Fast forwarding: the evolution of neurosurgery

The 2005 presidential address

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Despite the major social and economic reorganization of medical practice that has taken place during the past 40 years, neurosurgery—the most fascinating specialty in all of clinical medicine—has grown and prospered. Today, this specialty is poised for an era of spectacular advancement and improvement in care; however, significant problems with the potential to retard this growth face neurosurgery. Among these problems is the medical liability situation, which has the potential to destabilize neurosurgical practices and the current health care delivery system. Other issues facing neurosurgery include the potential for loss of the unique nature of the specialty through a conversion to shift-worker surgeons and increasing reliance on profit-seeking institutions for financial stability and liability protection. Lifestyle choices are of growing importance and currently discourage women from entering the field. With a growing knowledge base, there is the recognition that it may not be possible for most individuals to master all aspects of the specialty. There is continued confusion about manpower needs. In addition, some neurosurgeons are choosing to practice in ways that fail to meet the neurosurgeon’s obligations to society. There is a growing number of neurosurgeons who dislike providing trauma coverage and there is the potential for some neurosurgeons to give up intracranial neurosurgery. The author believes that it is not competition that will improve the delivery of neurosurgical care and allow for continued growth, but cooperation, and that it will be possible to alleviate many of our problems through increased regionalization of neurosurgical care delivery. This proposal has the potential to promote the formation of neurosurgical teams, ameliorate the problem of physician fatigue, allow greater development of subspecialty skills, and ease the burden of trauma call. It should allow satisfactory solutions to lifestyle considerations and encourage more women to enter the field of neurosurgery. Such a transformation would encourage advances in care to be brought rapidly into the clinical setting and allow neurosurgery to be practiced at the very highest level.

KEY WORDS • American Association of Neurological Surgeons • presidential address • evolution of neurosurgery

I t is with sincere gratitude that I thank you for the privilege of serving as president of the AANS. I would like to acknowledge the support, assistance, and advice of the officers, board of directors, and membership. Many hard-working, engaged individuals have produced a virtually endless stream of phone calls and email. We have tried to address some important issues and, although friends in agreement are preferred, opposition is inevitable. To those who have opposed my positions, my ideas, and often just me, I give thanks. You have sharpened my wits, kept me grounded, and, to use an old Missouri aphorism, reminded me that no matter how thin the pancake, it still has two sides.

There are some individuals whom I wish to acknowledge for the personal mentorship and kindness they have provided to me. Ray Snider was professor of anatomy at Northwestern University and later head of the Center for Brain Research at the University of Rochester. In the summer of 1961, he introduced me to the fun of research and to Paul Bucy, the bold clinician-scientist who worked in Snider’s laboratory demonstrating the therapeutic effects of cerebral pedunculotomy for hemiballismus. Bucy took an interest in me and provided the spark that lit a life-long fire. Cho-Lo-Li was a gentle and poetic researcher who was kind enough to let me into his laboratory at the NIH. I remain grateful to my neurosurgical teachers, Henry Schwartz, Sidney Goldring, and Bill Coxe. For me, there could not have been anyone better.

Past AANS presidents have delivered speeches notable for their eloquence. Often scholarly and enlightening, frequently witty and wise, their talks have touched on a variety of subjects. In surveying some of the older addresses, however, it seems to me that traditionally the president described the state of neurosurgery—according to his beliefs and prejudices. I asked myself, should I do that? This is not an audience to take lightly. This question reminded me of the story about the nuclear physicist, Leó Szilárd, who was thinking of keeping a diary. He informed his friend Hans Bethe, “I don’t intend to publish. I am merely going to record the facts for the information of God.” “Don’t you think God knows the facts?” Bethe asked. “Yes,” said Szilárd. “He knows the facts, but he does not know this version of
the facts.” So in that vein, I will return to that tradition. Nevertheless, one cannot help thinking that trying to settle a problem with oratory is like attempting to unsnarl a traffic jam by blowing horns.

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Those words were delivered at this meeting 20 years ago. They were true then, yet I am convinced that the next few years will be of great importance, bringing opportunities that must be seized, policies that must be set, and decisions that must be made, which will have far-reaching effects on how we will practice our specialty in the future.

