

The late A. Baird Hastings had a saying that "the most practical thing in the world is sound basic research." His words have been borne out by the development of nuclear fission and fusion, the use of isotopes, the perfection of plasma fractions, and the isolation, commercial production, and, finally, chemical synthesis of antibiotics.

Since the war years, advances in circulatory and respiratory physiology have continued, cardiac surgery has been established, immunology has developed as a new science in surgery, and recent clues to improved methods of care for certain types of severe head injuries have emerged. Thus new knowledge applicable to national needs in war has continued to flow.

National preparedness in casualty management depends upon ongoing collaboration between military and civilian research units,

a collaboration that also involves the many new trauma centers established throughout the country by the federal government. The military has special expertise in weapons analysis, casualty logistics, and wound ballistics. Military surgeons interested in trauma are, in a sense, full-time field specialists.



**Dr. Charles L. Scudder** (1860-1920), after whom the Scudder Oration is named. Dr. Moore predicts he is "one of the last Bostonian Scudder orators to have known Dr. Scudder personally."

Military surgical research should remain strong and active during peacetime, even though it is constantly threatened by budget cuts and by the pressure for research into tropical diseases or other aspects of military medical care. Surgical research in the military must not be shoved out of laboratories by other interests. The new university in Bethesda should add strength to military-casualty research. It has already staked out interesting projects in this field.

On the civilian side, while some current studies of trauma are in promising areas, other laboratory efforts appear to be preoccupied with old problems, which makes some research subject to the accusation that the investigator does not look up from his research-grant applications long enough to see what the real problems are. For this reason it is refreshing to see analyses of the handling of trauma on a regional basis in the United States, and regional studies of outcomes—the fate of the injured.

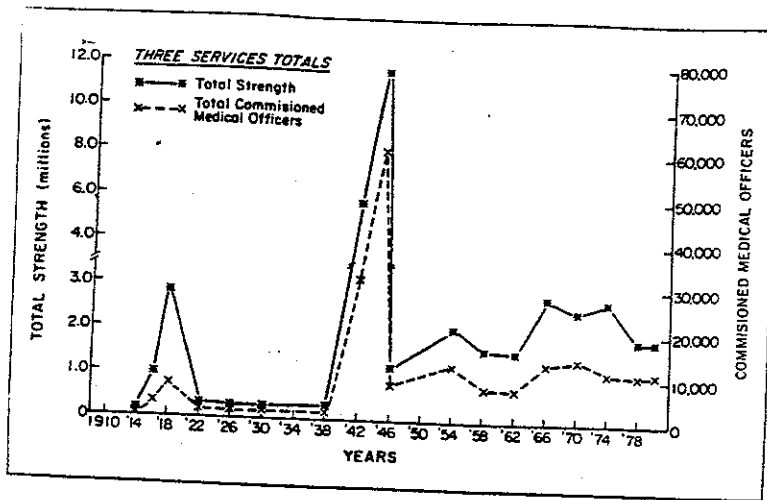
There is an urgent need for such regional evaluation even though it is always controversial and apt to raise hackles. We must be able to compare the effectiveness of various institutions in the care of injured people. The Committee on Trauma of the American College of Surgeons has been a leader in this field. Regional evaluations will improve civilian management and at times teach lessons applicable to military needs. Some trauma in civilian life occurs at random or in isolated locations, while other episodes of trauma occur *en masse*. Both situations are reminiscent of field conditions in war.

### Radiation and physical injury

Research into the effects of combined radiation injury and physical injury appears to be a front-ranking need that can be explored in Defense Department laboratories and by the civilian establishments. Comparatively little is being done in this field, if one may judge from the distribution of civilian research grants, recent publications, papers submitted to the College's Surgical Forum, or research training programs. An outstanding exception is the work of the Armed Forces Radiobiology Research Institute, now an integral part of teaching and research at the Uniformed Services University. Nonetheless, much remains to be done, especially in the surgical sphere.

The simultaneous occurrence of radiation injury and burns, fractures, or soft-tissue injury from missiles results in a powerful combination. Radiation has profound effects on everything the surgical patient needs to survive injury: not only clotting and healing and bone-marrow repair, but also the lung, gastrointestinal tract, kidneys, and the immune system. Important research programs could be set up in civilian surgical departments for long-term study in animals of the effects of radiation on the immunology of wound sepsis, on the physical and chemical details of wound healing, on the use of various types of sutures or prostheses, and on the management of fractures. New methods of treatment might result to tide the patient over a long period of bone-marrow and immunologic suppression pending his own recovery. Such methods would be analogous, in a sense, to the use of the artificial kidney to tide the patient over a period of transient renal failure.

