Commentary: In surgical training, practice makes...*almost* perfect

Joseph A. Dearani, MD, and John M. Stulak, MD

From the Department of Cardiovascular Surgery, Mayo Clinic, Rochester, Minn.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Aug 21, 2018; accepted for publication Aug 24, 2018; available ahead of print Sept 24, 2018.

Address for reprints: Joseph A. Dearani, MD, Department of Cardiovascular Surgery, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (E-mail: jdearani@mayo.edu).

J Thorac Cardiovasc Surg 2019;158:e15-6

0022-5223/\$36.00

Copyright © 2018 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2018.08.055>

Postgraduate education in medicine has undergone dramatic change during the last 15 years and has been strictly enforced by the Accreditation Council for Graduate Medical Education. Changes are not specialty specific and not evidence based, nor are they supported with the investigational rigor necessary to change other practice paradigms.¹ The 80-hour workweek restriction has received the greatest attention, and uncontrolled studies in the medical specialties are extrapolated to the surgical specialties.¹ Surgeons, like military personnel, police officers, firefighters, astronauts, and athletes, among others, are counted on to perform at their human limits intellectually, emotionally, and physically. Training for these professions requires significant practice, conditioning, and resilience to be successful.¹ These elite performers typically work beyond standard limitations to achieve excellence. Success in surgery requires intellect, technical ability, critical thinking, judgment, and grit (Figure 1).^{2,3} All these essential qualities are part of the surgical residency curriculum and are obtained in the hospital setting: the operating room, outpatient clinic, intensive care unit, step-down wards, and conference rooms. If residents want to improve their individual performance, however, the only factors that can be pursued outside of the hospital are technical abilities (through simulation exercises) and fund of knowledge (intellect).²

The review in this issue of the *Journal* by Han and Patrick,⁴ “See One—Practice—Do One—Practice—Teach One—Practice: The Importance of Practicing Outside of the Operating Room in Surgical Training,” sends a refreshing and important message to the current era’s surgical trainees (and attending surgeons). Han and Patrick⁴ emphasize the importance of “practice” outside the operating room as a necessary strategy to improve technical ability. There are numerous strengths of this review. First, the article is written by 2 residents (no faculty in the authorship) who recognize that cardiac surgery, arguably the most technically demanding surgical specialty, has an insufficient training paradigm to achieve (technical) excellence.

Surgeon success depends on integration of 5 key variables, including technical ability.

Central Message

Technical ability is an essential ingredient for surgeon success and can improve with independent and deliberate practice.

See Editorial page 671 in the February 2019 issue.

Second, the article provides a thorough overview of the types of “practice”—both independent and deliberate practice. Each is accurately defined and well referenced to serve as a resource for those interested in understanding the subject, and each focuses on “various practice regimens of effortful activities designed to optimize improvement with specific goals, intrinsic focus, self-reflection, and appropriate feedback.” Third, “grit,” or perseverance, is recognized as an important quality for further improvement in performance. In the field of surgery, grit can refer to either one’s personal desire to improve technical performance with practice simulation outside the operating (as Han and Patrick⁴ use the term) or to persistence by the surgeon in an individual patient’s care (eg, a complex case of a patient with multiple trips to the operating room, protracted intensive care unit course with complications, etc). This “never give up” attitude is a mind-set that is generally present in the personality and style of every cardiac surgeon. Finally, the article has relevant analogies to other professional domains, such as the sports world, that help to emphasize salient points and to make it an enjoyable read. Han and Patrick⁴ recognize the challenge of achieving comprehensive surgical training and acquisition of the necessary skills for competency on residency completion. They focus their “out of hospital efforts” on improvement in technical abilities and apply various simulation exercises with appropriate supervision and feedback.

FIGURE 1. Surgeon success depends on integration of 5 important variables. Technical ability is one element, and it can be improved with independent and deliberate practice.

