Southwestern Surgical Congress

Geographic maldistribution of general surgery PGYI residents: another US surgical desert

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**Abstract**

**BACKGROUND:** Practicing general surgeons are unevenly distributed across the country. This study evaluates the geographic distribution of categorical, general surgery (GS) PGYI positions per capita.

**METHODS:** Data were obtained from the 2012 National Resident Matching Program match and the 2010 US Census.

**RESULTS:** The mean for GS PGYI positions per 10^6 population was 3.85 ± .61; 27 states fell below this value. The 7 American College of Surgeons (ACS) regions ranged from a low of 1.4 ± .50 (Intermountain) to a high of 9.89 ± 4.41 (Northeast). The mean (2.18 ± .34) for the 19 state membership of the Southwestern Surgical Congress was below the mean for the country.

**CONCLUSIONS:** There is a maldistribution of GS PGYI positions compared with state and regional populations, particularly in rural areas. This mirrors the maldistribution of practicing general surgeons across the United States. Additional GS residences and resident positions are urgently needed to correct this “Surgical Desert” of graduate surgical education.

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The 3-decade decline in the general surgeon workforce in the United States had its origin in the 1981 report by the Graduate Medical Education National Advisory Committee, which had predicted a 145,000 physician surplus by the year 2000. The Council on Graduate Medical Education created by Congress then took steps to decrease the number of specialists trained in US residencies from 70% to 50% along with capping the number of residency positions at 110% of allopathic medical graduates in 1993. They also concluded that a reduction in funding for graduate medical education would result in the training of more primary care physicians. In response to this report, Congress passed the Balanced Budget Act of 1997 (Public Law 105-33), which froze the number of graduate medical education positions qualified for funding by Medicare. The most recent blow to graduate medical education was dealt by the President's National Commission on Fiscal Responsibility and Reform, which proposed cutting Medicare funding to train resident physicians by $60 billion through 2020.

In a 2008 report, Lynge et al documented a 4.2% decrease in the number of actively practicing general surgeons over a 25-year period (1981 to 2005). When adjusted for a population growth of 29% during this time, the number of general surgeons per 100,000 population had actually decreased by 26%. By 2005, only 18% of general surgeons practiced in rural areas, and their rate of 6.36 per 100,000 population had decreased to 5.02 (↓ 20%) in 25 years. In 2008, Williams and Ellison reported that there was an immediate national shortage of 1,300 general surgeons. Several years later, Sheldon put the national...
The purpose of this study is to evaluate both the number and location of categorical general surgery (GS) PGYI resident positions in this country and compare it with individual state and regional populations. Our hypothesis is that there is a maldistribution of categorical GS PGYI resident positions in relation to state and region populations, coinciding with the aforementioned “Surgical Desert” of all practicing general surgeons in this country.

**Methods**

The number of GS PGYI positions offered by each state, the District of Columbia (DC), and Puerto Rico (PR) was obtained from the National Resident Matching Program Results and Data 2012 Main Residency Match. The population for each of the 50 states, the DC, and PR was obtained from the 2010 US Census. All Accreditation Council for Graduate Medical Education accredited, categorical, GS residencies in the United States and PR have been assigned to 7 geographic regions by the Division of Education of the American College of Surgeons. The 7 geographic regions are Pacific, Intermountain, Midwest, South, Southeast, Northeast, and New England. The 19 state membership of the Southwestern Surgical Congress (SWSC) was obtained from the 2013 SWSC Web site.

The number of GS PGYI positions per 10⁶ population was then calculated for each state, DC, PR, the American College of Surgeons’ 7 US geographic regions for GS residencies, and for the 19 state membership of the SWSC. The results are expressed as a whole number to the 1/100th decimal place $\times 10^{-6}$.Five states (Alaska, Idaho, Montana, South Dakota, and Wyoming) do not have a GS residency, but their state populations were included in determining the mean ± standard error mean (SEM) for the whole country. Results were analyzed using analysis of variance with a significance of $P$ value less than .05.

