

Excellence in Spinal Neurosurgery

Volker K.H. Sonntag

The *New Oxford English Dictionary* defines excellence as “the possession chiefly of good qualities in an eminent or unusual degree surpassing merit or skill.” The definition of medicine is “the art of restoring and preserving health.” Consequently, excellence in medicine is the art of restoring and preserving health with surpassing merit or skill.

For patients, the price of mediocrity is high if it means morbidity or mortality. Therefore, the cost of mediocrity, in both human and financial terms, is higher than the cost of excellence. Nonetheless, the financial cost of pursuing excellence, particularly when it involves sophisticated methods of diagnosis and treatment, can be high and somehow must be reconciled with the total resources available for health care.¹

Excellence does not translate to the same objective in every situation. The excellence, ie, the goal, of a spine surgeon is not that of a vascular surgeon. The excellence of an internal medicine doctor is not that of a pediatrician. The definition of excellence or the pursuit of excellence involves a struggle to obtain mastery or complete control of doing something considered imminently worth doing. My definition includes that aspect of excellence, but I also define excellence in spinal neurosurgery as a wheel supported by multiple spokes. The spokes consist of leadership, family, physical and mental fitness, mentoring, education, judgment, patient care, research, friendship, obligation to society, and technical mastery.

HISTORICAL EXCELLENCE

Many well-known neurosurgeons are hallmarks of excellence in spinal neurosurgery. Excellence in spinal neurosurgery began in 1887, when Victor Horsley first successfully removed a spinal cord tumor. In 1905, Cushing incised the posterior column of the spinal cord to remove an intramedullary growth and was surprised by the patient's unexpected improvement after the procedure. Elsberg's interest in spinal cord tumors led to his publication of *Tumors of the Spinal Cord* in 1925.

In 1929, Dandy continued the tradition of excellence in spinal neurosurgery when he successfully operated on 2 patients with intervertebral cartilaginous swelling. Regarding

the cartilaginous masses as traumatic in origin, Dandy proposed that sciatica might have a similar basis. In 1934, Mixter and Barr made a seminal contribution to the treatment of spinal disorders when they operated on a herniated lumbar disk and established its correlation to sciatica. From the 1930s through the 1950s, other neurosurgeons such as Stockey, Semmes, Murphy, Spurling, and Scoville contributed to the treatment of spinal disorders. All of these surgeons increased our understanding of spinal disorders, primarily of the cervical spine. In 1940, Cloward performed his first posterior lumbar interbody fusion. He made many superb contributions to the treatment of spinal disorders, which culminated in his 1958 report of his technique for anterior cervical discectomy and fusion.

More recently, Sandy Larson embodied this spirit of excellence when he emphasized that neurosurgeons should perform spinal instrumentation procedures, especially thoracic and lumbar instrumentation. In the 1970s and 1980s, he championed the neurosurgical treatment of complex spinal cases. Like Ed Benzel and Dennis Maiman, Sandy Larson also emphasized the importance of biomechanics in the treatment of spinal disorders. Ziya Gokaslan and Arnold Menezes, among others, are creating an excellent blueprint on how to treat tumors of the spine and abnormalities of the craniovertebral junction. The frontiers of excellence in spinal care are also being pushed forward by surgeons like Chris Shaffrey, Steve Ondra, Russ Nockles, and others who are championing the treatment of spinal deformities. Rick Fessler, Kevin Foley, and many more are emphasizing the importance of minimally invasive spine surgery.

Besides those already mentioned, excellent spinal neurosurgeons worthy of mention are Charlie Branch, Reg Haid, Mike Fehling, Vince Traynelis, Atul Goel, Noel Perin, Paul McCormick, Stephen Papadopoulos, Curtis Dickman, Paul Cooper, Alan Crockard, Mark Hadley, Luiz Pimenta, Ron Apfelbaum, Pat Johnson, Rick Batzdorf, Dan Resnick, Robert Heary, Sunny Sundaresan, Ian Kalfas, Rusty Rodts, Ken Yonemura, and, unfortunately, too many others to name.

LEADERSHIP

Excellence in leadership in spine was demonstrated by David Kelly, who led the Neurosurgical Spinal Task Force in

the early 1990s. This task force was singularly responsible for keeping spine a part of neurosurgery. At that time, our orthopedic colleagues challenged organized neurosurgery concerning who should be the primary and possibly the only specialty to provide spine care, especially complex surgical spine care. The Neurosurgical Spine Task Force, under Dr Kelly's superb leadership, made sure that spine care remained a prominent component of neurosurgery.

Ed Laws, Stewart Dunsker, Russ Travis, and Sid Tolchin, all past presidents of the American Association of Neurological Surgery, and Ron Pickard, then President of Sofamor Danek, also demonstrated excellent leadership when organized neurosurgery, industry, and organized orthopedics successfully defended the benefits of the pedicle screw. These leaders were instrumental in winning the legal battle against the Plaintiff Legal Committee and its thousands of lawsuits against spinal surgeons and industry. As a result of their efforts, the pedicle screw was reclassified as a Class II device; ie, it obtained Food and Drug Administration approval. After this reclassification and a growing number of verdicts against the Plaintiff Legal Committee, most of the plaintiff's suits were dropped. This fight, however, took almost 10 years, so commitment is also part of excellence.