Changing times are not a new subject to this lectern. Paradoxically, even the concept of change has permanence. In fact, change has probably been the most frequent topic of an address to a professional society. It is often depicted as an unwelcome threat to our profession, but we all know that change also brings promise. A common form of entertainment for mature folk is to discourse on where things went wrong. Yet, it is foolish to dwell on this, because things have not gone so badly. I recall being told by a past generation of neurosurgeons that it was a mistake to acquiesce to Medicare and to allow the NIH to support our research. Today, this hardly sounds rational when one takes into account the benefits that have been conferred, which far exceed any perceived inconvenience or loss of autonomy to physicians and researchers. Despite dire predictions, experience has shown that we have little to fear because, despite the radical social and economic reorganization of medical practice during the past 40 years, neurosurgery—the most fascinating specialty in all of clinical medicine—has grown and prospered as we continue to provide our patients with a growing roster of near-incredible benefits.

Concurrently, we should recall that, despite our reputation for independence of action and thought, neurosurgeons are not the masters of our own professional fates. In his 2004 presidential address to the Association of American Medical Colleges, not unsurprisingly entitled, “Promising Change,” Jordan Cohen pointed out that change is resisted by the concept of autonomy and that autonomy is good; it gives us the obligation to set and enforce our own standards. Cohen stated,

... but it is not autonomy that is the problem, it is autonomy, unthreatened from accountability that is the bar to change. It is failure to recognize that self-satisfaction with past success is no excuse for ignoring the need to change to secure a better future.²

Our obligation is to serve the needs of patients with neurological diseases, to promote new knowledge and the best neurosurgical practice, and, in so doing, “contribute to the evolution of humankind.”²⁴ Our efforts must be made within the context of social need and our responses must be appropriate. We serve at society’s pleasure and are very fortunate that society values our skills and interests so highly.

Today, we are positioned for an era of spectacular growth and improvement in care. Modern computer-guided surgery, incredible advances in imaging, and a growing understanding of tumor biology and the pathophysiology of the brain, combined with the promises offered by molecular biology, genomics, proteomics, and stem cell therapy will allow us to deal with problems that previously were unapproachable. It is with the electrode, chemode, implant, and vector that much of tomorrow’s neurosurgery will be defined. Yet, few practitioners expect that it will be all smooth sailing. So, just as past presidents have done, I will describe some problems facing us. Some of these seem relatively immediate and I will emphasize those problems whose solutions may be affected by our hands rather than by those of others. There is one problem that I will largely omit today, our medical liability situation. There are those here who are hard at work at possible solutions. I can add little to their well-chosen words and thoughtful analysis, other than to say that this effort deserves everyone’s support.

Neurosurgical Training

One topic that I would like to say a few words about is residency training and duty hours, for I believe that this topic is emblematic of a broad shift in society’s values—an evolutionary step that will impact us in a major way. Our specialty has always attracted the very best individuals and we must keep it that way. During my internship, I was on call every day and night all year, with only a barred day off every few weekends and a 2-week vacation. Our heroes were those clinicians who, legend had it, did not leave the hospital for a month at a time. Although my residency took place a long time ago, I can readily recall sleep deprivation, inappropriate ideation, and a brush with a median divider as I dozed off driving home. Whereas few of us trained in a residency that had rigid limitations on duty hours, that is the situation today. In answer to society’s perceptions and the reality of ongoing federal legislation, the ACGME now requires these limitations. Are these restrictions wisely designed? Is 80 or 88 hours the right amount? Can an arbitrary, rather inflexible, and somewhat punitive program that encourages whistleblowers work? Well, I believe it can, if it is fashioned correctly. Will it turn out residents as sturdy as you or I? Undoubtedly! Nevertheless, without modification of the obligations of both residents and the training programs, we could see an adverse impact on the residents’ individual surgical experiences and their participation in educational conferences, as well as restrictions on educational opportunities that previously were available. Training programs, some imperiled by liability expenses and lack of reimbursement for care of the uninsured, are now further burdened with the expenses associated with documentation of compliance and the need for additional ancillary personnel. Nevertheless, I suspect that this change, which initially was resisted but is now universally accepted, may eventually prove to be beneficial to our specialty. There are two even greater risks, the first of which I am afraid may reflect the shift in societal values. It is the potential for the development of a shift-worker–like mentality with a concomitant loss of pride in our activities and a diminished sense of responsibility. We have been trained to be present whenever we are needed, available to intercede at the most critical times in a patient’s life. Although in some other specialties this obligation is similar, it is indispensable in neurosurgery. If this cannot be conveyed to new members of the neurosurgical community, there is the risk that those entering the field will no longer consider themselves or their obligations to be special. My attitude may be chauvinistic, but I believe
Fast forwarding: the evolution of neurosurgery