**Results**

The number of GS PGYI residency positions per 10⁶ population ranged from a high of 31.58 for the DC to a low of 1.11 for Nevada (Table 1). The $\pi \pm$ SEM for the country was 4.26 ± .64 not including 5 states (Alaska, Idaho, Montana, South Dakota, and Wyoming) without a GS residency and falls to 3.85 ± .61 when their combined population is included. Eighteen states and DC are above the mean for the entire country (the 3.85 ± .61) with an average of 6.57 ± 1.35 GS PGYI positions per 10⁶ population. These 19 geographic entities have 626 (56%) GS PGYI positions for a population of 115,840,360 people (36% of US population).

The 50 states, the DC, and PR assigned to 7 regions of the country for GS residencies by the American College of Surgeons are depicted in Table 2. The mean ± SEM for GS PGYI positions per 10⁶ population ranges from a low for the Intermountain region (1.40 ± .50) to a high for the Northeast (9.89 ± 4.40). New England and the Northeast are the only 2 regions above the mean (3.85 ± .61) for the country. The mean of 9.89 ± 4.40 for the Northeast region was significantly ($P < .01$) greater than the mean for each of the other 6 American College of Surgeons (ACS) geographic regions. Fourteen of the 19 (DC + 18 states) states above the US mean (3.85 ± .61) occurred in 3 regions: Midwest (6/12), New England (4/6), and Northeast (4/6). The other 5 states above the mean for the entire country occurred in the South (3/8), Southeast (1/7), and Intermountain (1/8) regions. None of the 5 Pacific states scored above the mean for the country.

The mean of 2.18 ± .34 for the 19 states of the SWSC is significantly ($P < .05$) below the mean of 3.85 ± .61 for the country, the mean of 4.82 ± .90 for 31 states, DC, PR not in the SWSC, and the mean for 5 of the 7 ACS regions of the country for GS residencies. Only 3 (North Dakota, Nebraska, and Arizona) of the 19 states are above the mean.
for the country and 4 states of the SWSC do not have a GS residency. These 19 states have 290 (27%) GS PGYI positions for a combined population of 113,684,776 people or 36% of the US population.

**Comments**

**Key findings**

For the 2012 National Resident Matching Program, there were 240 civilian GS residencies with 1,146 categorical PGYI positions in 45 states, DC, and PR. Five states (Alaska, Idaho, Montana, South Dakota, and Wyoming) do not have a GS residency. Only 18 states and DC with about one third of the US population are above the mean of 3.85 GS PGYI positions per 10^6 population for the country. Only 2 (New England and Northeast) of the 7 ACS regions for GS residencies are above the mean of 3.85 GS PGYI positions per 10^6 population. They have a little over a third of the GS residences and GS PGYI positions, but only 20% of the US population and 5% of the total square miles of the country.

The 19 state membership of the SWSC has a mean of 2.18 GS PGYI positions per 10^6 population, which is below the mean (3.85) for the country as well as the mean (4.82) for the other 31 states, DC, and PR who are not in the SWSC and for 5 of the 7 ACS regions of the country. The SWSC has about a quarter of the GS residencies and GS PGYI positions, a third of the US population, and about half of the total square miles of the country. These results show a geographic maldistribution of GS PGYI positions across the country in relation to both population and land area and mirrors the same maldistribution for practicing general surgeons. Multiple measures are needed to correct this “Surgical Desert” of graduate surgical education.

**Comparison with previous data**

In 2008, Lynge et al. published a 25-year analysis of the US GS workforce with the majority (82%) practicing in urban areas. During this time period, the absolute number of practicing general surgeons in the country decreased by 4%. While the US population had a growth of 29%. The end result was a 25.9% decrease in the number of general surgeons per 10^5 population (7.68 to 5.69). The decrease of 27% (8.04 vs 5.85 GS per 10^5 population) for urban areas was greater than the 21% decrease (6.36 vs 5.02 GS per 10^5 population) for rural areas. The number of general surgeons per capita practicing in rural areas was below that for urban areas for both time periods. Small counties nonadjacent to an urban area had the fewest general surgeons per 10^5 population for both time periods (1981 and 2005) and showed a 16% decline (5.15 vs 4.75 GS per 10^5 population) during that 25-year period. By 2005, rural areas of the country had experienced a
greater decrease in general surgeons younger than 40 years of age and an increase in those 50 to 62 years of age compared with urban areas.\textsuperscript{4} Thompson et al\textsuperscript{11} showed a similar disparity between urban and rural areas for the number of practicing general surgeons per 10\textsuperscript{5} population. The number of general surgeons per capita ranged from 6.53 in urban areas to 4.67 for small isolated rural areas. Like Lyng\textquotesingle s study, the rural surgeons were older and within retirement age.

