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SCUDDER ORATION ON TRAUMA

In praise of surgical hedgehogs: trauma and the compleat surgeon

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No family escapes trauma, whether by vehicle, war, or chance accident. My mother and two sisters were killed in a train, a son has been scalped in an automobile and my wife grazed by a deranged man's bullet. My twenty-first birthday was spent helplessly watching friends die of hemorrhage from battle wounds. My twenty-second year was spent attending to compound fractures and incidentally destroying one of the first scientific protocols designed to assess the value of a then priceless new magic powder called penicillin, which I liberally sprinkled into the wounds instead of administering parenterally as intended. Early middle age brought involvement with the mass casualties of the acute civil disturbances of 1967, and later middle age with the more chronic flow of civilian injuries that continue to bedevil our society to this moment. This autobiographical sketch seeks less to establish my own credentials than to personalize the unabated frequency and great variety of trauma that may affect any citizen on almost any day; to gain encouragement and comfort for the future from the great advances in therapy made in one short surgical lifetime as typified by the repair of arteries and the development of antibiotics; and to focus attention on the repayments we fortunate survivors may make through improvement of our medical system.

The ancient Greek poet, Archilochus, said, "The fox knows many things but the hedgehog knows one big thing." About 25 years ago, Sir Isaiah Berlin used this statement as his text for an analysis of Tolstoy's work and character. This now classical study explored the qualities of those with unitary vision who avidly seek to integrate facts and concepts in contrast to those who explore and observe separate facets of a problem and are content to leave them unrelated. I am attempting to transpose this analogy to the surgery of trauma, and to consider its implications for training and subsequent practice.

Quite simply, I wish to advance the virtues of the surgical hedgehog, to plead the cause of unitary vision, to advocate that probably all surgeons and certainly those who treat seriously injured patients be trained as compleat surgeons. As I do so, I hasten to state immediately and urgently that I am *not* advocating a surgeon for all seasons, equally expert in the repair of all structures. I am, however, unapologetically advancing the thesis that the foundation for the training of all surgeons must remain genuinely broad, inquiring, and intellectually flexible, and that the increase in scientific knowledge is no justification for any diminution in our range of interest as we pass into practice. No surgeons today have greater need of a broad and rigorous training than those who declare themselves to have a special interest in the management of trauma. To set the fracture well and ignore the hypoxemia is not good enough; to concentrate on the dilated pupil in the shocked patient to the exclusion of the abdomen is an invitation to disaster; to neglect ventilation for the fascination of an arteriogram is unforgivable.

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Price of fractionation

A frightening fractionation of the patient among specialists of all kinds has become the order of the day. The injured patient propelled past a stellar array of super-specialists without the services of a galactic surgical pilot may be needlessly lost in eternal darkness. It has never surprised me that all the King's horses and all the King's men couldn't put Humpty-Dumpty together again. If Humpty's care had been coordinated by just one person—the King's trauma surgeon—he may well have survived. In a world of multiple injuries, unisystem expertise is unacceptable. The disruption of physiological systems attendant on serious injury has a basic pattern that demands rapid and accurate integration by the surgeon. The complex biological changes in cardiopulmonary function, wound healing, hormonal interrelationships, metabolic activity, and coagulation processes which inevitably occur in severe trauma remain ignorant of the artifically compartmentalized knowledge of assorted medical experts. It is vital that we guard against what Ortega y Gasset calls "the peculiar brutality and aggressive stupidity with which a man comports himself when he knows a great deal about one thing and is totally ignorant of the rest." If surgeons surrender their hedgehog qualities and become dependent on squadrons of imported medical foxes, long domesticated in the quiet fields of elective disease and strangers to the turbulent world of trauma, we shall be guilty of a great disservice to our patients. Furthermore, as surgeons, we shall pay for this surrender with a marked eclipse of the hard-earned respect in which we are held both inside and outside the profession of medicine. The Edwin Smith papyrus reminds us that our origins spring from the field of trauma, and the public, as if impelled by some cultural atavism, continues to expect surgeons to guard them against the hazards of injury. We cannot cease to demonstrate by action and ability our preeminence in the care of the injured patient. And to action and ability must be added availability.