that chauvinism has been one factor that attracts the very best to neurosurgery. It is not ordinary work. By special, I do not mean privileged; what is special is what we have set out to do, the skills we obtain, and the responsibility that we readily assume on behalf of our patients and our craft. These are not attributes that can or should be industrialized, yet the path, while appearing obscure, points to an obvious end. If a resident must conform to a limited number of duty hours, will this also be imposed on the practicing neurosurgeon, who currently is expected to be available day and night throughout a patient’s course of care?

I said that there were two risks. The second is the potential for decreased duty hours to diminish the role of research training for neurosurgeons. Henry Schwartz, the quintessential cutting neurosurgeon and also the first in North America to record electrical activity from the human cortex, spoke to this body in 1968 of the necessity for neurosurgeons to train in nontraditional disciplines. In his presidential address, Sidney Goldring spoke of important clinical breakthroughs whose genesis arose from seemingly irrelevant basic laboratory investigations in which clinicians, whose minds were prepared by training and knowledge, recognized the significance of a particular fundamental observation. Today, we acknowledge that the field of neurosurgery must include practitioners and researchers with training and expertise in a host of contemporary scientific disciplines. Thirty-six years ago, during my first year of training, I diagnosed a malignant brain tumor in a close friend and assisted at his operation. During the procedure, I could not help but think of Kurtz’s words from Conrad’s Heart of Darkness, “the horror, the horror.” I hear these words again with every intrinsic neoplasm I see. There has been little to suggest that surgical treatment of malignant brain tumors will ever play more than a limited therapeutic role, and then only as an adjunct, whereas true advances may evolve from a growing understanding of molecular biology and the novel delivery of tumoricidal agents. Although no one would advocate that we lessen our commitment to laboratory efforts when it is these efforts that occurred a tremendous expansion in the knowledge of neurosurgical diseases and of the complexity of the technologically driven procedures that we use to treat them. Neurosurgery itself is a moving target. The effects of endovascular therapy and stereotactic radiosurgery on the practice of neurosurgery are obvious to all and represent only the tip of the iceberg when it comes to the field’s evolution. There is an increased demand for special skills, which has led to a system of relatively unregulated fellowships that are only now, through the work of the Society of Neurological Surgeons’ Committee on Accreditation of Subspecialty Training, beginning to be put into order. Fellowships extend the already lengthy training period an additional 1 or 2 years, adding to a trainee’s time and financial burden in a specialty in which more than half the programs require 6 years after the first postgraduate year. There are many reasons that an 8- or 9-year training program may not be appropriate, but the most potent is that it surely will dissuade some outstanding students from entering our specialty. This realization has led to considering the development of a basic curriculum for all neurological residents with subsequent branching into different subspecialty paths. Despite reasonably good agreement on a cognitive core, there remains a substantial divergence of opinion about the surgical expectations to be incorporated into a neurosurgeon’s basic training and difficult questions of how residents may be guided into specific paths. In addition, one must be concerned that the consequences of an 80-hour week with a basic path-directed curriculum will be neurosurgeons who are expert, or perhaps competent, in only one or two subspecialty areas.

