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Neurosurgery’s founding principles

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These are turbulent times for American neurosurgery. It is important to look ahead and prepare for the future but it is also important to look back—for it is memory and tradition that prevent the tyranny of the present. It is impossible to know where we are going if we don’t remember where we were. In this paper I want to discuss the founding principles of neurosurgery—the principles that have allowed neurosurgery to prosper in its first century—and to stress the importance of adhering to these principles in times of change. I also want to talk to you about how the American Association of Neurological Surgeons (AANS) is helping neurosurgeons honor our founding principles, while preparing neurosurgery for its second century.

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Since its founding early in the 20th century, neurosurgery has grown and prospered. Neurosurgeons now treat more patients with lower risk, less pain, shorter hospital stays, and better outcomes than was the case only a few years ago. Our specialty has flourished because we have adhered to our founding principles. Now, with increasing frequency, we are being told that it would be expedient to abandon these principles. It is essential that we do not. Neurosurgery—a vigorous, exciting specialty during its first century—will continue to grow and prosper only if we remain true to our founding principles.

What are those principles? I believe that we can determine neurosurgery’s founding principles because, more than any other specialty, we have a founding father—Harvey Cushing—and what a founder he was! Cushing (Fig. 1) was more than the foremost surgeon of his day. He was an accomplished artist (Fig. 2), a Pulitzer Prize–winning author, a physician-scientist, a soldier, and a teacher. The revered position of the brain surgeon in American culture is due, in large part, to the accomplishments of our iconic founder. I maintain that the principles to which Cushing adhered are the founding principles of our specialty.

Principle I. First, Be a Good Doctor

In Cushing’s words, “… a surgeon is nothing if ignorant of medicine. The surgeon, though graduated doctor of medicine, not infrequently lapses into the state of being little more than a craftsman …” How easy it is to focus on the operative skills we need and forget about everything else. In the quest for efficiency and “patient safety” we have been encouraged to leave the care of our patients in the clinic to a physician’s assistant, the care of our patients on the floor to a hospitalist, and the care of our ICU patients to an intensivist. If we do this, we become technicians, not physicians. In the words of our founder, “A physician is obligated to consider more than a diseased organ, more even than the whole man—he must view the man in his world.” Neurosurgery is a demanding technical specialty, but we do much more than perform procedures. We care for our patients in the clinic, the emergency room, the operating room, the recovery room, the ICU, and the hospital wards. We are specialists in the care of patients with neurological disease, not technicians who have mastered a motor skill. The AANS in its educational offerings and in its advocacy efforts will never view neurosurgeons as mere technicians who leave the nonsurgical portions of patient care to the “cognitive specialists.” Before we can be great neurosurgeons, we must be good doctors.

Principle II. Commitment to Research, Innovation, and Quality Improvement

Harvey Cushing was the archetype of the neurosurgeon as physician-scientist. His insights and innovations,
Throughout his career, are legendary. In medical school he was instrumental in developing the first anesthesiology record and, somewhat later, introduced intraoperative blood pressure monitoring to American surgery.\textsuperscript{3,7,15,20,21} In the Hunterian Laboratory at Hopkins, which he directed, he made observations demonstrating the possibility of surgery for valvular heart disease 40 years ahead of its time and developed the means to deliver positive pressure endotracheal anesthesia more than 20 years before this technique became routine in humans.\textsuperscript{15} He not only founded the specialty of neurosurgery, he was also a founder of the field of endocrinology. From the very beginning of our specialty, it was expected that leaders in the field of neurosurgery should be capable investigators.

Today, neurosurgical research, innovation, and quality improvement are under attack from various educational and health care reform efforts. Because of resident work hour restrictions and increasing demands for faculty clinical productivity, time for research by neurosurgery residents and faculty is becoming a rare commodity. Federal funds for neurosurgical research are limited, and the opportunity for neurosurgeons to work with industry has been adversely affected by the Sunshine Act and other aspects of the Affordable Care Act.\textsuperscript{1,8} For much of neurosurgery’s first century, the majority of the world’s health care innovation occurred in the United States, and most of the funding for such research came not from federal grants but from private foundations, individual donors, and industry—with industry accounting for more than 70%. However, the Affordable Care Act includes more than $500 billion in new taxes over its first 10 years, and United States health care technology companies are moving their research and development centers overseas.\textsuperscript{1,14} A long list of companies have announced plans to open new centers abroad for research and development and clinical trials.\textsuperscript{1} In addition, educational and health care reform efforts that elevate primary care above specialty care, ineffective efforts at preventive medicine above treating the sick, and community health centers above academic medical centers are destroying the research infrastructure that leads to improved patient care.