In pleading the cause of the compleat surgeon, I have no wish to turn the clock back or to decry the rise of specialization but I do wish to speak against a conceptual return to the role of barber-surgeon or cutter for the stone, employed and directed by so-called learned members of physic. In England, surgeons first escaped this brutish status in 1745 when our professional ancestors split from the barbers. Although the liberating seeds of a new image were sown by the physiological work of John Hunter over the next half century, a hundred more years had to pass before the birth of Halsted and, with him, the first great flowering of American surgery in which an intellectual dimension was added to a heritage of craftmanship. It would be a shame to squander any part of the birthright of 200 years through mental lethargy, physical inertia, or social isolation.

Charles Scudder himself stated that "special surgery should not be practiced except by those with a sound training in general surgery." The surgery of trauma qualifies as special. I submit that the compleat surgeon must resemble the hedgehog in having a central body of knowledge from which spring spines of information representing different subsets of physiological function, spines capable of moving simultaneously in integrated fashion in defense of the patient. If these symbolic spines are permitted to atrophy through disuse, our successors will inevitably be relegated to the roles of carpenter, handyman, and tinker called in as tradesmen by aristocratic and autocratic intensivists, respiratory therapists, medical nutritionists, and assorted antibiotic gurus. In my more paranoid nightmares, I sometimes see us moving through hospital corridors

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mournfully singing a parody of the indentured man's song in "Showboat,"

"Stitch that wound, open that tummy,
Do that 'trach,' hurry up, Dummy,
Pass that 'scope, crack that head,
Hey, don't think—Halsted's dead."

Meeting society's needs

As we review our role, we also need to examine a further dimension without which no one can qualify as the truly compleat surgeon —a societal dimension. We are surgeons bound together by an interest in the treatment of the injured and we do well to pause for a moment to ponder a few questions both about ourselves and about our patients. Are we not exofficio our injured brothers' keepers? Does our responsibility begin before the patient is hurt? Should our compleat surgeon be involved in the affairs of society? Do we as surgeons and as a College have new societal obligations consonant with the changing expectations of our fellow citizens? Should we be urgently seeking objective evaluation of the results of our treatment? Should we be studying the economics of injury in an altruistic manner, hoping to reduce the burden to the taxpayer? Can we insist on the definition, establishment and maintenance of standards, refusing to accept the laissez-faire doctrines of transient bureaucrats who deal in inanimate statutes rather than in raw human suffering? I believe the answers are self-evident and all in the affirmative, but the task is arduous and the necessary self-criticism discomforting.

Consider first the size of the problem we confront. You have heard the litany often, yet not often enough. Perhaps as surgeons, we should on Scudder Day think of our civilian dead much as we think of our war dead on Memorial Day. In 1977, 104,000 Americans died in accidents. Of these, 49,500 died in motor-vehicle accidents, an increase of five percent over the previous year, and at least half of these accidents were alcohol related. About 10.6 million were disabled, of whom 390,000 suffered some degree of permanent impairment of function. These accidents cost about $61.5 billion. While chronically fearful of cancer and acutely aware of cardiovascular disease, our citizens seem unable to remember that trauma is our greatest killer between the ages of one and 38 when our families are young and vigorous and full of promise. Within an hour, another ten will have died of injuries.

The automobile's impact

Let us consider the automobile. To many, the automobile epitomizes the United States today. Yet as recently as 1894, there were only four cars in this country, and it was not until March 1896 that the first automobile was seen on the streets of Detroit. C. B. King, 32 years old, traveled down St. Antoine Street to Jefferson Avenue (where a man named Henry Ford has since built his Renaissance Center) to Woodward Avenue, subsequently to have what I understand was the world's first automated traffic light, and on to a square named Cadillac—all at six mph before the car expired. Three years later, the first of millions of auto fatalities occurred in New York City.