Support for Neurosurgical Research

We must remain committed to our patronage of scientific research. Mastery of complex scientific disciplines requires time, patience, and support; however, the ability of academic departments to nurture the clinician–researcher is being strained well beyond the effect of duty hours. Sky-high liability premiums and the unyielding demands of some academic institutions for the generation of greater clinical volume have set this stage. For many departments, it will be difficult to compensate neurosurgeons who are dedicated to laboratory efforts when it is these efforts that prevent them from generating sufficient funds to cover liability insurance, let alone a reasonable salary. We all know that the instantaneous gratification and financial opportunities associated with clinical work become a seductive si-
prohibit the profession from direct regulation of our numbers and the Residency Review Committee is not allowed to consider overall need when making decisions regarding the number of residency positions. Studies performed in the two decades preceding this century yielded the prediction of an oversupply of physicians. This does not seem to be the case. On this matter, intelligent planning appears to have been supplanted by a blind faith that market forces will produce an appropriate response. In reality, however, it is our government through Medicare, by means of restrictions on the number of funded residency and fellowship positions, that now determines the size of the physician workforce. I doubt that anyone has a good understanding of how many neurosurgeons will be needed in the future and we cannot be sure that the market place as currently configured will sort things out. Nevertheless, it is reasonable to expect that, as our field continues to incorporate new scientifically based therapies, we will require greater numbers. One may also be convinced, from both the increasing number of advertisements in our journals and the number of calls and flyers received on a daily basis offering finishing residents high-paying jobs in remarkably bucolic settings, that there now exists an insufficient number of neurosurgeons. Relatively small hospitals offer to employ surgeons and pay handsomely and, in some cases, exorbitantly for neurological activity. It is quite possible, however, that this perceived need for increased manpower is fueled not by unmet patient needs, but by the desire of small hospitals to obtain neurosurgical coverage so that they may enjoy the generous profit margins associated with neurosurgical procedures. Despite this, other factors—some as seemingly straightforward as population growth—seem to indicate that for our specialty to continue to flourish more neurosurgeons will be needed. We must view with alarm the American Board of Neurological Surgery data that indicates that there are no more certified neurosurgeons practicing today than there were 10 years ago and 5% fewer than in 1998. We need to abandon our reluctance to embrace the findings of workforce studies simply because of the inaccuracies of the past and attempt to define accurately our true workforce need.

Women in Neurosurgery

If there is or will be a shortage of neurosurgeons, this may become exacerbated by our failure to attract a large segment of the medical student population at a rate remotely approaching their entry into medicine. Women constitute half of the entering classes in today’s medical schools and most view neurosurgery as a poor career choice. Although our field is populated with outstanding women and men, we should reflect on what we are missing when the great majority of women do not consider neurosurgery as a viable career. We must direct training and practice so that women are attracted to our field. In doing so, we must accommodate the obvious biological and social roles that women fulfill. When I became a program director nearly a quarter of a century ago, I made a special effort to attract women into our program. Admittedly, I had only a rudimentary appreciation for the special needs of female neurosurgeons and believed that all that was needed was an equal opportunity. For some, that was sufficient. I no longer believe this. Despite some reshuffling of traditional roles, we must recognize that we have no right to insist that our trainees be nontraditional, and their reluctance to do so should not exclude them from becoming neurosurgeons. Gender discrimination is being actively addressed at most institutions of higher learning and medical schools. Nevertheless, over the past 15 years, the number of women entering neurosurgery has risen only slightly, despite the fact that female applicants, 11% of those entered into the match, are successful in matching at a rate of 65%, nearly identical to their male counterparts.

Neurosurgeons and Trauma Care

An issue of increasing concern is the delivery of neurotrauma care. Caring for the patient with neurotrauma is difficult. There are not enough neurosurgeons to cover every hospital. Patients may present at inopportune times and interfere with elective schedules. Compensation for this activity is often not forthcoming and uneven at best. Many of these patients are uninsured and are said to be unduly litigious. Even if true, it is disheartening to see those physicians best suited to treat neurotrauma retreat from this activity. No one understands the pathophysiological characteristics of the injured intracranial contents and the spine better than the neurosurgeon. This is our training and our obligation. Who will care for you or your family member with a significant head injury? Who will make the observations and conduct the research that will improve care? Efforts by some neurosurgeons to avoid calls or to shift this activity onto others, such as the emergency room physician or the physician’s assistant, may open the door for the so-called acute trauma specialist, a subgroup of general surgeons who have identified this as a problem and perceive a willingness for us to leave this responsibility to others. They have proposed the development of an ACCME-sponsored residency training program that would include exposure to neurosurgery and would empower trainees to manage and treat neurotrauma. It is hard to envision these surgeons serving patients as well as we can. At a time when our specialty is embracing subspecialization, it appears to be a step backward, at best. For me, this is a black-and-white issue, with no shades of gray. I see no argument that can justify the abdication of our responsibility to these patients.

