Editorial

Surgical education in the twenty-first century

M. SEAN GRADY, M.D.

Department of Neurosurgery, University of Pennsylvania Medical Center, Philadelphia, Pennsylvania

In this era of increased scrutiny on patient safety, surgical education, and informed consent, Dr. Morgan and his colleagues test an exceedingly important hypothesis regarding the effect that resident participation has on the outcome of major intracranial surgery. It is a very common experience for faculty neurosurgeons at academic medical centers to be asked by patients and/or their family about who will perform the operation. Specifically, the patient wants reassurance that the experienced surgeon—not a trainee—will be performing the operation. The public is increasingly well informed about this particular topic from the media and is perhaps misled by the inaccurate portrayal of surgeons in popular television programs. Furthermore, there have been proposals introduced by the Centers for Medicare and Medicaid Services to specifically identify, through the informed consent process, exactly who will be performing what part of the operation as well as the level of experience of that individual. As counterpoint, neurosurgical training programs are responsible for educating the neurosurgeons of the future who will be taking care of us. In addition, the residency program director in the US now must state for each finishing resident that the resident is competent to independently perform “common” neurosurgical procedures, although there is no definition as to what are common neurosurgical procedures. One can use the guidelines for case numbers posted by the Neurological Surgery Residency Review Committee (www.acgme.org/acWebsite/RRC_160/160_guideCaseNumb.asp) as a surrogate for operations that a resident should master by the conclusion of residency. If that is used, then residents performing at least the median number of surgeries could be considered competent in that procedure. Craniotomy for aneurysm is included in this group of procedures. This presupposes that the resident played a significant role in the operation.

Morgan and colleagues address the impact that the trainee has on outcome of elective craniotomy for small, uncomplicated aneurysms. They defined an adverse outcome as a new neurological deficit (present 6 months after surgery) caused by the procedure. Data were collected as 3-year increments over a period of 15 years, with 355 cases evaluated (196 with significant trainee participation and 159 with no trainee present). The initial 3-year interval demonstrated a higher-than-expected morbidity rate, which the authors attribute to a learning curve by the senior surgeon. In the remaining 12 years, the presence or absence of a trainee made no difference in achieving a very respectable outcome.

There are several important qualifying features in this study. First, the senior surgeon was always present and scrubbed in the operating room, assisting the trainee. Second, residents were experienced (that is, they were in their last 3 years of training), although it is not quite clear how many cases were performed by senior advanced residents who were expected to perform the majority of the intracranial microdissection and aneurysm clip placement as opposed to less experienced trainees who performed the extradural component of the surgery. Finally, the impact that the resident had on the duration of operative time was not measured, although this was not an aim of the study.

Risks posed to patients by trainees are not restricted to residents. As new techniques are introduced into neurosurgery (deep brain stimulation, radiosurgery, neuroendoscopy, and endovascular approaches to identify just a few), neurosurgeons in practice must determine how they will incorporate these skill sets into their practice. One inadequate strategy is to attend a weekend course for the purposes of certification. The introduction of robotic surgery into obstetrical and gynecological, urological, and general surgical procedures may serve as a modern example of how to safely introduce new technology. In acquiring this skill set by a surgeon in practice, the trainee performs a standardized number of procedures with a supervisor to ensure satisfactory outcomes. This is quite analogous to residency training and perhaps serves as a model to cite to patients and payors.

The Halsted approach to surgical training, wherein the trainee is given progressive graded autonomy, may no longer be viable in the twenty-first century. On the other hand, there is no question that practice makes perfect, and that observation alone is insufficient to develop the motor skills needed to safely and successfully perform surgical procedures. Surgical simulators for neurosurgery are in a nascent stage of development but promise some capability of providing a means of manual practice. However, actual
performance of surgery remains essential to develop the
skills necessary to perform neurosurgical procedures safe-
ly. It is of significant importance that trainees, under the im-
mediate supervision of established surgeons, are capable
of performing as well as the established surgeon alone in
complex cranial operations. More studies such as this will
be critical in reassuring the public that meaningful partici-
pation of trainees in surgery in no way affects outcome.