Possibly more than any other group in those early years, physicians saw the social value of the automobile. They soon recognized that they were able to visit many more patients much more rapidly over a greater area, and conversely receive more casualties more rapidly from an even wider area. In 1903, Dr. Nelson Jackson of Burlington, Vermont, made the first cross-country trip by car from San Francisco to New York in 63 days, 19 of which were spent waiting for parts. Within a few years, medical journals were publishing papers on the hazards of driving. The April 1907 issue of *The Lancet* contained a discussion of the drinking habits of the drivers in what was called the motor omnibus, stating "in the interest of the public security, it is not too much to demand that men while in the actual discharge of such responsible duties should not be permitted to take alcoholic liquors." You know the rest of the story only too well. Nahum's biblical injunction that the "chariots shall rage in the streets, they shall jostle one against the other in the broad ways, they shall run like lightnings" has come to pass.

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Now that we have become mechanized nomads with 20 percent of us moving our homes each year, the automobile is our caravan. Many of us die in the automobile; some live in it; a few are even conceived in it. The fact is that we have lost more young men in the past decade on the roads than we lost in Vietnam and Korea combined. And yet we continue to refuse to wrestle with the problem of the drunken driver or to take strong, considered, sustained stands on automobile safety even though we, more than anyone, see the plight of the victims. And now we are faced with the latest travesty born of an unholy alliance between strident motorcyclists, paid lobbyists, and pusillanimous legislatures: the repeal of helmet regulations and the predictable associated rise in death and paraplegia. I have heard the arguments for repeal shouted in the name of freedom, a debasement of the meaning of the word. Surely all freedoms are relative, including the freedom of the motorcyclist to enjoy without penalty the largesse of the taxpaying population as they cover the vast costs of his often self-incurred paraplegia. Is it possible that in our zeal to practice moderation in all things, we have sometimes disapproved only moderately of circumstances that cause avoidable major trauma?

Our involvement as surgeons

Some argue that these statistics are public health problems and not in the specific province of surgeons, but we can no longer escape the need to involve ourselves as a profession in the affairs of society. As surgeons concerned about the welfare of injured patients, we should mobilize for peace as we mobilize for war. Surgeon-citizens, perhaps using our Committee on Trauma as the catalytic agent, may well spearhead and coordinate such an offensive. As surgeons, we all understandably share delight and great pride in reporting the decline in mortality and morbidity from liver injuries, chest injuries, head injuries, burns or whatever our personal interests may be. And so we should, for such reports are the distillate of unnumbered days spent in surgical care, unmeasured tension awaiting doubtful outcomes, and invaluable dollars garnered for research.

Such triumphs, however gratifying, are doomed to be perpetually relative, expressed always as a percentage of the number of patients at risk. The size of the pool from which we rescue our patients has the greatest impact on our results. It is in the unglamorous, undramatic, and frequently contentious area of prevention that the surgeon who makes part of his living from trauma might well return something to society by giving his attention to some basic issues. There are many paths that can be taken: improving safety for the local high-school football team, preaching on the dusty roads that lead to school groups or on the gustatory roads to Rotary luncheons, participating in local television shows on the value of helmets to cyclists, collecting and studying relevant data, or educating uninformed congressmen. Unquestionably, involvement in these matters takes us into areas where we are traditionally reluctant to venture. The wilderness from which we wish to rescue our patients is full of political quicksand, economic whirlpools, and predatory lobbies, but I have never viewed surgeons as lacking courage or stamina or common sense.

We have some examples of what may be achieved when surgeons and their College set goals, develop standards, and determine to improve the care given to the patient. All such efforts are first opposed by entrenched interests and probably seem discouraging. Nevertheless, the quality of hospitals, the monitoring of residency programs, the control of sepsis, the establishment of registries, and many similar great accomplishments of our College were achieved through this sense of mission. Some of our colleagues have tremendous personal achievements to their credit. A recent Scudder Orator, Dr. Deke Farrington, for example, was a prime builder of the system of emergency medical services of this country, which has been so immeasurably improved by his efforts. While we can all bask vicariously in the reflected pride of this accomplishment, we cannot affort to dally as long as the slaughter on the roads and other types of avoidable injuries continue.