Early in transplant research, now almost 30 years ago, we had the opportunity to perform operations and manage postoperative care for patients who had received sublethal whole-body irradiation. The task was difficult to achieve and sometimes incompatible with survival. The current use of bone-marrow transplantation after marrow deletion by drugs is a model not only for radiation injury but for radiomimetic or mutagenic toxins. Some lymphoma-treatment modes involve such widespread use of whole-body irradiation or immunosuppressive drugs that subsequent operation or sepsis carries an increased morbidity and mortality. Some surgical research groups close to oncology



*Manpower totals for the three services (Army, Navy, Air Force) from 1914-1980. The wartime manpower peaks are evident. Over the past 34 years the strength of the armed services has been at a substantially higher level than it was between the two world wars. The ratio of Commissioned Medical Officers (CMO, scale on right) to Total Strength (TS, scale on left) has remained nearly constant in recent decades at 600 CMO/100,000 TS.*

institutes should take on the study of these patient problems and focus on wound healing and postoperative immune capability.

An important as any one research undertaking is the matter of keeping the military and civilian sides in close touch with each other.

An annual national conference on the care of trauma relevant to military needs should be held. It might be conducted under the joint auspices of the department of surgery of the Uniformed Services University and the Committee on Trauma of the College, or the American Society for the Surgery of Trauma. Its primary purpose would be to establish an ongoing dialogue between workers at defense laboratories, the Uniformed Services University, and the Armed Forces Radiobiology Research Institute on the one hand, and the surgeons, hematologists, immunologists, and basic scientists of the civilian establishment whose work bears directly on the care of injury, both physical and immunologic.

Years ago the Surgeon General of the Army held similar conferences at Walter Reed Army Institute for Research and at the San Antonio-Brooke Army Medical Center, Fort Sam Houston Unit. Now it would seem wise to broaden these conferences to include all Department of Defense laboratories under the leadership of the Uniformed Services University and include the civilian establishment.

#### Medical officer education

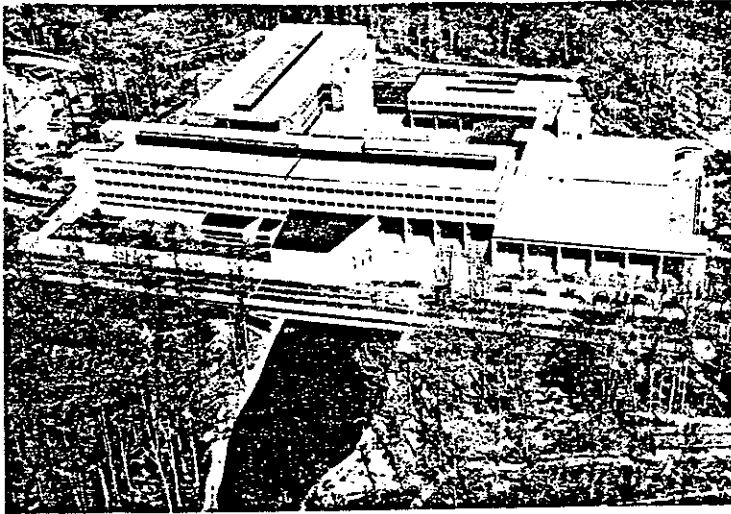
From before Pearl Harbor to after Saigon, a period of 33 years or one-third of this century, medical officers for the military services were enrolled largely through the draft.

Thus for one-third of a century the young physician, dentist, or veterinarian had an unremitting requirement for military service

not shared by any other professional, businessman, or worker. In my own experience with postgraduate education in surgery over 30 years, literally every single one of our graduating residents was forced to cope with the problems or make the most of the opportunities offered by military service. Then, in 1973, with some Berry Plan deferees still entering uniform, the medical draft gradually tapered to zero. With the wind-down of the Vietnam action, it was obvious that difficulty was in store for medical care in the Armed Forces.

On September 26, 1972, Congress passed Public Law 92-426, known as the "Uniformed Services Health Professions Revitalization Act." Some aspects of this legislation had been advanced for years by members of the House and Senate Armed Services committees, but by none more diligently than the late Representative Hebert of Louisiana.