Specific to the issue of resident training, and particularly surgical training, the impact of work hour restrictions should be separated into tangible (measurable) and intangible (subjective assessment) components. The *tangible* impact of work hour limits is measurable and has been examined in the literature; however, most reports exist as “survey” data. Interestingly, most trainees do not approve of work hour restrictions, report no change in supervision and no change in rest, and also report increased hand-offs, duty hour noncompliance, and falsification.⁵ Now, 15 years later, these initial impressions have remained consistent. Despite these widespread negative impressions, even more stringent regulations have been imposed (rather than the opposite) in response to those actually engaged in surgical training. In many general surgery programs, case numbers have declined significantly (31%; 1395 to 953) for junior residents as well as for chief residents (31%; 345 to 237) before versus after duty hour restrictions.⁶ In addition, it also has been shown that when aggressive and innovative resourcefulness (ancillary staff hiring, night float, less overnight call) were implemented to preserve education, there were no significant changes in operative case load.⁷ To date, there has been no large-scale assessment of other important aspects of resident surgical education that may have been impacted, such as subspecialty fellowships sought and attained, academic productivity, or early attending surgical outcomes within the first 5 years of independent practice. It is difficult to ascertain whether these adverse consequences exert a long-lasting effect on the trainee or at what point after graduation they are overcome and what cost they detract from surgeon experience, outcomes, or quality of life.

The *intangible* impact of work hour limits is more difficult to capture and may be the most adverse effects of work hour restrictions. Reduction in clinical exposure means less experience with those skills that are least enhanced by independent or deliberate practice. The most important of these is the domain of surgical judgment and critical thinking. These skills are innately tied to presence of *real-life* clinical situations, whether in the operating room, the intensive care unit, or the outpatient setting when trying to weigh the risks, benefits, and role of surgery in a complex case. Only through the *physical presence* of these real scenarios can these skill sets be learned.

Work hour restrictions and Accreditation Council for Graduate Medical Education rules are here to stay. Resident and attending surgeons must work within the boundaries of these regulations and at the same time incorporate new technologies and procedures that facilitate and advance the specialty. Both practicing in one’s “off time” and surgeon self-assessment are also essential to optimize performance and improve outcome. These factors cannot be overemphasized, because the current era is one of public reporting and transparency, which are currently applied to programs and institutions but are soon to become surgeon specific. Cardiac surgery is a “high stakes, high reward” specialty, with an intricate interface between technology (the heart-lung machine, robots, hybrid operating rooms with advanced imaging modalities, etc) and the patient...with the surgeon in the middle. Our quest to optimize and improve performance mandates our determination to adapt, change, persist, and “practice” at every level of our surgical career. In health care, there will always be room for outcome improvement, and for the surgeon, “practice” outside the operating room to advance one’s technical ability is just one method for additional surgeon success. Surgeons will always be chasing excellence and will always be...almost “perfect.”

References

1. Nauta RJ. The surgical residency and accreditation council for graduate medical education reform: steep learning or sleep learning? *Am J Surg.* 2011; 201:715-8.
2. Dearani JA, Gold M, Leibovich BC, Ericsson KA, Khabbaz KR, Foley TA, et al. The role of imaging, deliberate practice, structure, and improvisation in approaching surgical perfection. *J Thorac Cardiovasc Surg.* 2017;154:1329-36.
3. Dearani JA. A letter to the resident starting my service.... *World J Pediatr Congenit Heart Surg.* 2018;9:381-2.
4. Han JJ, Patrick WL. See one—practice—do one—practice—teach one—practice: the importance of practicing outside of the operating room in surgical training. *J Thorac Cardiovasc Surg.* 2019;9:671-7.
5. Drolet BC, Sangisetty S, Tracy TF, Cioffi WG. Surgical residents’ perceptions of 2011 accreditation council for Graduate Medical education duty hour regulations. *JAMA.* 2013;148:427-33.
6. Watson DR, Flesher TD, Ruiz O, Chung JS. Impact of the 80-hour workweek on surgical case exposure within a general surgery residency program. *J Surg Educ.* 2010;67:283-9.
7. Ferguson CM, Kellogg KC, Hutter MM, Warsaw AL. Effect of work-hour reforms on operative case volume of surgical residents. *Curr Surg.* 2005;62:535-8.