



My name is *** and I am a general surgeon

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I want to thank President Daniel Margulies and the Southwestern Surgical Congress for the kind invitation to deliver the 2018 Thomas G. Orr Memorial Lecture. I have had an interest for almost ten years in the direction general surgery training is headed and have become keenly aware of the looming workforce shortage in general surgery.

The first question is “What is a general surgeon?” Many have trained to be general surgeons, but today the large majority of those completing a general surgery residency go on to complete a post-residency specialty training program. In 2014, the Resident Education Committee of the Society for Surgery of the Alimentary Tract (SSAT) published an article that discussed how the general surgery many of us ‘grew up’ with is a shadow of its former self.¹

Today, general surgery has been subdivided to the point we have specialization and even sub-specialization (Fig. 1). Several questions deserve consideration: Why is this happening and how did we get here? How is this sub-specialization impacting the looming workforce shortage in general surgery? Is the workforce shortage real or not?

Is the General Surgery Workforce Shortage Real? The idea of a workforce shortage in surgery is not novel. In 2008, Ellison and his colleagues² reported the average number of general surgeons necessary to serve a population is about 7.6 per 100,000. One of the assumptions in the article is that the average general surgeon will work approximately thirty years. The authors compared the number of general surgeons projected to retire to the number of new general surgeons expected to finish training from 2005 through 2035. The authors estimated that while the overall number of active surgeons would increase, it would not keep up with the projected demand. While this suggests a workforce shortage in general surgery, there is evidence that the problem may be a maldistribution of general surgeons. A paper published by the SSAT

similarly estimated the number of general surgeons to be 7 surgeons per 100,000 population.³ Unfortunately, the authors reported that graduates of training programs tended to practice in urban areas, thereby increasing the number of surgeons in urban areas and not in rural or non-urban areas. Interestingly, they reported that “the 7% of general surgeons in rural practices serve 60 million people, or 24% of the population”⁴ and that the disparity between urban and rural areas actually increased between 1996 and 2005. Specifically, the number of surgeons in urban areas increased (9.58–10.43 surgeons per 100,000 population) while for rural counties, (small rural/large rural and isolated) there was minimal change. We are training general surgeons and while there may be a future shortage, the maldistribution is likely to have a greater impact in rural communities.

The American Association of Medical Colleges (AAMC) Data Workforce Report⁵ demonstrated that between 2010 and 2015, the number of general surgeons in this country (who declared themselves general surgeons) decreased by 4%. A heat map (Fig. 2) from the American College of Surgeons Health Policy Research Institute demonstrated that from 2006 to 2011 there was a decline in the number of general surgeons in 1139 counties, 206 counties lost all their general surgeons, and 938 counties had none in either year.⁶ Closer examination reveals that many of these counties are likely rural, or at least, non-urban, reinforcing the concern that while there is an overall projected shortage of general surgeons, we have a substantial geographic maldistribution of general surgeons. It is unreasonable to expect patients in rural areas to come to urban areas for their care and many will never make it to see a general surgeon due to personal, financial, or logistic reasons. How do we fix that problem?

In order to identify the contributing factors it is important to understand the perceived reasons for the workforce shortage from those most involved, practicing surgeons and residents. The SSAT administered a survey to both groups in who were members of the SSAT exploring their thoughts on the contributors to the projected general surgeon shortage.⁷ Residents felt that decreases in insurance reimbursement, increases in practice expenses, lifestyle barriers and surgeon burn out were key factors contributing to the workforce shortage. In reality, residents have no direct experience with the issues of decreasing reimbursement and practice expenses so how did residents develop these opinions? One possible explanation is that they hear the faculty, practicing surgeons,