EXCELLENCE IN PROFESSIONAL RELATIONSHIPS

Spinal neurosurgeons need excellent working relationships with their colleagues, which include fellow neurosurgeons, residents, operating room personnel, nurses, and physician extenders, among others. Nurses are the backbone of good patient care, and neurosurgeons should respect and honor their role. Surgeons might be the captains of the ship, but nurses make it sail. Physician extenders are also an integral part of good patient care. Nurse practitioners and physician assistants are now an invaluable component of patient care, teaching, mentoring, nursing, and acting as liaisons among neurosurgeons, patients, and their families. This was not always the case.

Nurse practitioners and physician assistants first became a part of neurosurgical care in the middle 1970s. At that time, I was a resident at the Neurosurgery Department at Tufts University and was one of the authors of an article defining the physician assistant's role in neurosurgery as basically working as the equivalent of a postgraduate year 1 intern. In an editorial note, the editor of the journal stated that "the Editor does not agree with the use of physician assistants in neurosurgery."² Nonetheless, physician assistants and nurse practitioners are now major contributors to excellent patient care in neurosurgery.

A primary goal in spinal neurosurgery, as it should be in all aspects of medicine, is achieving a good patient/doctor relationship. Fidelity, honesty, and altruism should govern

a physician's relationship with neurosurgical patients. Neurosurgeons need to be compassionate listeners. Yet a recent study found that 72% of doctors interrupted their patient's opening statements after an average of 23 seconds.³ Neurosurgeons should cultivate a patient-centered relationship. Neurosurgeons need to honor the trust their patients place in them; they should advocate for patients throughout their course in the healthcare system.

SURGICAL SKILLS

The ultimate goal in spinal neurosurgery is good patient care, which consists of detailed preparation, excellent surgical skills and decision making, and, as discussed, excellent working relationships with colleagues and patients. Excellent surgical skills are first achieved and then maintained through a thorough understanding of the anatomy and biomechanics of the spine and surgical pathology. Technical surgical skills are then improved with experience and repetition. To quote Aristotle, "Excellence is an art won by training and habituation. We are what we repeatedly do. Excellence then, is not an art but a habit."

Surgical skills must be used constantly and are improved by embracing new techniques and procedures that will benefit the surgical care of patients. Excellence is achieved by regularly reviewing the results of one's activities, which helps improve performance, and acquiring expertise in one's chosen specialty. A good example of this process in neurosurgery is submitting key cases to the American Board of Neurosurgeons every 3 years as part of the maintenance of certification (MOC) process. These cases are possibly then reviewed and compared with similar cases submitted by colleagues. This process also could help determine the spinal neurosurgeon's performance, thereby possibly leading to improvement and eventually to excellence.

Theoretically, excellence is never making a mistake, but that goal is unobtainable. Consequently, when a mistake or mishap does occur, it should be admitted and disclosed. It is important to learn from mistakes. Therefore, the process of disclosure and learning from mistakes contributes to achieving excellence.

JUDGMENT

Although excellence in surgical skills is important, decision making, especially in spinal surgery, may be even more important. The decision to operate or not to operate is one that we as spinal neurosurgeons face daily. When, or even if, to operate is also often crucial, for example, on an acute spinal cord injury, bilateral locked facets, or a burst fracture of the thoracolumbar junction.

Decisions about surgical procedures should be based on evidence-based medicine, which is lacking in spinal neurosurgery. However, the guidelines for the management of acute

cervical spine and spinal cord injury published in 2002 are an excellent start. They point out the lack of Class I evidence in the treatment of cervical spinal cord injury.⁴ The guidelines for the performance of fusion procedures for degenerative disease of the spine published in 2005 also point out the lack of Class I evidence for fusion procedures of the degenerative lumbar spine.^{4,5}

Determining whether to operate is a thoughtful, often agonizing process. It should be driven by providing the patient the best care available. The decision to operate should be made once all appropriate nonsurgical treatments have been exhausted; the diagnostic abnormalities and the history and physical of the patient fit the surgical indication of the disorder or disease; and the patient, after being well informed about the surgery, agrees to the surgery. Greed, secondary gain, personal ambition, and deceit do not belong in the armamentarium of spinal neurosurgeons and are the antithesis of excellence.

SERVING WITH EXCELLENCE

Spinal neurosurgeons not only should demonstrate excellence by mastering the technical aspects of their field and fostering their relationships with friends, students, and family but also should serve their neurosurgical community. As my colleague Hal ReKate likes to say, neurosurgeons should become neurosurgeon citizens. This contribution to excellence can be expressed on many levels, for example, by serving on committees of sections and associations. Joining the Sergeant-at-Arms Committee is a good start. Serving on boards, executive committees, and councils of the various neurosurgical organizations and participating on the editorial boards of neurosurgical journals are other venues of service.

