Surgical Subspecialization: Escape Route for Surgeons or Added Benefit for Patients?

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"I know what residents and interns and attendings are from watching *Grey's Anatomy*," my patient told me in the preoperative area before her thyroidectomy, "but what exactly is a fellow? You're a real surgeon, right?" I reassured her the way I do all patients with similar questions. Yes, I am a "real" general surgeon—board certified, in fact—but I am dedicating an extra year of training specifically to endocrine surgery.

I am not alone—80% of my colleagues finishing general surgery residencies choose to pursue fellowship training.[1–4] This increasing trend toward postresidency surgical subspecialization has been blamed for "intensif[ying] the shortage of general surgeons"[2] and is projected to "lead to further shortfall in general surgical services."[5] However, this bleak outlook is based in the pessimistic perception that general surgical residents seek fellowships as escape routes. I argue that we are motivated not by avoidance, but rather by a fundamental desire to deliver expert care to our patients . . . and the realization that residency does not equip us to do that.

General surgery residency instills an understanding of surgical principles, but it does not a master make. Although nowadays this is often conveniently blamed on duty hour restrictions, I doubt that freshly minted surgeons have ever been able to claim real expertise. The oft-cited studies published by Ericsson and colleagues[6] (and popularized by Malcolm Gladwell in his book *Outliers*) suggest that elite performance results from 10 000 hours of "deliberate practice" extended over a decade or more. Others have estimated that it takes 15 000 to 20 000 hours to train a surgeon, doubling the 10 000 hours to account for development of both cognitive and technical skills.[7] By the numbers, even the 80-hour workweek does not compromise this: 80 hours per week for 49 weeks per year for 5 years totals 19 600 available hours. But, based on data collected *before* the implementation of work hours regulations, surgical residents only spend about 3000 hours operating (2753 hours as the surgeon and 272 as an assistant) during their 5 years of training.[8] Given that 3000 hours is about one-third the time over one-half the years that experts claim it takes to become an expert, it is no surprise that trainees feel unfinished upon the completion of residency.

In the past it may have been acceptable to accumulate the additional needed experience during the first few years of practice. Why are so many graduates in the modern era seeking additional formal training? The first, and most obvious, reason is that general surgery itself is changing. A recently published analysis of Accreditation Council for Graduate Medical Education case logs demonstrated that the average number of chief resident cases has decreased by 29: from 271 in 1989–1994 to 242 in 2007–2011.[9] Although this decline correlates temporally with the advent of the 80-hour workweek (and it is therefore tempting to write off the lost volume to lost time), I believe the real explanation lurks in the case diversity data. During the same time period, chief residents averaged 15 fewer trauma cases and 30 fewer vascular cases.[9] Nonoperative management of trauma and endovascular procedures, both unquestionably beneficial for patients, have eroded two basic pillars of general surgical training. The fundamental familiarity with anatomy that trainees gained from trauma laparotomies or open vascular exposures cannot easily be replaced by laparoscopic colectomies (which increased in the same study from fewer than 1 to more than 9 cases per chief resident[9]) or endovascular abdominal aortic aneurysm repairs (which increased 1000% between 1993 and 2007[10]).

Paradoxically, although case diversity is narrowing on a big picture scale, it is relatively rare for residents to perform discrete operations repeatedly during the course of their training. In fact, on average, residents perform 9 operations more than 20 times, 20 operations more than 10 times, and only 40 operations more than 5 times during 5 years.[4] For perspective, the Surgical Council on Resident Education (SCORE) curriculum currently lists 88 "essential-common" operations and 70 "essential-uncommon" operations; for all 158 of these, residents are expected to have "a comprehensive understanding of the procedures and their perioperative management regardless of their individual experience."[4,11] To further complicate matters, the number of repetitions of certain operations during a residency at a

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tertiary referral center often represents a skewed case distribution. For example, I did 12 renal transplantations and 11 pulmonary lobectomies during my training, but only 4 hemorrhoidectomies and 3 splenectomies. In fact, several of the 26 different cases I did more than 10 times are not considered "essential" at all, and should be performed by fellowship-trained subspecialists. For the academic purposes of well-rounded resident education and board examinations, understanding 158 cases makes sense. From a practical standpoint, however, I argue that it is unreasonable to expect *anyone* to be competent, let alone an expert, in performing 158 operations. By pursuing fellowships in greater numbers, perhaps surgical residents are recognizing this seemingly insurmountable task and consciously choosing more focused practices. Does that create a "shortfall in general surgery services," or does it simply build a surgical workforce who can realistically achieve true expertise?

Although the desire to excel is one reason to pursue subspecialty training, fear of inadequacy is also a powerful motivator. In several survey-based attempts to study the self-confidence of surgical residents, about one-quarter of residents worry that they will be unable to operate independently at the completion of training.[12,13] Regardless of the types of operations being done, surgical residents are losing autonomy overall. Duty hour regulations have soured attendings' attitudes toward trainees,[14,15] and because of a variety of other factors, including supervision regulations, billing stipulations, medicolegal considerations, and productivity pressures, residents do less and less. Of all the specialties, surgery suffers the most pronounced consequences because motor skills cannot be learned by reading and discussion. Even senior residents are often relegated to glorified first assistants, because the attending ultimately determines every detail, from incision placement to retractor positioning to skin suture material. Of the 1136 cases I recorded as "surgeon" during my residency, I was allowed to operate independently in about 25 of them. Overall my training was excellent, and my experience (or lack thereof) is typical. No wonder 43% of surveyed fellowship directors disagreed that fellows arrived capable of performing 30 minutes of a major procedure independently.[16] This inability to take charge in the operating room arises directly from being constantly micromanaged. Interestingly, there seems to be a corresponding disconnect between faculty perceptions of residents' knowledge deficits regarding operative management and residents' self-reported learning needs. Faculty identified natural history of disease, anatomy, and patient outcomes,[17] all of which reflect subjects that must be studied *outside* the operating room. Residents, on the other hand, reported their greatest shortcomings in instrument selection and use, selection of suture material, and operative field exposure.[17] I suspect many faculty members are never aware of residents' deficits in these seemingly minor aspects of intraoperative decision making because they never surrender this level of detail to the learners. Consequently, graduating residents are ill equipped to "captain" an operating room and may seek additional training in order to gain independence before they are truly on their own.

However, we must not link fellowship training with self-doubt. Our generation's proclivity to subspecialize is rooted in far more than insecurity. It also reflects the fact that we are growing up in a data-driven era. We are training in a time when evidence-based practice, patient safety, and quality improvement deservedly receive more attention than ever before. A junior-attending learning curve is less acceptable to patients and referring physicians alike. Evidence is mounting to show that higher surgeon volumes of specific cases lead to lower morbidity and mortality as well as shorter length of stay.[18–23] Even more compelling, recent research suggests that breast cancer patients and colon cancer patients are more likely to receive standard-of-care surgical treatment from trained subspecialists.[24–26] A shortage of 41 000 general surgeons is projected by 2025,[5] but in the face of data like these, perhaps we should worry more about improving the population's access to surgical subspecialists.

As a postgraduate year 8, I am finally looking for a job. Like many graduating fellows, I hope to find a position that allows me to concentrate primarily on my subspecialty. However, I do not believe this signals the demise of general surgery. Rather, I am proud to belong to a generation of general surgeons who recognize practical limitations and respond by developing focused expertise in order to take the best possible care of our patients.

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