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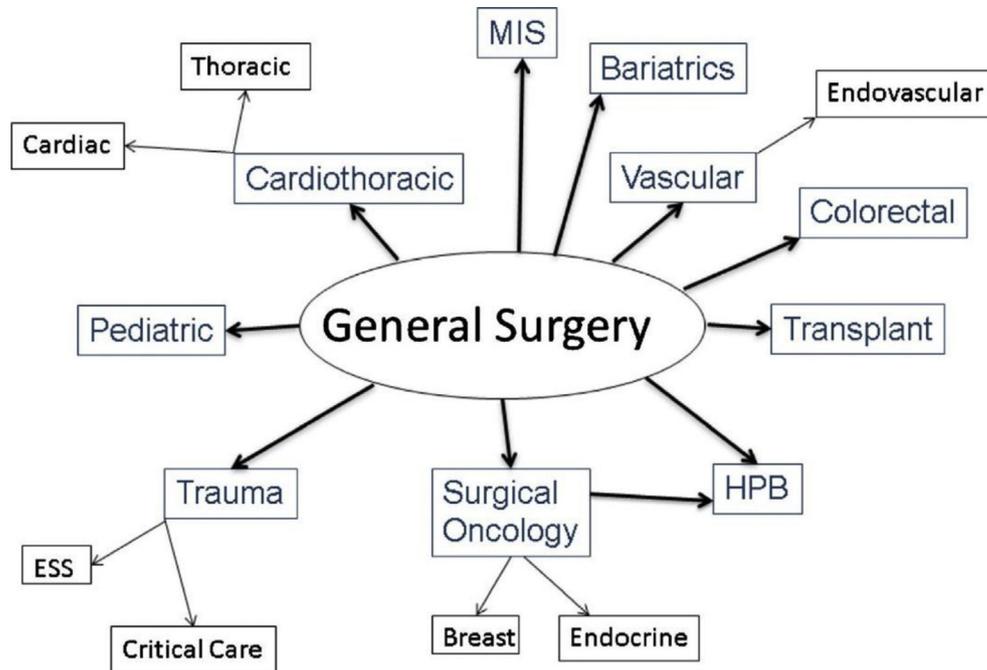


Fig. 1. The subspecialization of surgery in 2013.²⁷

complaining about poor work-life balance, diminishing reimbursements and the increasing cost of doing business. Hearing these kinds of comments may contribute to their perception of why general surgery might not be a great career choice. Our responsibility is to change the perception of general surgery with the hope that it leads to trainees choosing to remain in general surgery.

Until the 1970's the majority of graduates from general surgery programs were board certified and practiced general surgery. In the 1980's, the first two fellowships were developed in vascular surgery and surgical critical care both of which are approved by the Accreditation Council for Graduate Medical Education (ACGME).⁸ Recently, there has been a proliferation of non-ACGME fellowships, including one of the more popular fellowships, minimally invasive and bariatric surgery. The trend toward fellowships evolved in the ensuing 30 years and today up to 80% of graduating general surgery chief residents will pursue post-residency specialty training.⁹ One logical solution would be to simply train more general surgeons, but as many know, it is not quite that simple due to the Balanced Budget Act of 1997 which puts a "cap" on the number of Medicare funded residency positions.¹⁰ In many surgery training programs, the number of trainees exceed the Medicare funded positions and the "above cap" positions must be funded from other sources (e.g., hospitals, medical schools, practice plans, etc.). The seemingly simple and logical solution to the surgeon workforce shortage, train more general surgeons, requires identifying funding for those additional positions and addressing the issue that up to 80% of graduating general surgery residents are electing to do subspecialty fellowships. Much has been written regarding the need to focus complex procedures in high volume centers with expertise (the centers of excellence paradigm) to improve outcomes and streamline costs, but unfortunately, this creates the perception that a fellowship is necessary to be competitive to work in centers like these.

Are there factors contributing to the perception that post-residency fellowship training is necessary? The idea of professional fulfillment, the de-valuing of general surgery, and the fear of feeling

unprepared for practice have all been suggested as contributors to this trend. Interestingly, desire to practice in an urban area tends to require doing a post-residency specialty fellowship. If you want to practice in downtown Manhattan, it is difficult to "hang your shingle" and say "I am a general surgeon." Other fellowship trained specialists will be quick to point out that they have additional training, suggesting expertise that makes them better suited to treat a disease like colon cancer, breast cancer, or a thyroid nodule. Some of the decision to pursue a fellowship also depends on the desired practice model. Those of us in leadership roles promote specialization by saying that we need to hire a colorectal surgeon to do the advanced, complex colorectal cases, promoting the idea that sub-specialization is necessary.

Does doing a fellowship create a competitive advantage for jobs and did we create this perception in our trainees? In a 2012 publication, Adra, et al. reported the fellowship choices of residents from both independent academic medical centers and university academic medical centers and found no difference in the fellowships selected by residents in the two types of institutions.¹¹ When the program directors in these institutions were queried about why chief residents were choosing to do fellowships, more than 70% replied that residents did so because they desired more training. Was this because they felt their general surgery training was inadequate? While this question is difficult to answer, Program Directors reported that only about 60% of residents in both training models felt satisfied with their training in general surgery. One issue is whether there is a financial advantage to extra training or, asked a different way, is the choice to do a fellowship financially driven? Based on published information, financial consideration does not appear to be a principle driver of the decision to pursue a fellowship or, at the very least, not an admitted reason.¹² To provide further support, advanced training in surgical oncology and breast surgery continue to be highly desired in spite of a study published in 2017 that surgeons in these specialties have less income opportunity over a career than general surgeons.¹³