Spine Surgery

We should all be proud to see the growing prominence and success of neurosurgical spine surgery. During his AANS presidency, David Kelly engineered the resurgence of this major part of neurosurgery, which was once at risk. This success has benefited all neurosurgeons and with it has come a deserved strength and independence. Yet, the growth and enthusiasm for spinal surgery carries some hazards. One is represented by the dilemma presented to the neurosurgeon who may be asked to use unproven technologies that have become accepted, popular, profitable, and in fact, often demanded. Another concern is the risk to neurosurgery occasioned by the potential for spine surgeons to become marginalized from the rest of the neurological community. Although this is not the case for the great number of neurosurgeons for whom the attraction to this subspecialty is fostered by the remarkable conceptual and technical advances of the field, for a few surgeons, it may be that
Fast forwarding: the evolution of neurosurgery

by restricting their practice, in some instances they may find lower liability insurance rates and a justification to opt out of being available for neurotrauma call.

This practice and attitude, if it were to become widespread, jeopardizes our relatively small specialty. At a time of remarkable scientific opportunity, if we were to become functionally unaligned, we would have a difficult time maintaining our momentum. Neurosurgery could be critically wounded; its evolution retarded; and its ability to protect its core values of education, the acquisition of knowledge, and improvement of patient care, weakened. The fragmentation of neurosurgery could seriously reduce our impact on both institutional and governmental decision making at a time when influence and access to external resources will be most needed.

Problems associated with trauma call and the potential disengagement of spinal surgery must be addressed. The answers may not be easy to find, but I assure you that we will all do better together. We must find solutions that will preserve the ability of neurosurgeons to choose their area of interest and comfort and foster their experience in these areas, while retaining the integrity of our specialty and meeting its obligations. At the very least, it will take good will and dedication to our specialty to achieve this.

I have described my view of some of the issues facing neurosurgery. Before I try to develop a perspective, let me digress for a moment. Some of our problems undoubtedly represent the natural progression of a dynamic society. I am confident that we will weather difficulties internal to our specialty and, as William Faulkner said, not only will we survive but prevail. Other problems, such as medical liability, have the potential to destabilize not only our practices, but a health care delivery system that has evolved over many years and, despite its faults, serves the majority of our population well. In most communities patients needing neurosurgical attention, irrespective of their financial or insurance statuses, receive high-level care; nevertheless, this is not the case throughout the country.

Presently, health care spending constitutes nearly 15% of our gross domestic product and the average premium for a family insurance policy is $9,000 per year, a figure representing 21% of the national median household income of $42,000. Although this high national expenditure has paid dividends with an increase in life expectancy, the development of remarkable drugs, and the most technologically and intellectually sophisticated medicine in the world, we still have 45,000,000 uninsured Americans. Currently, there is no real plan to solve this enormous problem. Although, some experts, social philosophers, and politicians promulgate the illusion that the answers to this problem lie just around the corner and will be found through patient empowerment and the heightened efficiency brought by increased provider competition and investment in information technology, once again finding the solution will fall to physicians and hospital resources.

I do not believe that competition, as we know it, is the answer. For those in competitive situations, this is not how things are going. For the past 24 years, I have practiced in an extremely competitive environment, replete with satisfaction surveys and hospital and provider evaluations. Although our community enjoys a high level of care, it is not dissimilar from the rest of North America. For the consumer, care remains expensive, for the uninsured awkward to access, and competition is represented by marketing that is best described as cheesy, which often sensationalizes the trivial. It is heralded by the obscene presence of two gamma knives located within a mile of each other. The norm is to shift uninsured patients from one institution to another. Our community has seen little benefit from an across-the-board duplication of expensive equipment and an outright reluctance to plan and share. It is not this competition that will evolve into a patient-centered, consumer-driven, provider-friendly health care system.