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Other directions

In 1976, the Committee on Trauma, under the guidance of the late Dr. Oscar Hampton, took a potentially controversial step when it approached the need for regionalization and categorization, seeking to promote the interests of the injured patient rather than the individual physician or hospital. A start was made but much remains to be done. The field cries out for leadership. We need to review and refine our goals to be certain that we believe in them, for it is possible that we may be faced with disconcerting personal, professional, and economic facts, and occasionally, while seeking out the enemy, we may meet ourselves.

Many hospitals remain reluctant to close their emergency departments even though these are inadequately equipped and inappropriately staffed. In their determination to be most things to all men, a number of such institutions and their staffs, sometimes motivated by understandable but misdirected pride or sometimes stimulated by economic incentives, duplicate expensive equipment and engage undertrained and underutilized physicians to avoid the perceived slight of being regarded as an incomplete and therefore inferior hospital. This reaction, while human, is fiscally unsound and professionally indefensible. Shared agreements based on need, geography, and available resources should be entered into by neighboring hospitals. While a few areas in the country have implemented ecumenical systems for the care of the injured patient, we have a considerable distance to go before we have an optimal network in place.

Hospital administrators often understand the problem better than either their medical staffs or their boards of trustees, and it is to this latter group, always well meaning but often ill informed, that more education should be directed. There is work for all, in the universities and outside, in the rural areas and in the cities, in the regional committees of the College and at headquarters, in the boards of trustees and in the medical staffs of hospitals. Care of the patient transcends the ideology of the Federal Trade Commission or interstate commerce agencies. The public must be made aware that the injured patient is not an industrial product that can be easily recalled. This College must continue its insistence on high standards of care for the injured victim. If not us, then who? However, while we pursue this most worthy of causes, we must recognize that there are finite limits to the amount of money that the people, through our government and third-party mechanisms, are prepared to pay for care. And so, we must, out of conviction—or failing that, out of simple self-interest—be part of a continuing and urgent study of cost factors. Such a study should consider the number of dollars involved in the care of the patient and correlate the end results measured in terms of disability to determine whether a new system or therapy does indeed produce superior results. The time for relying on unproven assumptions set forth in seductive paper programs has passed. Ultimately, we depend on a combination of human skills, experience, and commitment more than any single factor, and the concept that further expenditures on elaborate systems or equipment are cost-effective warrants dispassionate challenge in a society that does not have unlimited means.

A measurable data base

Emotion and passion and anecdotal extrapolations provide the flimsiest of bases on which to advocate the formulation of health policy. First we need measurable data. Lord Kelvin once said, "When you can measure what you are speaking about and express it in numbers, you know something about it, but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager kind." We must support the often neglected research efforts of those who have attempted to devise injury severity scores as a first attempt to measure the outcomes in comparable groups of patients.

Although we may have initial difficulties in agreeing on the ideal methodology, we can start with reasonable disclaimers built in for the more skeptical participants. Once this has been done, we need to institute specific treatment protocols for definable lesions.

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Only under these circumstances can we measure the results of our therapies with confidence and begin to distinguish clearly limned fact from prejudice entrenched through mindless repetition.

Research of this kind is difficult but essential as we seek to improve the lot of the injured patient at a reasonable cost to society. We need to coordinate some of the design and data-collection labor with groups of other professionals, but the world of science is increasingly enhanced by interdisciplinary synergism. Here again, the surgeon as hedgehog is ideally placed to assist. The fast-running fox moves too restlessly to see the larger picture.

The achievements of the past decade have been great and we have much reason to be proud. Intensive care units, respiratory support, total parenteral nutrition, arteriography, renal dialysis, the measurement of cardiac output, rational antibiotic usage, pharmacological manipulation of the circulation, and most recently CAT scanning have become parts of daily clinical practice. We sometimes fail to appreciate how far and how rapidly we and our patients have traveled. Changes creep up on us imperceptibly and if properly immunized by our period in training, we absorb them into our surgical beings by a process of intellectual pinocytosis.