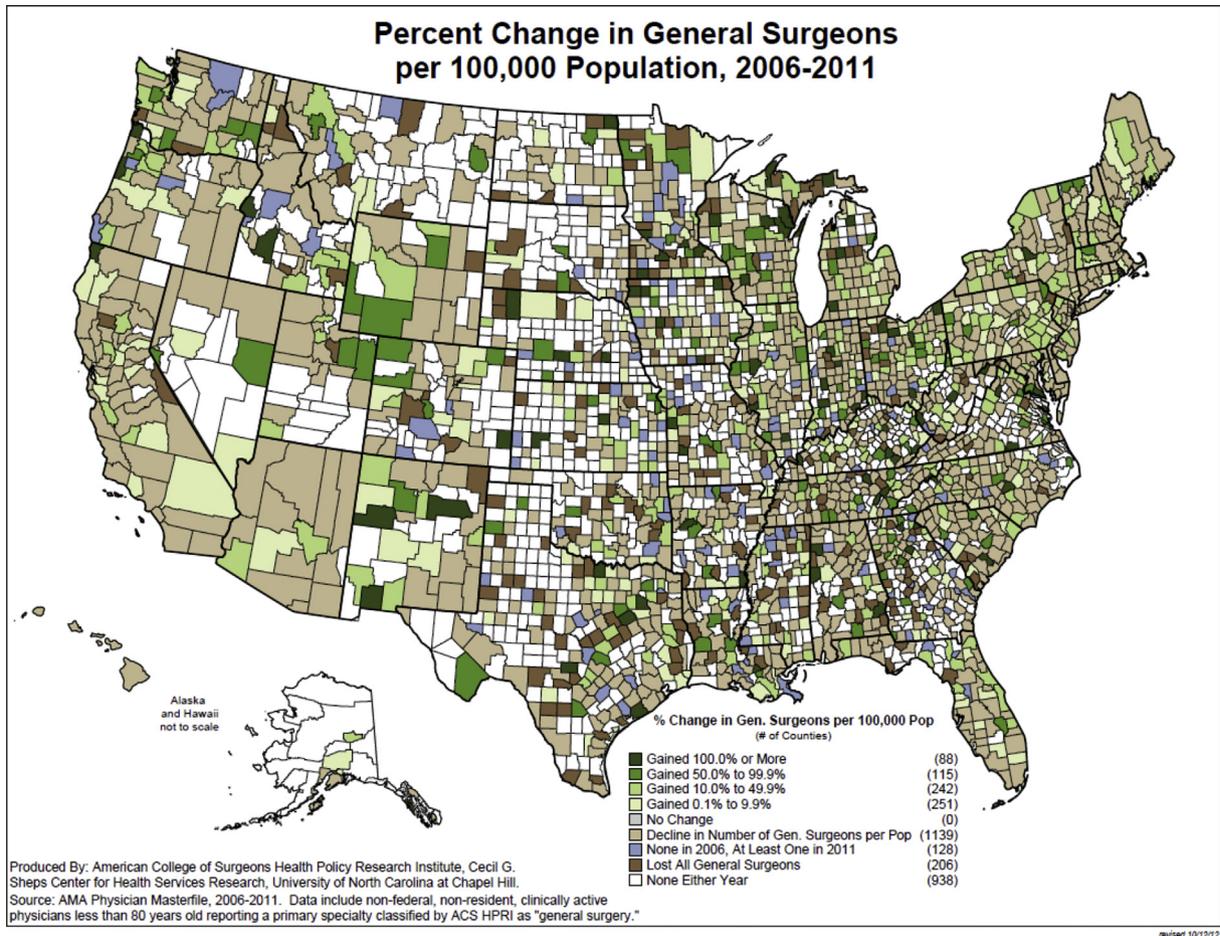


Fig. 2. Surgeons per 100,000 populations.²⁸

A survey of general surgery residents explored the factors contributing to sub-specialty choice.¹⁴ As previously noted, future earning potential was not a major factor leading to specialty choice. Not surprisingly, and encouragingly, having positive role models and wanting to do the specialty-specific procedures played a key role in specialty choice. The ability or inability to achieve work-life balance did not seem to deter residents from selecting a specialty. Specialties like cardiothoracic surgery, critical care/trauma, pediatric surgery, and transplant surgery were all perceived to have worse work-life balance than general surgery, but were still selected as career choices. So while the ability to achieve some work-life balance is worse in other specialties than for general surgeons, residents still elected to pursue these specialties, further supporting the importance of mentors and appeal of the specialty.