Despite these obstacles, our dedication to neurosurgical research, innovation, and quality improvement must be maintained. Since many of our problems are due to misguided and intrusive government policy, our advocacy efforts have become increasingly important. When I chaired the Washington Committee for Neurosurgery in 2009, neurosurgeons were the first physicians to proclaim the many adverse effects of the Affordable Care Act, while its passage was still in doubt. We saw this law as a threat to our founding principles. We knew it would, to a greater or lesser degree, make all health care decisions political decisions. Unfortunately, larger and richer medical and surgical societies opposed us. They prevailed and a truly terrible law for American medicine—particularly for specialty care, academic medicine, and medical research—has been enacted.\textsuperscript{8} This fight is not over. It is not clear that we can win but we cannot stop fighting.

The AANS is doing much more than political advocacy in support of neurosurgery research, innovation, and quality improvement. The Neurosurgery Research and Education Foundation (NREF) is neurosurgery’s best vehicle to foster neurosurgical research by providing a private, non-government source of funding for research in neurosurgery. The NREF, jointly managed by the AANS, the Society of Neurological Surgeons, the American Academy of Neurological Surgery, and the Subspecialty Sections,
needs your help and the help of our industry partners to support its work for the good of our specialty and our patients. It is only through basic, translational, and clinical research that the vitality of neurosurgery can be maintained.

We also need to realize that research, innovation, and quality improvement must not be the province of only a small number of academic neurosurgeons. Much of Cushing’s influence on the new specialty of neurological surgery was due to his meticulous cataloguing of the outcomes of his patients. The path to quality improvement in neurosurgery is no different now than it was in Cushing’s time. Collect meticulous data on each of your patients, on the processes of your care, and on your patients’ outcomes. Analyze these data and report them in a nonpunitive environment to other neurosurgeons, and neurosurgical care will improve. The AANS is supporting this founding principle of neurosurgery through the work of the NeuroPoint Alliance (NPA). NPA is the neurosurgical organization devoted to gathering, analyzing, and publishing data on what we have called the science of neurosurgical practice—the habitual and systematic collection, analysis, and feedback of data, inseparable from practice, via audited registries. As Cushing demonstrated almost a century ago, properly designed registries generate new knowledge about the effectiveness of care, refine our operative indications, and improve quality. I believe that the work of the AANS, the NREF, and the NPA will be the salvation of neurosurgical research, innovation, and quality improvement.