In 2007, Goodman\textsuperscript{12} showed a migration of general surgeons from lower to higher physician density areas, abandoning both rural and nonmetropolitan counties adjacent to metropolitan counties. Reports from Missouri, North Carolina, and Kentucky have focused on the crisis of too few general surgeons in rural counties in each of their states.\textsuperscript{13,15} In 2005, North Carolina had 22 counties without a general surgeon, while 53 counties had a decrease in the states.\textsuperscript{13–15} In 2005, North Carolina had 22 counties without a general surgeon, while 53 counties had a decrease in the states.\textsuperscript{13–15} In 2005, North Carolina had 22 counties without a general surgeon, while 53 counties had a decrease in the states.\textsuperscript{13–15} In 2005, North Carolina had 22 counties without a general surgeon, while 53 counties had a decrease in the states.\textsuperscript{13–15} In 2005, North Carolina had 22 counties without a general surgeon, while 53 counties had a decrease in the states.

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In a recent report from this institution, the GS workforce for Texas was analyzed by both state and county populations for the year 2012.\textsuperscript{16} Compared with a benchmark of 7 general surgeons per 10\textsuperscript{5} population, Texas had a deficit of 329 general surgeons. At the county level, 127 of 254 counties had no general surgeon, but half of them were too sparsely populated to support a general surgeon. When the need was assessed for each county by population, Texas needed 449 general surgeons per 10\textsuperscript{5} population or 36% more than the calculated need for the state population. This discrepancy is because of the fact that 31 counties, mainly metropolitan areas, had a surplus of 135 general surgeons.

In 2009, Belsky et al\textsuperscript{17} reported that there were 133,796 surgeons in active, postresidency practice in the United States in 2006, which yielded a surgeon to 10\textsuperscript{5} population ratio of 44.7. There was an uneven distribution of these surgeons nationally with fewer practicing in rural areas, that is, a “Surgical Desert.” In fact, 925 (30%) of the 3,107 US counties did not have a single surgeon for 9.5 million people, that is, 3.2% of the national population. Regionally, one third of counties in the Midwest, South, and West lacked a surgeon compared with only 4% of counties in the Northeast. They readily admitted that economics play a role in the distribution of surgeons. Each surgeon is dependent on a sufficient surgical patient volume to support both his/her surgical practice and a hospital or ambulatory surgical center. Counties without a surgeon had one tenth the population of those with at least one surgeon. Although 89% of counties without a surgeon had a population of less than 10,000 people, 6% had a population of 25,000 to 54,000 people and could have supported 2 to 8 general surgeons. They also noted that about 50% of the counties without a surgeon had a Critical Access Hospital, which provided both inpatient and 24-hour emergency services. Therefore, half of the counties without a surgeon have a hospital but most lack a sufficient population to support a surgeon.

In 2010, Sheldon\textsuperscript{6} showed a similar “Surgical Desert” for general surgeons based on the statistics for 2009. According to Sheldon,\textsuperscript{3} the present shortage of general surgeons in this country is the result of multiple factors, which he termed a “perfect storm.” These factors according to multiple authors are: (1) the Balanced Budget Act of 1997, freezing funding for graduate medical education at the level for 1993; (2) not enough residency posts to accommodate the increased number of medical school graduates\textsuperscript{15}; (3) the number of general surgeons certified by the American Board of Surgery annually has been stagnant at about 1,000 surgeons for the past 40 years\textsuperscript{19,20}; (4) only 20% of these 1,000 certified general surgeons each year plan to practice GS\textsuperscript{19}; (5) Affordable Care Act of 2010 plans to cut $60 billion in spending on graduate medical education by 2020\textsuperscript{21,22}; and (6) declining interest of medical students in pursuing GS as a career.\textsuperscript{23} The net result of these 6 adverse factors is a predicted shortage of 21,400 general surgeons by 2020 or a projected 25% reduction in the GS workforce. The population most affected by this workforce reduction with be the 62 million Americans living in rural areas.\textsuperscript{20}