Are residents choosing fellowships because they feel unprepared for practice? The 80-h work week has been with us for about 15 years and there has been much discussion about how it has impacted the training paradigm for general surgery. In particular, the concepts of deliberate practice and the often referred to 10,000 hours required to achieve truly expert skill have been raised as concerns for residents being less well prepared with the 80-h work week.¹⁵ Before discussing how the 80-h work week has impacted competency, it is important to know how residents perceive the impact of the 80-h work week. One of the important premises of the 80 hour work week was to improve patient safety, but how have we done? Drolet et al.¹⁶ reported results of a survey exploring resident perception of the changes resulting from the duty hour restrictions and found

that the majority of the residents actually disapproved of what had taken place with the ACGME requirement in 2011. Overall feelings of the residents regarding their training were worse or decreased in 66%, quality of life for senior residents was worse, work schedules were worse, and preparation for more senior resident roles was worse. Most importantly, in the minds of residents about 90% felt that patient safety was either unchanged or worse after the implementation of 80 hour work rule.

Are we providing adequate training opportunities to insure competency? Malangoni et al.¹⁷ compared the submitted American Board of Surgery operative logs of all graduating general surgery residents from 2005 to 2011. The question raised was whether the work hour restrictions had contributed to diminished operative experiences. From 2005 (not long after the implementation of the 80 hour work week rule) to 2010–2011, the average total operations done by graduating Chief Residents actually went up from 1023 to 1238 ($p < 0.01$). However, what was evident was that the number of laparoscopic operations increased significantly in that period of time (170–253, $p < 0.01$). This leads to the question: Have work hour restrictions had a negative impact on resident comfort with complex cases leading to the feeling that post-residency training is necessary? In a presentation at the Southern Surgical Association, Friedell, et al.¹⁸ presented results of a survey of Chief Residents. While only seven percent reported they were not confident in their skills, more than 50% were uncomfortable or only somewhat comfortable with complex cases such as common duct exploration, pancreaticoduodenectomy, right hepatic lobectomy,

and esophagectomy. The authors concluded that residents are confident with their skills, but general surgery was no longer providing adequate training in esophageal, liver, pancreas, or biliary surgery. Additionally, technology advances have changed the practice of more routine general surgery operations and fewer are being done via an open approach. Has the addition of technologies like laparoscopy and endovascular approaches actually had a negative impact on the case mix of graduating residents? The answer to this is quite likely, “Yes.” In a study from the University of North Dakota, Sticca and colleagues¹⁹ found that open abdominal procedures had declined significantly. There was a significant increase in the numbers of colectomies (1011%), appendectomies ((542%), and inguinal/femoral hernias (265%) done laparoscopically. Will young general surgeons be comfortable doing an open appendectomy or inguinal hernia if the laparoscopic approach is contraindicated or conversion to an open approach is necessary?

The decision to pursue fellowship training is multifactorial and an individual one. In an effort to identify factors influencing this decision, Klingensmith, et al.²⁰ surveyed U.S. allopathic general surgery graduates completing their residencies. Confirming what many have noted, 25% of graduates planned on practicing as general surgeons and 74% elected to pursue fellowships. Interestingly, regardless of career track, more than 90% reported confidence in their operative abilities. The most common specialties selected were surgical critical care (14.0%), vascular surgery (13.4%), minimally invasive surgery (12.7%), and colorectal surgery (10.7%). The reported reasons for choosing general surgery as a career included (1) having a greater variety of cases and a broader scope of practice, (2) desire to become more autonomous now and end training, and (3) confidence in their current training. In contrast, residents electing to do a fellowship responded most frequently, but only 57% of time, that they were interested in the specialty. Of importance, 35% of those choosing to pursue fellowships reported that they were doing a fellowship to improve surgical skills and to gain confidence and experience.

What can we do to modify our training paradigm to improve the preparation of our residents to stay in general surgery? There have been increasing concerns that diminishing operative ability of graduating residents may also be, in part, due to the loss of operative autonomy and decision making opportunities. Much of what is being proposed to improve the skills and confidence of graduating general surgery residents is focused on addressing ways to increase resident decision making and operative autonomy with the hope of decreasing the perceived need to do a fellowship.