Principle III. Commitment to Education, Scholarship, and Camaraderie

Cushing’s contributions to education and scholarship are as foundational as his contributions to research, innovation, and quality improvement. He trained many outstanding young men to advance the new specialty of neurosurgery after his retirement—and this training was extraordinarily rigorous. Today, neurosurgical education, like neurosurgical research, is being jeopardized by bureaucratic intrusions. Since 2003, the duty hours for neurosurgical residents in the United States have been limited, and there are those who want to turn us into employees who hand off our patients to the next shift. A few years ago I was sure this could not happen to neurosurgery. Today I think there is cause for concern. Recently, I heard a neurosurgery residency applicant ask about work hours and vacation time. I felt the Earth shift under my feet. In my more than 30 years as a resident and faculty neurosurgeon, neurosurgical recruitment had always been based on the Shackleton model. Ernest Shackleton was a British explorer. About the same time that Harvey Cushing was moving to Boston, Shackleton began planning an expedition to Antarctica. He set sail in August 1914 with a crew of 27 men, and while Cushing was overseeing the formal opening of the Peter Bent Brigham Hospital in November of 1914, Shackleton and his crew were approaching Antarctica. Their ship became trapped in pack ice and was eventually crushed. They camped on the ice until April 1915, when, after reaching open water, they boarded three lifeboats and made it to uninhabited Elephant Island. Shackleton then took a small crew and set off in one of the lifeboats on an 800-mile journey to find help—eventually reaching a whaling station on South Georgia Island. There followed numerous, unsuccessful attempts to reach the men left behind on Elephant Island until, finally, at the end of August 1916, more than 2 years after they set sail, all the men were rescued. There had been no talk of mutiny. The point of this story is not the happy ending—it is Shackleton’s recruiting strategy. The possibly apocryphal story goes that he placed a newspaper advertisement that read: “Men wanted for hazardous journey. Small wages, bitter cold, long months of complete darkness, constant danger, safe return doubtful. Honour and recognition in case of success.” I doubt that those who answered such an advertisement—or those who applied to work with Dr. Cushing—asked about duty hours or vacation time. Like Shackleton and his crew, these neurosurgeons knew that the specialty they had chosen required extraordinary commitment and perseverance to achieve the honor and recognition that came with success (Fig. 3). We have always taken care of our patients when they need us, for as long as they need us. Neurosurgery has led the charge in vigorously resisting training our residents as shift workers, and the AANS will remain committed to this founding principle.

In addition to setting the standard for rigorous training, Cushing was also the epitome of the neurosurgeon scholar. During his career he published 13 books, including a Pulitzer Prize-winning biography of Sir William Osler, and more than 300 scientific articles. And his long-time friend and collaborator, Louise Eisenhardt, became the founding editor of the Journal of Neurosurgery. The AANS has continued this commitment to education and scholarship. Today we publish the latest neurosurgical science through the Journal of Neurosurgery, JNS: Spine, JNS: Pediatrics, and Neurosurgical Focus. Our educational offerings have expanded to include AANS Neurosurgeon and many AANS and NREF offerings on YouTube and iTunes. AANS educational materials help neurosurgeons prepare for their board examinations through the Oral Board and Maintenance of Certification preparation courses and through our new publication, Neurosurgery Knowledge Update. Working with the Society of Neurological Surgeons and the Congress of Neurological Surgeons, we will soon make all of this educational material available through a single portal. Be assured the AANS is intensely committed to neurosurgical education and scholarship.

There is one other aspect to this founding principle—camaraderie. Cushing had a strong belief in the value of medical meetings. He helped form the Society of Clinical Surgery in 1903 and served as the President of the American College of Surgeons. In 1919 he suggested that a society be formed so that “neurosurgeons might come together once or twice a year to discuss problems of mutual interest and observe one another’s work.” This led to the formation, in 1920, of the first neurosurgical society in the world, the Society of Neurological Surgeons, with Cushing as its founding President. By 1930, membership in the Society of Neurological Surgeons had become too restricted for a growing specialty, and in 1931, a group of young neurosurgeons formed a new society that, with...
Cushing’s blessing, took his name. The first meeting of the Harvey Cushing Society, now the American Association of Neurological Surgeons, was held at the Peter Bent Brigham Hospital 83 years ago, on May 6, 1932. Cushing took great pride in this new society, writing to Tracy Putnam, the Secretary, “I am very proud of you all—and that I should have been immortalized by having you use my name is a source of pride and gratification.” The AANS has adhered to Cushing’s founding principle of commitment to education and camaraderie. Today, through the efforts of the AANS and the NREF, we offer more than 100 continuing medical education programs for neurosurgeons from residency to retirement, as well as courses for the advanced practice clinicians who work with us. And, of course, we hold our Annual Meeting—a meeting that brings us together to learn, to socialize, and to renew our commitment to each other and to our specialty. Don’t let anyone convince you that this kind of gathering is no longer important.