Let us return to the issues facing neurosurgery. They include the potential for loss of the unique nature of the specialty through a conversion to shift-worker surgeons increasingly reliant on profit-seeking institutions for financial stability and liability protection. It is a specialty that has continued to evolve with the development of sophisticated alternatives to direct open neurosurgery to treat a number of our most difficult-to-treat medical conditions safely. Lifestyle choices are of growing importance; not only are women discouraged from entering our field, but some neurosurgeons are choosing to practice in ways that fail to meet our obligations to society. We are faced with a growing number of neurosurgeons who are unhappy about providing trauma coverage and there is the potential for some to give up intracranial neurosurgery. Our knowledge base is growing and it may no longer be possible for most individuals to master all aspects of our specialty. We are confused about manpower, but it does not seem likely, or even desirable, to provide every hospital with a neurosurgeon, even if desired.

It is, however, likely that solutions will emerge and evolve. I submit that it is not competition that will improve the delivery of neurosurgical care, but cooperation. I believe that many of these problems may be alleviated through increased regionalization of neurosurgical care delivery. Please understand, I do not advocate regionalization to academic centers alone; instead I suggest that we embrace a philosophy of health care delivery that would, for many, affect how neurosurgical care is delivered and how neurosurgery is practiced. I have never thought that a solo or undermanned small practice is an appropriate neurosurgical paradigm and I do not believe it is in the best interest of patients for complicated neurosurgical care to be delivered in facilities lacking the resources to provide the technology and expertise that for some cases make a difference in outcome. It is not difficult to envision the practice of neurosurgery evolving into relatively large group practices with individual subspecialization. I find it troubling in 2005 to see the nonemergency treatment of aneurysmal subarachnoid hemorrhage in facilities that do not have dedicated neurosurgical intensive care personnel and a neurosurgeon or neuroradiologist experienced in performing intervention- al intravascular procedures. Although not definitive, there have been reports7,13 that for some complicated neurological conditions, increased volume is related to better outcome. This may also be the case for even less complicated conditions.7 There are additional reasons to foster regionalization. It would necessarily promote the formation of neurosurgical teams and enhanced teamwork. It should allow resources to be centralized to serve the needs of patients rather than the desires of hospitals. It may ameliorate the problem of physician fatigue and allow more efficient utilization and greater development of subspecialty skills. It can go a long way toward meeting society’s demands.
for reasonably rested, well-educated, and up-to-date neurosurgeons who are constantly available, and it can be organized to ease the burden of trauma call, which is exacerbated by the availability of too few individuals covering multiple hospitals. It may allow lifestyle considerations to be addressed in more satisfactory ways and encourage more women to enter neurosurgery. I think this is a change that will be good for neurosurgeons, and most importantly, for our patients.

A Few Additional Observations

I believe that our civilization has evolved to the point at which health care is a right and that neurosurgeons, along with all other caregivers, recognize it as such.

The AANS Board of Directors and I also believe that insurance coverage for all Americans is desirable and inevitable, and the sooner we get to that point, the better. If we wish to shape how this is enacted, then we should participate in the development of a reasonable system that allows this country’s uninsured citizens unencumbered access to high-quality health care. This will encourage advances in care to be transferred rapidly to the clinical setting and allow neurosurgery to be practiced at the very highest level. As I said earlier, neurosurgeons are a special group. I know of few other medical practitioners who are called on to give so much of themselves to help their fellow citizens. I also know that you, like me, will enjoy seeing the rapid evolution of neurosurgery into its next stage of excellence. It is only fair to acknowledge that twenty-first century medicine has its problems, but it is also fair to consider it as a whole. This past year, I have spent a great deal of time trying to impress on policy makers the impact of their unwise choices on the best practice of neurosurgery; as a consequence, perhaps when I have made my point too forcefully, I have been asked if I would do it again. I can only provide the answer that I gave my just-turned-18-year-old daughter—an unqualified “yes.” I doubt that anything can ever replace the feeling after a difficult case results in a good outcome, the satisfaction of the successful experiment, or the thanks of a grateful patient.

Concluding Remarks

I would like to thank you for your attention and, once more, indicate how grateful I am to have had the opportunity to serve as president of the AANS. As I look out at you, I cannot help but think of the words said by Johnny Carson when he retired, words that I believe apply to every single one of us, “I’m one of the lucky ones. I found something to do that I like. That really is a huge piece of luck.”

References


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