Reference

1. Reznick RK, MacRae H: Teaching surgical skills—changes in the

RESPONSE: First and foremost, we not only agree with Dr.
Grady’s comments, but we also find his endorsement of our
study’s relevance to the evolving and dynamic field of ne-
urosurgical training very encouraging. We need to strive to
improve neurosurgery through such basic principles as a
commitment to lifelong learning.1,2 This must include im-
proving neurosurgical education and understanding of the
impact that this has on clinical outcomes. Just as evidence-
based medicine is important in medical decision making,
evidence-based education should also be of importance in
planning neurosurgical training. Evidence that improve-
ment in neurosurgical education is possible has been pro-
vided by Long3,4 with an innovative competency-based
curriculum. However, in addition to this overall curriculum
design it is important to also investigate specific education-
al contexts (such as aneurysm surgery in specific institu-
tions) and their impact.

It is readily apparent that neurosurgery harms a signifi-
cant number of patients. Therefore, it is imperative for us to
be committed to lifelong learning to improve our under-
standing of performing neurosurgery.5,6 It is also an impor-
tant principle that neurosurgeons learn best by practicing
neurosurgery.1,2 It follows from the potential for us to harm
patients in neurosurgery and the need to learn by practicing
neurosurgery that a profound ethical and professional di-
lemma challenges those who do not understand the impor-
tance of a team approach to healthcare delivery. The in-
dividual neurosurgery expert who delegates responsibility
to less experienced surgeons is knowingly increasing the
likelihood of harm to patients. However, we believe this
view of the neurosurgery workplace is incorrect. The un-
derstanding and delivery of neurosurgical care belongs to a
community of highly skilled and educated practitioners that
not only includes participation by neurosurgeons but also
extends to include all the team members responsible for
patient care. This understanding is shared within this com-
unity of practice. In this community of practice, the sep-
aration between the need for neurosurgeon and resident to
be identified as learners should be abolished. The neurosur-
geon is a senior learner and the trainee is the junior learner.
This is the enactivist view of learning.1,2 We, as neurosci-
entists, should recognize the similarity between the com-
monality of practice of the team members and their interac-
tions and the parallel conception of how teams of neurons
interact to enact learning and memory. In the brain, un-
derstanding does not rest with one neuron but is a shared
action of a team of neurons. In neurosurgery, understanding
does not rest with one neurosurgeon but shared action of a
team. In addition we believe that the general public needs
to realize that a team approach to their treatment provides
the best protection against error.

In recognition of this team approach to healthcare de-
delivery and learning, we at the Australian School of Ad-
vanced Medicine at Macquarie University call our resi-
ients “Scholars” and our faculty “Advanced Scholars” as
an acknowledgment that learning is a primary responsibil-
ity. A bidirectional feedback between student learner and
neurosurgeon learner is essential for the potential optimiza-
tion of both the learning experience and patient care. The
goal to achieving an improvement in medicine is for both
the resident and the surgeon to recognize that one of their
most important roles is to learn. Learning within a team of
learners (including the resident–surgeon team) in the con-
text of performing as a surgeon is essential for both in the
present and future.1,2

DEEPA SONI, M.D., M.P.H.
MICHAEL K. MORGAN, M.D.B.S., M.MED.ED., F.R.A.C.S.
Macquarie University
Sydney, Australia

References

1. Brown JS, Collins A, Duguid P: Situated cognition and the culture of
2. Davis B, Sumara DJ: Cognition, complexity, and teacher educa-
3. Long DM: Competency based residency training: the next ad-

cance in graduate medical education. Acta Neurochir Suppl 78:
153–158, 2001
4. Long DM: Competency-based training in neurosurgery: the next
5. Long DM: Educating neurosurgeons for the 21st century. Ne-
urosurg Q 62:78–88, 1996
6. Schön DA: Educating the Reflective Practitioner. Toward a
New Design for Teaching and Learning in the Professions.
San Francisco: Jossey-Bass, 1987
7. Shumway JM, Harden RM: AMEE Guide No. 25: The assessment
of learning outcomes for the competent and reflective physician.