Principle IV. Autonomy and Advocacy

When Cushing was appointed to his first faculty position at the age of 33, his annual salary was $500. It was expected that additional income would come from his private patients. However, early in the 20th century, there were those who called for paying clinicians a salary to work full time for a medical school, with all patient fees paid to the hospital. Early in Cushing’s career at the Peter Bent Brigham Hospital, Harvard Medical School was offered $1.5 million, an enormous sum at that time, to adopt this plan at the Brigham. Cushing came out firmly against it. He agreed that a clinical professor should have his teaching, research, and clinical activities under one roof, but he did not think that he should be deprived of the autonomy that a private practice would offer him. The Harvard leadership suggested to the Brigham trustees that a younger man might be secured for the post of Surgeon in Chief. In the end, the trustees voted to retain Cushing and to reject the grant. Many of us are only too familiar with this kind of scenario. As the costs of maintaining a practice rise and reimbursement for our services falls, more and more neurosurgeons have become salaried employees. In this environment, our autonomy in managing our patients is under assault from insurance companies, hospital administrators, practice plan administrators, quality improvement committees, the federal government, and others. We are told when to start and stop antibiotics, who does and who does not need an MRI scan, who needs to be referred to physical therapy, how often we must wash our hands, and how to prepare a patient for a craniotomy. We know that often it is compliance, not quality, that is measured and rewarded. We listen to harangues by airline pilots and the disciples of Japanese auto manufacturers on how to improve the safety and quality of neurosurgical care. We are compared, unfavorably, to line cooks at the Cheesecake Factory. Our health care system is depressingly bureaucratic and getting worse instead of better. As a specialty, we cannot just long for the good old days or rage against the madness. We must be committed to maintaining our autonomy in an increasingly hostile environment. This kind of advocacy for our profession also has a long pedigree. In 1934, Cushing was asked to head an advisory group to a federal committee that had been created to “study … measures for bringing about better distribution of medical care in the lower income groups … and more satisfactory compensation of physicians and others who rendered medical services ….”

![Fig. 3. Photographs of Dr. Gilbert Horrax, Dr. Cushing’s long-time assistant (A), Dr. Leo Davidoff, Dr. Cushing’s resident (B), and Dr. Norman Dott, Dr. Cushing’s resident (C). From Cohen-Gadol AA, Spencer DD (eds): The Legacy of Harvey Cushing: Profiles of Patient Care. New York, NY/Rolling Meadows, IL: Thieme/American Association of Neurological Surgeons, 2007. Original photographs housed at Cushing Library, Yale University.](image)
Neurosurgery’s founding principles

accepting the invitation, wrote, “… most of the agitation regarding the high cost of medical care has been voiced by public health officials and members of foundations—most of whom do not have a medical degree, much less any actual first-hand experience with what the practice of medicine and the relation of doctor to patient means.”21 The AANS has devoted much of its efforts, through the work of our political action committee, practice management courses, and—in collaboration with the Congress of Neurological Surgeons—the numerous activities of the Washington Committee and the Council of State Neurosurgical Societies, to defending the autonomy of neurosurgeons. In addition, as more of us become hospital and health system employees—and as more of our compensation is determined by documenting our value to the health system—we need to develop the infrastructure to collect and report the data we will need to prosper. The AANS, through the NeuroPoint Alliance and its National Neurosurgery Quality and Outcomes Database program, is an indispensable organization for neurosurgery and neurosurgeons in this new environment. Knowledge is power. Those specialties that can best collect, analyze, and report data will prevail, and the AANS is committed to making sure that neurosurgery is one of those specialties.

Principle V. Humility

The caricature of the neurosurgeon features arrogance. However, in my experience, neurosurgeons are rarely arrogant. They are usually confident but humble individuals. Dr. Cushing displayed this combination of great confidence and great humility. In 1921, he was asked to give an address at the Massachusetts General Hospital. He did not pay tribute to the many illustrious names associated with the hospital but extolled the virtues of those faithful employees—nurses, orderlies, clerks, and laundresses (Fig. 4)—who had given a lifetime of loyal service and who, no less than the physicians and surgeons, created what he called the personality of the hospital.4,21

In another speech in 1930, he told his medical student audience that “You of the next generation of doctors, with triumphs undreamt of before you, will look back on the ignorance of mine with pity, and yet with charity, knowing that your turn will come.”5 Humility in the face of our ignorance is certainly a founding principle of our specialty. The leaders of the AANS who I have known have been confident but humble individuals.