While a solution to this general surgeon workforce shortage will need to be multifactorial, Sheldon\textsuperscript{24} has proposed a possible financial solution. He recommends instituting an all-payer system to fund graduate medical education. All commercial medical insurance companies and Medicare would become equal partners in the $9 billion annual cost of training 100,000 residents. More recently, the American Surgical Association funded a conference attended by surgeons in academic, community urban and rural practice, and the military.\textsuperscript{20} Their conference produced 6 recommendations for enhancing the GS workforce: (1) enhance the number of GS trainees and the breadth of training; (2) incorporate more flexibility and breadth in residency; (3) minimally invasive surgery should largely return to GS; (4) broaden the use of community hospitals; (5) publicize loan forgiveness and improved VISA status for international medical graduates pursing GS; and (6) select candidates with a bias toward a general surgical career.

To accomplish the lofty goal of correcting the GS workforce deficit in this country, these same academic surgeons will also need to provide viable solutions to correct the geographic maldistribution of GS residents in relationship to recent regional population shifts and accelerated population growth as delineated in this manuscript. The first logical step is to get Congress to repeal or modify the Balanced Budget Act of 1997, which locked in the number of graduate medical education positions qualified for funding by Medicare at the level in 1993. Another solution would be to establish additional residencies modeled after the rural GS training program at the Gunderson Clinic in La Crosse, Wisconsin, which has a
long, successful track record of training general surgeons to practice in rural America. They situate their unique because GS is the only surgical specialty at their institution. Therefore, their residents garner a significant surgical experience in orthopedic surgery, neurosurgery, otolaryngology, plastic surgery, cardiothoracic surgery, and urology. They also spend a 2-month rotation on obstetrics and gynecology where they complete about 25 cesarean sections, 20 hysterectomies, and many gynecologic oncology cases. To replicate this model will be extremely difficult because it requires surgical specialty faculty without the accompanying specialty residences and fellowships.

References


Discussion

Discussant: Dr Wayne Anderson (Williston, ND). As we all know, health care in the United States has changed dramatically. While our population has steadily increased, our physician population has not kept pace. This is especially true in my hometown of Williston, North Dakota. This has led to a significant shortage of physicians in all specialties, general surgery being greatly affected by the manpower shortage, which is even more critical in the rural areas.

The authors emphasize the significant geographical maldistribution of PGY1 residents in our surgical training programs. No one will refute the importance of the training programs having access to a large and varied volume of patients. However, this is not something that can be easily achieved in the surgical desert. I’m fortunate to practice in a rural area within 100 miles of where both my wife and I were raised. However, we certainly qualify as living in this surgical desert, and we wouldn’t have it any other way. I was fortunate to train in a program that prepared me well for a life in rural surgery. In North Dakota and neighboring Montana, there are 109 counties. By my estimate, 73 of those counties do not have a general surgeon. So you can see the impact that this has.

My questions are these: What can we do to encourage our medical students to consider a career in surgery and our surgical residents to then consider a rural practice instead of seeking the subspecialty training and pursuing a niche type practice? Educationally, how can our community hospitals partner with the training programs to participate in the training of future residents?

What can we as an organization do to reestablish general surgery as the most desirable of specialties to allow us to attract the best and brightest students and residents? Given the constraints that we currently have, the decrease in the number of specialists established by the Council on Graduate Medical Education, the Balanced Budget Act of 1997, and the more recent National Committee on Fiscal Responsibility and Reform, how can we meet the needs of
rural America and increase the training not only in general surgery but also in all the other specialties?

Dr Kenneth Sirinek: I think that we have to be role models for our students. Hiram Polk brought this up about 10 years ago in a manuscript. I think we felt like we had a rebirth in general surgery with laparoscopic surgery, but that’s not gone far enough. I think, if we stand in the hallways and complain about the dean, about the CEO, the hospital, about something that might be wrong with our personal career or something going wrong that day, we are not serving as good examples.