From this bill, two major programs emerged: The Uniformed Services University of the Health Sciences was established, and the Health Professions Scholarship Program was put on an entirely new basis. The late Dr. Anthony Curreri of Madison, Wisconsin, a Fellow of this College and professor of surgery at Madison, was appointed President of the new university. He worked with great effectiveness to appoint his new faculty, and with the backing of the university's Board of Regents, headed by Mr. David Packard (formerly Deputy Secretary of Defense), he guided the university to remarkable progress over its first seven years. Then, just at the moment of his work's first fulfillment, which was to be at graduation in 1980, he died. During Tony's presidency, Dr. Jay Sanford was appointed Dean and has carried forward with characteristic energy that he has transmitted to the whole faculty.



*Aerial view of the main administration and classroom buildings at the Uniformed Services University of the Health Sciences in Bethesda, Maryland. The National Naval Medical Center would be above and to the reader's left. This building includes space for departmental teaching and administration facilities for the first two years of the curriculum, as well as facilities for certain special conferences and other clinical meetings and lectures held during the third and fourth year.*

Begun in makeshift quarters and housed with other facilities of the Department of Defense while new facilities were being built, the university admitted its first class in the fall of 1976. In 1979 the new buildings were completed in a wooded area southeast of the National Naval Medical Center in Bethesda.

An impressive faculty has been recruited, composed of specialists in both pre-clinical and clinical disciplines. The teaching hospitals for the clinical years are remarkable: Walter Reed Army Medical Center, the National Naval Medical Center, Malcolm Grow and Wilford Hall Air Force Medical Centers, and the Clinical Center of the National Institutes of Health. In addition, the students may take elective or clinical courses at a variety of military and public health hospitals and laboratories, including military installations abroad and civilian hospitals at home. A graduate program in the biological sciences has been initiated, and 45 PhD students were enrolled last fall.

Dr. Norman Rich, a Fellow of this College and a member of the Committee on Trauma, is the first professor of surgery. He is in charge of surgical teaching throughout the school and is chief of a surgical unit at Walter Reed Army Medical Center.

The curriculum is also remarkable. It combines a high-quality general medical education with the specific requirements of the Armed Forces. Each student, from day one, becomes an officer in one of the four uniformed services. Prior to the beginning of the first year and again in the second and fourth years, there are special field exercises that provide a realistic understanding of the living conditions of combat and the stresses of the services. Direct hands-on experience in casualty management, initial and final care of

trauma, battle-field pathology, air evacuation, and resuscitation are a part of the clinical curriculum. The course work on the medical effects of nuclear weapons is a unique aspect based on the work at the Armed Forces Radiobiology Research Institute, and it could well be emulated at most of the civilian medical schools.

Over the coming years, class sizes gradually will enlarge to the ultimate strength of 150 to 175 graduates each year. As officers, the students are paid a salary. They have a payback mandate to serve in the Armed Forces, similar to what is required of graduates of the military academies at Annapolis, West Point, and Colorado Springs. Officials anticipate that these students, educated with a strong bias toward the special problems and responsibilities of the uniformed services, will remain in the services for significant periods of time. If 75 to 85 percent remain in the services for 20 years after graduation and if military medical officer requirements remain essentially the same, by the year 2000 about 20 percent of our medical officers will come from the university.

The Health Professions Scholarship Program is an analogous undertaking housed in the civilian medical schools. The program provides students with tuition and a stipend for living expenses and requires a postgraduate residency commitment. It is available to a larger number of students, but officials anticipate that fewer graduates will remain in the Armed Forces. If 20 to 35 percent of the graduates remain in the services for 20 years, another 55 to 60 percent of military medical officers should come from this source. Together the two sources will add up to at least three-quarters and possibly as high as 90 percent of our military medical

strength by the year 2000. The students will have received a fine education and be committed to careers in the uniformed services.

The cost of educating these students is not low. However, as a taxpayer and a surgeon who has witnessed the rising cost of everything in American medicine, I do not believe it is excessive. The cost of these two programs together adds up to about 1/100th of one percent (0.01%) of the defense budget.

It is a tribute to the foresight of Congress that the nation can now look forward to

a future of adequate military care for its young people in uniform, and their families, with at least some degree of equanimity. The student body at the Uniformed Services University is outstanding. Enrollment in the Health Professions Scholarship Program is increasing and will soon reach the level of 1,000 to 2,000 graduates per year. Our nation, for the first time in its history, is educating a group of physicians and surgeons in peacetime who will be prepared to treat military trauma should war again return to the scene.