Conceptualizing the whole

Training, to a large extent, makes us what we are. It is easier to teach trainees to sew accurately, achieve hemostasis, gain adequate exposure, resect decisively, join tendons, reposition bones, or anastomose bowel than it is to have them conceptualize the widespread hidden disconnections of the internal milieu after severe injury. Both are important. As we grope for glimpses into the great unknown of sequential changes, we need to cultivate heightened imagination. Consider very briefly our concept of septic shock. For too long, we visualized this entity almost mechanistically as being comprised of an invasion of the bloodstream by organisms with consequent poisoning by esoteric toxins resulting in high fever, hemolysis, and hypotension. And so it was until the early 1960s when we began to appreciate that many patients begin their episode of septic shock with hypertension, vasodilatation, and an increased cardiac output, and that sometimes an inappropriate polyuria develops rather than the traditional oliguria.

Today, modern thinking, the product of a fundamental conceptual change, views septic shock as a multisystem syndrome which no cell, no tissue, and no organ can escape. Litvinov, the Russian diplomat, once said that "peace is indivisible." Borrowing from his aphorism, I would suggest that for today's surgeon, shock is indivisible. Obviously, subsets abound to beguile and distract the foxes, but integration is imperative for the wise hedgehog and his patients. Myocardial function is depressed; changes in the ionized magnesium and calcium levels occur; blood is shunted through skeletal muscle beds, possibly resulting in increased cardiac output; capillaries leak and predispose to the adult respiratory distress syndrome; the glomerular filtration rate is reduced and the countercurrent mechanism altered, causing changes in urinary quantity and quality; the sympathetic nervous system is stimulated and an increase in catecholamines contributes to the hyperthermic, hemodynamic, and metabolic changes, including a decrease in the insulin/glucagon ratio and enhancement of the catabolism of sepsis; disordered hepatic membranes and cells lead to cholestatic jaundice and hypoalbuminemia; alterations in the cellular activity of the brain are reflected in an altered sensorium; a host of changes occur in the immune system, and the disturbance of coagulation mechanisms finally terminates in disseminated intravascular coagulation. These are but a few of the pieces in the mosaic of septic shock. The puzzle is endless but all the pieces are related. Somehow we must learn to communicate to our residents and colleagues the excitement and reward of the physiological search that deserves equal billing with the thrill of hemostasis and the restoration of bodily contour.

Technological advances

When he had only his senses to rely on, the surgeon necessarily turned outwards to the large, to what he could easily see and feel. To

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register the pulse, blood pressure, and urinary output was enough for the 1940s; the addition of urinary osmolality and blood electrolytes sufficed for the 1950s. Gradually, in the 1960s, the central venous pressure catheter, the volume ventilator, and the availability of blood gases advanced the treatment of the injured; the '70s have brought the pulmonary artery catheter, invasive measurements of cardiac output, and detailed coagulation profiles.

The 1980s no doubt will carry us into the world of noninvasive minute-to-minute methods for measuring cardiac dynamics, the accurate dissection of pulmonary function, measurement of cellular energetics, and manipulation of the immune system. To this will be added temporary support of the heart, lungs, and perhaps the liver, much as we are now able to support renal function. Already, new horizons open on the fields of opsonins, complement, specific noxious substances in the blood of septic patients, host resistance, immune-modulation, specific substrates to improve cellular function, stroma-free hemoglobin, and blood substitutes. In tomorrow's surgical life, we shall be involved with our patients' membranes, interstitial gels, and intracellular organelles.

Powerful diagnostic and therapeutic instruments such as microelectrodes, electron microscopes and radioimmunoassays permit us to explore man's interior. New numbers with new meanings are being spawned. The language and mathematics of these physiological changes can and must be learned by surgeons as we are enabled to move from the general to the specific. Not surprisingly, these new measurements frustrate surgeons who do not understand their origins or potential value in patient care. Significantly, and even ominously, the readings and the results are often clear to a rapidly increasing body of intelligent nurses and paramedical personnel who are watching us very carefully, critically, and in some cases perhaps covetously. If we opt out, there will be no shortage of others ready to divide our patients' care pragmatically, leaving us only the cutting and the sewing. In fact, the anonymity of numbers needs only to be feared if through ignorance we are unable to interpret them. And so we must strive even harder to wed science to the art of surgery. The compleat surgeon appreciates that we live in a world where we increasingly seek early warning signals. Objective data on the physiological subsets of which our patients are constructed serve as the guiding stars on which we may fix our clinical sextants.