The other problem that we have is that we have all of our surgical specialties in these training programs, and that we are down to the point where we have a surgeon of the left adrenal gland. So that’s what our students are looking at, and they feel insecure to go out and practice unless they get that training to be the expert for the left adrenal gland. In fact, the American College of Surgeons has recognized this and have that transition-to-practice program in place right now.

But I think we have a role model. We have the Gunderson Clinic in La Crosse. Interestingly, they only have a general surgery residency, but they have all the other surgical specialties on faculty. The residents who train in that program get to do all of those specialty cases. Now that’s rare. I don’t know how we can duplicate that in other parts of the country, but it would be nice to go ahead and take that.

In response to your own situation in North Dakota, there was a paper from North and South Dakota, where the busy rural surgeons are doing almost 1400 cases a year, and the not-so-busy rural surgeons are doing about a thousand. So it’s a horrendous burden, and we appreciate you for sticking it out.

I guess we are addressing our constituents in Congress on many issues, trying to turn over malpractice. We are trying to get rid of the RBRBG, or whatever that acronym is, presently. But we need to focus and get active to get them to overturn this and build more general surgery residencies. Right now, they put all the money into creating more medical schools. So now we have 21,500 medical students to fill 21,500 general surgery residency positions.

Dr John R. Potts (Chicago, IL). I work for the ACGME, and I want everybody in the room to know that ACGME recognizes this problem, but we don’t control where residencies are established. We do not control the flow of dollars. A lot of people don’t understand that. I just want to emphasize that.

At the ACS panel the other day, they pointed out that the IOM panel that’s currently looking at graduate medical education was motivated by seven senators. Five or six of those seven senators who asked for that IOM panel were from the Four Corner states. They were from the very region that you are talking about, Ken.

So Congress is sort of aware of this, but those three bills that are in Congress to increase the number of GME slots all aim to increase the number of primary care slots. General surgery is really not considered by them as a primary care slot. So, first thing is how can we educate Congress on the need? And secondly, not just general surgery needs to be emphasized. I think what needs to be emphasized is generalism.

I think the other specialties have the same issue that we do. They are all subspecializing to the Nth degree, and those subspecialists just cannot serve as many people as a generalist can.

I agree with you entirely. We have got to keep general surgery trained individuals as general surgeons. I think it also goes to internal medicine, pediatrics, and the others as well.

I’m not sure I ever came up with a question so much as a statement!

Dr Kenneth Sirinek: You are correct. There are not going to be enough general surgeons or general practitioners for the Affordable Care Act.

Dr David Antonenko (Grand Forks, ND). You stated that there are 80% of all graduates in general surgery going to fellowship. When you look at the literature that’s not true. That’s the number that is perpetuated by many people. If you look at the literature closely, the 80% figure comes from the northeast part of the United States. If you look at community programs as well as others, in many cases, it’s less than 40%.

So we need to look at programs that will train general surgeons, as you have stated that will go into general surgery, and not push this concept that you have to go into a fellowship.

Dr Kenneth Sirinek: There is literature to support that it’s 80% for the country. And you might be right, I didn’t look at it by region. But it’s 79% or 80% by about five different publications.

Dr Tim Nelson (Albuquerque, NM). One of our senators, Tom Udall, did propose a bill providing funding for primary care training that did not include general surgery, so you can talk to your representatives and senators and ask them to be sure that general surgery training gets included in funding.

My question addresses options for funding Since there are unused those spots are up in the northeast, and the federal funding is with them, and even when they have redistributed it, it doesn’t have much effect, have you looked at what states have had alternative funding mechanisms? I just say that because our governor and legislature have been pretty forward in looking at primary care and have included general surgery, so we actually now have a funded spot for general surgery training that’s funded by the state. Do you know if any other states have done this?

Dr Kenneth Sirinek: I haven’t looked at the funding part of it, but a lot of it is being funded by the hospitals to go ahead and get that money. And there has been a 10% increase in the number of categorical PGY1 positions in the past five years. So we are getting more, but they’re not being funded by Medicare.

And I can’t talk to any of our politicians. Dr. Stewart will not let me.