It is important for neurosurgeons to assume leadership positions in professional organizations to continue to foster excellence in the field itself. This work is all voluntary, nonremunerative, and, to some extent, a sacrifice. But the effort is very worthwhile. Only by becoming involved, giving back, and not sitting on the sidelines can spinal neurosurgeons fully contribute to their specialty and possibly even influence, in a small way, its course.

Yet we also have an obligation to our nonneurosurgical community. Spinal neurosurgeons should contribute to the well-being of society as a whole: volunteering at a food kitchen, coaching children's sports teams, participating in the Parent Teacher Association, volunteering and serving at a church or synagogue. We can volunteer in a neighborhood, city, state, country, and even underdeveloped countries.

A neurosurgeon's haven of support is composed of friends and family. Friendship should be cultivated and cherished. It is a relationship that involves mutual knowledge, respect, and esteem. Family is, in my opinion, the most important component of anyone's life and certainly should be that for a spinal neurosurgeon. We should do everything possible to be a good life partner and a loving, caring, and teaching parent.

EDUCATIONAL EXCELLENCE

Becoming a spinal neurosurgeon, an excellent spinal neurosurgeon, is a long, difficult, and demanding educational process. To become neurosurgeons, students must be in the top of their class in high school, college, and medical school to obtain that coveted resident spot. There is self-selection for a neurosurgical career. In 2007, the 126 medical schools admitted 17 759 students of the 42 315 who applied.⁶ Of the about 16 000 graduating medical students per year, only 310 apply for the 171 positions as first-year neurosurgical residents in the United States. This group of students has been exposed to the demands and trials of neurosurgical training and to the competition to obtain neurosurgical training.⁷ Even after completion of residency, success is not guaranteed. Neurosurgical training, as we all know, is arduous but eventually rewarding. Nonetheless, board certification is not guaranteed. The average failure rate on the written board examination is 17%, and the average failure rate on the oral examination is 15%.⁸

Even after board certification is obtained, formal education must continue. The MOC process is now a reality. In fact, 40% of neurosurgeons now have a time-limited certificate and participate in the MOC. Regardless of participating formally in MOC, all neurosurgeons must continue to educate themselves in surgical technique and in the 6 competencies: cognitive knowledge, patient care, professionalism, system-based practice, self assessment, and communication. As the Roman philosopher Horace (65-8 bc) claimed, "No man ever reached to excellence in any one art or profession without having passed through the slow and painful process of study and preparation."

MOC is important. But equally important is teaching that experience to students, residents, and fellows. Teaching should encompass more than basic neurosurgery, more than spinal neurosurgery; it should also consist of mentoring and nurturing. This can be done by example, by listening, and by counseling. During the training period to become a neurosurgeon, it should be emphasized that neurosurgery is important but that family, outside activities, and hobbies should not be neglected. When training is complete, individuals should not be neurosurgical geeks; they should be neurosurgical mensches.

At the Barrow Neurological Institute, we have had the opportunity to train 138 graduates, 46% of whom work in academics at 44 institutions in Canada and the United States. We hope that we trained them to become complete neurosurgeons, ie, neurosurgical mensches.

RESEARCH

Research also is essential to continue to push the frontier in spinal neurosurgery. It is an obligation to advance the specialty of spinal neurosurgery, and both clinical and bench research must be included. Bench research should focus on advancing the treatment of spinal cord injury and the field of biomechanics. Recently, biologics and genetics have emerged

as areas of intense research interest. Such research is mandatory to advance all aspects of spinal neurosurgery and to promote excellence in the treatment of spinal abnormalities.

CONCLUSION

Excellence in spinal neurosurgery can be defined as a wheel. The spokes of the wheel are education, mentoring, good judgment, patient care, research, friendship, leadership, physical fitness, obligation to society and family, and technical mastery. Each spoke supports the wheel. Excellence or striving for excellence in each one of these spokes is my personal definition of excellence in spinal neurosurgery.

Disclosure

The author has no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

AU1

REFERENCES

1. English TA. What price excellence? *J Med Ethics*. 1982;8(3):144-146.
2. Sonntag VK, Steiner S, Stein BM. Neurosurgery and the physician assistant. *Surg Neurol*. 1977;8(3):207-208.
3. Marvel MK, Epstein RM, Flowers K, Beckman HB. Soliciting the patient's agenda: have we improved? *JAMA*. 1999;281(3):283-287.
4. Guidelines for the management of acute cervical spine and spinal cord injuries. *Neurosurgery*. 2002;50(Suppl 3):S7-S17.
5. *J Neurosurg Spine*. 2005;2(6). **AU2**
6. Kaiser Family Foundation. Coverage, access and quality: record number of students apply to medical schools, enrollment of black, Hispanic men increases by 9.2%, study finds. http://www.kaisernetwork.org/daily_reports/rep_index.cfm?hint=5&DR_ID=48263. October 17, 2007. **AU3**
7. Grady MS, Batjer HH, Dacey RG. Resident duty hour regulation and patient safety: establishing a balance between concerns about resident fatigue and adequate training in neurosurgery. *J Neurosurg*. 2009;110:828-836.
8. The American Board of Neurological Surgery: Program Directors Letter. <http://www.abns.org/pdfs/Program%20Directors%20Letter%20-%20May%202007.pdf>. May 2007. **AU4**