Inevitably, there will be added to these many wonders the harvest of the seeds planted in our research communities and, more specifically, in the trauma centers supported by the National Institutes of Health. Many of these fruits, initially regarded as esoteric — and, worse still, with wisps of mockery, as "academic" — ultimately pass into widespread use. A tendency to scoff is often a reflection of an intellectual retreat, and unless we try to understand the biological changes associated with trauma, we shall be artisans rather than professionals. As surgeons, we cannot afford to be infected by any populist anti-intellectualism or to accept in our midst a group of surgical Luddites who would destroy by scorn what with just a little effort they might profitably embrace. To this end, I would hope that we might reexamine the purposes and the value of our current stylized postgraduate courses, for I do not believe that many truly contribute to sustained knowledge. The nature of the surgical mission is action, and surgical continuing education must somehow have more of a psychomotor aspect built into it in which the registrant participates rather than sits passively. More carefully designed and innovative courses may be one answer; mini sabbaticals on busy trauma services may be another.

Our commitment

I have no wish to assume the role of Cassandra, but all Scudder Orators are accorded the privilege of looking wherever they wish— backwards or forwards, internally or externally. Some are nostalgic and others, inspirational. I fear that I am somber for I am obviously burdened by some important concerns. Not the least of these is the haphazard

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manner in which we equip our trainees for dealing with the injured patient.

The time is overdue for physicians who treat injured patients to be required to demonstrate their competence to do so, whether in the emergency department or in the hospital proper. In some areas of the country, the emergency department is being slowly deserted by the surgeon, especially at inconvenient hours, and certainly for traumatic lesions which are loosely defined as only moderate in extent. Professional vacuums, like any other, are automatically filled. If we as surgeons fail to demonstrate our commitment to the injured patient at all stages of his illness, we shall be relegated to a subsidiary if not subservient role. We belong by interest, tradition, training, and demonstrated competence in those parts of the emergency department that deal with the injured patient. We need to demonstrate to our hospital colleagues the energy, concern, and decisiveness that have traditionally characterized the surgeon. We also need to set and monitor the standards of care received by the injured patient. Trauma is still sometimes relegated to a relatively junior resident or unoccupied surgeon or designated nonsurgical occupant of the emergency department. Our patients deserve better than this.

Trauma should be the responsibility of the trained surgeon, but the determination of the responsibilities to be entrusted to that surgeon should depend on the type and extent of training that he has received. In other words, I think that those who claim to be equipped to manage the injured patient should have their credentials carefully reviewed by their peers. Phrased in the simplest of terms, surgeons who treat injured patients should not do so as a perceived right but because they have been properly trained to do so, have demonstrated their competence, and have shown a continued interest in the field of trauma. In addition, the surgeon must be prepared to respond with alacrity to the call from the emergency department; to guarantee this may require formalized on-call rosters within the department of surgery. We need to ensure that all surgeons have a solid grounding in trauma as part of their training. Where training programs are associated with institutions that see few injured patients, the residents of such programs must obtain the essential exposure elsewhere. No surgeon is compleat without this experience.

While I do not believe that special boards in trauma or trauma hospitals along the European model staffed by so-called traumatologists are needed, I think all surgeons who practice in rural areas should be broadly versed in the care of the injured patient and feel secure in their abilities. Once they have decided on the location of their practice, such surgeons may well desire special exposure and training in the field of trauma because the circumstances in which they work often demand exceptional versatility. Larger hospitals that claim to be equipped to accept injured patients should have on their staff experts in the management of patients with severe multiple injuries, much as we have surgeons who specialize in the treatment of patients with malignant or cardiovascular disease. Above all, these surgeons should be properly credentialed, clearly identified, and readily available around-the-clock. Injured patients should not be the flotsam and jetsam of surgical practice, randomly picked up by someone wandering through the emergency department.