As we examine how to change our training paradigm, it is important to consider what our communities need from a general surgeon. As mentioned earlier, in addition to the projected general surgery workforce shortage, there is a clear maldistribution of general surgeons in counties across the country, most of which are non-urban. Are graduating Chief Residents prepared to be a general surgeon of a previous era doing all of general surgery, delivering babies, doing basic vascular and thoracic operations, etc.? I believe we will never go back to that model of general surgery training, nor should we, but how do we provide our non-urban/rural communities with a general surgeon who is prepared to provide the care that is needed. The acute care surgery paradigm is of particular interest as the relatively new fellowships include training that will prepare fellowship graduates with many of the needed skills to practice anywhere. Examination of their curriculum reveals much of what was done during a general surgery residency 30 years ago including orthopedic surgery, neurologic surgery, plastic surgery, and thoracic surgery is part of the acute care surgery fellowship curriculum.²¹ Is it the right model? While the answer to this is not yet known the acute care surgery curriculum might better prepare trainees to practice in any community, but it is still postgraduate

training and not integrated into the five years of the current training paradigm. One concern was identified in a recently published article that reported the majority of the people who completed acute care surgery fellowships were practicing in metropolitan/urban university hospitals.²² So similar to the problem leading to the maldistribution of general surgeons, how do we encourage these fellowship graduates to work in non-urban communities?

In novel approach to addressing the autonomy issue, the surgery residency program of the University of Chicago reported an innovative model that set up a resident-led acute care surgery consult service.²³ The service includes an attending surgeon, a PGY-4 or -5 (senior or Chief), PGY-2, two Physician Assistants on a service that rotates monthly and is covered at night by a night float team. The senior resident served as the patient's primary surgeon and physician in the OR and for all perioperative care with attending supervision. Appropriate level cases were counted as TA (teaching assistant) cases with the senior resident supervising the junior resident through the case. They concluded that the model improved resident education, increased the number of teaching assistant cases, improved satisfaction with case variety, improved autonomy, and resulted in more efficient consultation.

Finally, the application of Entrustable Professional Activities (EPAs) to surgery residency has gained popularity as it has in many other kinds of residencies and medical school curricula.²⁴ EPAs address the issues of time-based training versus competency-based training, when is a resident at a level where we can say they are competent to do a procedure.

- EPA Five Levels of Observation
 - o One: Observation but no execution by the trainee, even with direct supervision
 - o Two: Execution with direct, proactive supervision
 - o Three: Execution with reactive supervision – on request and quickly available
 - o Four: Supervision at a distance and/or post hoc
 - o Five: Supervision provided by the trainee to more junior colleagues

I grew up in surgery in an era where the adage was “see one, do one, teach one.” In some respects the EPA paradigm has formalized this process and I'm curious to see where we end up with the EPAs as an important addition to our training programs.

There are some important issues that will inevitably impact how we train future surgeons. How will new payment models impact both training paradigms and specialty selection? Will we ever get to a true competency based model of training? In 1904 Dr. Halsted said “The average term for the house surgeon was 8 years in total. Halsted remarked that his applicants would gladly serve 10 years for this opportunity. He felt their zeal increased with the years.”²⁵ So he was very interested in making sure that the surgeons he trained were going to be competent ... I am just not sure we can convince young physicians to pursue a career in general surgery if it took 10 years. I often reference to a new generation of trainees, but are we that different from our forefathers in surgery? I remember hearing “when I was resident” from my senior attending surgeons when I was a resident. They would remind me that they were on call every day so they didn't miss half the good cases. We cannot assume that the way that we did things was the right way. A survey of residents explored the reasons residents chose not to practice general surgery.²⁶ The findings were interesting, but not surprising: 1) the demanding call schedule, 2) the comparatively poor reimbursements, 3) the broad and irregular skill set required – basically having to do a lot of different kinds of things, and 4) the poor image of the specialty.

In conclusion, there is a looming workforce shortage or potentially crippling maldistribution in general surgery. The problem is multifactorial, but we ought to be careful as mentors and role models in general surgery that we portray a career as a general surgery is a wonderful, rewarding, and fulfilling career. Yes, our trainees are from a different generation ... but so were we. We need to continue to attract the best and the brightest and improve the image of general surgery. We need to stop de-valuing our specialty and we need to advocate for it ... it is, after all, a noble profession and a specialty in its own right. We need to provide that mentorship and be positive role models for students and residents ... be that person they want to grow up to be. We need to accept that the 80 work week is here to stay and it may actually change over time – we don't know that yet. But whatever it is, we have to figure out how to train our residents in a way that's going to make them good, competent surgeons when they leave our programs. Finally, I think you need to figure out what it means when you say "I AM a general surgeon." For me, that means that I AM proud of the training I received and I know I can do the surgery I was trained to do. I know what it means to be a general surgeon ... do you?

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amjsurg.2018.11.001>.

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