Principle VI. Integrity

One of Cushing’s favorite quotes was “... if a doctor’s life may not be a divine vocation, then no life is a vocation, and nothing is divine.” Cushing’s view of neurosurgery as a divine vocation—a sacred occupation of great worth requiring extraordinary dedication and integrity—is the context of his whole life. He knew that health care is not a right. Rather, we, as physicians, have a responsibility to care for those who need our help—regardless of their ability to pay. These were not empty words for Cushing. If he felt that his professional fees were more than his patients could afford, he advised them to keep their money for their convalescence.7 It is estimated that he collected his surgical fees from about one-third of his patients. Few of us have that option today and we have all seen the newspaper stories regarding unscrupulous billing practices, fraud, unnecessary surgery, and other unprofessional conduct by neurosurgeons. There is plenty of blame to go around. We have created a health care payment system that is astonishingly arcane and puts many layers of bureaucracy between the physician and the patient. We are under a great deal of
pressure to increase our productivity by any means possible. In this environment, when our compensation comes not from the patient but from an insurance company, a federal agency, or the hospital, there is a great deal of temptation to make maximizing revenue our highest priority. This aspect of neurosurgery is far from a divine vocation. Being a neurosurgeon is a very odd way to make a living. We sit down with people we have never met and 30 minutes later they have agreed to let us perform operations that may leave them blind or paralyzed or comatose or dead. This is a remarkable expression of trust, and it only works if our patients are certain that our only concern is doing what we believe is best for them. If we lose this trust, we will not get it back.

Harvey Cushing, at his 70th birthday party, which occurred during the 8th Annual Meeting of this society, stated, “…ours is perhaps the most arduous and responsible of the many surgical specialties, we can have the great satisfaction of knowing that only men of a certain type will venture to make it their life work … its devotees have … the respect of the profession as a whole. May this continue for all time to be true.” Our founders held themselves to the highest standards, and the AANS will be vigilant in its support of this founding principle. May this continue for all time to be true.

Principle VII. It Is a Privilege to Be a Neurosurgeon

I want to close with an expression of gratitude to this specialty—this divine vocation—and to my patients. We need to remember what an enormous privilege it is to be a neurosurgeon. The view from behind my desk is shown in Fig. 5. Doctor Cushing passes judgment on my inadequate attempts to follow in his footsteps, and just beneath his gaze is an admonition to “Remember Why”—why I wanted to be a neurosurgeon in the first place. It was not to make the most money or achieve the greatest recognition. It was to be deemed worthy to enter a charmed circle, to carry on the traditions and founding principles of someone like Harvey Cushing. The admonition to remember why also reminds me of a parable that my grandfather first told me. A young man sets out looking for a job. He comes upon a stonemason and asks him how he likes his work. The stonemason tells him that it is exhausting work, cutting, lifting, and fitting heavy stones all year. His back hurts, his shoulders ache, and his hands are calloused. He tells the young man that he has been working on this wall for years and doubts he will ever get it done. It is a dreadfully hard job. The young man walks on, finds a second stonemason and once again asks how he likes his work. The second stonemason says, “I love this job. I’m building a cathedral.” When our hours are long, our frustrations great, our patients ungrateful, and the bureaucracy overwhelming, we must remember our founding principles and realize that we are building a cathedral. It is a great privilege to be a neurosurgeon, for neurosurgery teaches us, in a way that a less divine vocation cannot, how precious and fragile each human life is—and how important it is for each of us to do our very best, every day, in all that we do.

I would like to close with a reading from a book, given to me by one of my patients, a poet of some renown. She sent her book to me after her surgery because it included a poem she had written for me. It expresses the privilege of being a neurosurgeon with much greater eloquence than I could muster:16

[Poem reading]

Principle VIII. Remember Why

...ours is perhaps the most arduous and responsible of the many surgical specialties, we can have the great satisfaction of knowing that only men of a certain type will venture to make it their life work … its devotees have … the respect of the profession as a whole. May this continue for all time to be true.2 Our founders held themselves to the highest standards, and the AANS will be vigilant in its support of this founding principle. May this continue for all time to be true.

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Disclosure
The author reports no conflict of interest.

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