Where should we direct our energies? First, we should encourage increased involvement by surgeons in the prevention of injury. After all, it is in the very best tradition of physicians to try to ensure that we abolish the need for our services. Secondly, while we continue to assist in the training of emergency medical personnel to ensure that the injured patient has optimal care en route to the hospital, we need to concern ourselves with an accurate evaluation of the cost and benefits of the system. In a democracy, there is a period where a new system develops an internal dynamic momentum, gathers to it a mass of interested people, assumes the proportions of an industry, and, finally, develops all the accoutrements of a social action group. Definitions of role and responsibility then become important and the interface within and

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between paramedical and medical groups may through friction generate a considerable amount of heat. I do hope that we ensure that any heat and energy generated is channeled primarily to serve the patient and the taxpayer. If the determination of how the injured patient should be treated is to be changed in any way, let it be with the advice and understanding of surgeons rather than through default on our part.

Thirdly, while surgeons have long concentrated on the operating room within the hospital, the setting and monitoring of standards in the emergency departments of the country should be given due attention, for these have been neglected. Deficiencies should be rapidly corrected, and the impetus towards categorization and regionalization for patients with severe, multiple, or specific injuries, such as burns and those affecting the spinal cord and head, should be continued. I think such centers reduce mortality, diminish morbidity, and promote rehabilitation by concentrating trained available personnel of all kinds in juxtaposition to modern expensive equipment, but this thesis too is not immune from measurement. Fourthly, if we agree that surgeons are responsible for the care of the injured—and I hope we do—we should address this responsibility seriously and assume it throughout the week, day and night, and not episodically or unduly influenced by personal convenience. The emergency department physician or triage nurse has every right to expect a surgical presence without delay.

Fifthly, we need to retain, enhance, and encourage a genuine respect for research, basic and clinical, and to these we should add new social and economic dimensions. The transatlantic and transpacific flow of graduates to the United States from 1930 through the 1960s was stimulated by the quality and breadth of our research, not by the quality of our beef or our highways. It would be tragic if our brightest minds seeking exciting postgraduate experience were forced to turn to Europe and the Orient for want of appropriate local support and interest or because of national inertia, shortsightedness, or governmental parsimony. Lastly, the mechanism for inoculating each one of us effectively with new and useful knowledge requires improvement. Obviously, the potential for improvement lies primarily within each one of us but our institutional approaches to postgraduate learning probably could be greatly improved and perhaps we should review our current programs more critically and strive for innovations.

To achieve these objectives and others, I believe that all surgeons need to be compleat, for that is the way humans are—complete. And if our patients are not complete, our incomparable task is to restore them to wholeness. Trauma merely magnifies and accentuates the essential requirement that we remain broad in vision and that we consciously seek to integrate our knowledge and be receptive to new knowledge, no matter how perplexing and taxing it may be to our overburdened lives. I make no apology for stating publicly that with all our individual warts and blemishes, the trained surgeon remains one of our society's most worthwhile investments and greatest triumphs. I believe that as a group we are secure and honest enough to accept criticism from within and from without. Ultimately, the optimal care of the sick or injured patient is our lodestar. Using this concept as our guide, we can and should be zealous without being zealots, stand strongly for what we think to be right without being self-righteous, face moral problems without being moralistic, promote sanity without sanctimony.

Surgery is one of the greatest of human endeavors. My plea is that in the course of our travels, we do not abdicate our responsibilities by allowing excessively fractionated interests to enervate our central core. We must always strive to be surgical hedgehogs with integrated spines of knowledge, fierce in the defense of our patients. Let it be remembered that governments come and go, financing mechanisms change and ideologies crumble but surgeons and their patients remain locked in what is essentially a holy relationship that transcends everything and has its roots in the very meaning of civilization.