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Rural surgeons' perspectives on necessity of post-residency training are stable across generations

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ABSTRACT

Background: Training future rural surgeons is critical, but training needs are unclear. We hypothesize perspectives on necessity of subspecialty training differ among rural surgeons by generational cohort.
Methods: An online survey was sent to ACS Rural Surgery Listserv subscribers. Closed-ended elements were analyzed using bivariate testing and logistic regression. Purposively-sampled respondents participated in qualitative interviews analyzed using principles of grounded theory.
Results: Generation was irrelevant to respondents' hiring preferences, but older surgeons were more likely to state subspecialty training was ideal for any future rural surgeon. Controlling for practice context, younger rural surgeons were less likely to favor hiring a subspecialty-trained surgeon ($p = 0.019$). Themes emerged from qualitative analysis emphasizing broad training and the importance of practice context.
Conclusion: Across generations, rural surgeons' perceptions about the training needed for rural surgery are largely stable. Considering practice context will allow educators to better prepare future rural surgeons for rural practices.

Introduction

General surgical practice in rural or non-metropolitan settings has several key differences when compared to urban general surgery. For example, rural practices tend to have a higher volume of endoscopic procedures.[1,2] In addition, rural areas nationwide are facing a shortage of general surgeons.[3–7] Workforce forecasts indicate the rural general surgeon shortage will likely worsen; this is attributed in part to the parallel trend of general surgery residents increasingly choosing to sub-specialize, even though available jobs may not require it.[7–10] These two issues – the scope of rural surgical practice and the rural surgeon shortage – when viewed together make it clear that understanding currently-practicing rural surgeons' perspectives on the necessity of subspecialty training is important as educators work to optimally train those who plan to enter a rural surgical practice.[11]

We hypothesize perspectives on the training necessary for future rural surgeons differ between surgeons in practice for less than 20 years (younger cohort) and those in practice for more than 20 years (older cohort) due to inherent generational differences.

Methods

In collaboration with the American College of Surgeons (ACS) Advisory Council on Rural Surgery (ACRS), a mixed methods study was developed utilizing quantitative and qualitative methods in sequence. Phase one consisted of an online, anonymous, 15-item survey distributed through the ACS Rural Surgery Listserv. The final item on the survey asked respondents to voluntarily participate in phase two, semi-structured qualitative interviews. Quantitative data were analyzed using univariate and bivariate testing as well as multi-variate logistic regression. Variables used in regression analyses included those corresponding to closed-ended survey

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questions in addition to descriptive variables such as community size, defined as rural (≤50,000 people), small non-metropolitan (>50,000 and ≤ 100,000), and large non-metropolitan (>100,000); and region, defined according to US Census sub-regions.

Our main independent variable was generational cohort. The younger cohort is comprised of those in practice for less than 20 years, and the older is those in practice for more than 20 years. We made this decision after triangulating 1) the distribution of years of practice in our sample; 2) definitions of the Baby Boomer, Generation X, and Generation Y cohorts; and 3) the timing of changes in surgical training, such as duty hours restrictions. In our sample, 59.8% of surgeons were in practice for 20 or more years. Existing generational definitions translate to our older cohort being comprised of Baby Boomers and our younger cohort consisting of Generation X and Generation Y. Any surgeon who was in training after 2003 changes to duty hours were implemented by definition falls into our younger cohort. After considering all three of these factors, we were confident it was meaningful to divide our sample into the older and younger cohorts at the 20-year mark.[12,13]

Our dependent variables came from two survey items: one asking respondents whether sub-specialty-training would be ideal in the next general surgeon he or she hired and one asking respondents to state whether sub-specialty training is the ideal training for any new general surgeon interested in a rural surgical career. The first asks respondents to consider their own practice environment, whereas the second asks respondents to consider rural surgery more broadly.

All quantitative tests were run using Stata SE14. The quantitative methodology was the primary analysis, with the qualitative methodology secondarily providing supplemental data aiding in the interpretation of quantitative outcomes.[14]

In phase two, all survey respondents who indicated a willingness to participate in qualitative interviews were examined, and we purposively sampled from this frame with the goal of eliciting the opinions of practicing general surgeons across a diversity of community sizes and geographic areas.[15] Variation was defined as differences in geographic location, town size, and time in practice. Interviews were digitally recorded, then transcribed, with transcripts analyzed using grounded theory principles facilitated by NVivo 11.[16,17] Qualitative analysis is presented with selected illustrative quotes; attributions to interviewees use state and generational cohort.

Results and discussion

In this study, we seek to understand how a currently-practicing rural general surgeon's generational cohort affects his or her perspectives on the necessity of sub-specialty training for future rural surgeons. The first phase yielded 236 survey respondents from 47 states and one Canadian territory. A response rate calculation was not possible as the total number of Listserv participants is constantly in flux. A majority of respondents, 59.8%, had been in practice for more than 20 years. Over three-quarters of survey respondents, 77.7%, identified as general surgeons without sub-specialty training (See Tables 1 and 2).

Among those in practice for more than 20 years, 21.6% would prefer to hire a sub-specialty-trained surgeon as their next partner, whereas 14.9% of younger surgeons would, a difference that was not statistically significant ($p = 0.202$). Regarding ideal training for any future rural surgeon, 6.5% of older surgeons stated the necessity of sub-specialty training, while 1.1% of younger surgeons did. The *t*-test for this survey item indicated statistical significance at the 0.05 level ($p = 0.046$). As a robustness check, we ran Chi-squared tests, which returned the same results, with no difference between the younger and older cohorts regarding their next hires but a difference in their perspective on sub-specialty training for any future rural surgeon. These results suggest respondents may think differently about sub-specialization when considering their own practice than when considering rural or non-metropolitan surgery as a whole.

Logistic regression indicated generational cohort was not a relevant factor in preferring hiring a sub-specialty-trained surgeon as a next partner, consistent with bivariate testing results (OR 0.64, $p = 0.20$, 95% CI 0.32–1.27). Contrary to bivariate testing results, logistic regression did not indicate generational cohort was relevant in a surgeon stating that sub-specialty training was the ideal training for any future rural surgeon (OR 0.16, $p = 0.08$, 95% CI 0.02–1.25).

When holding town size and Census sub-region constant, logistic regression results remained consistent. Being in the younger age cohort was not a statistically significant factor in the likelihood

Table 1
Geographic characteristics of respondents by generational cohort.

What is the approximate population in the area of your main hospital?
(Percentages in parentheses represent the proportions of each cohort by category)

	Older Cohort		Younger Cohort		Total	% of Total
Less than 50,000	102	(60.4%)	67	(39.6%)	169	72.2%
50,000 or more but less than 100,000	24	(64.9%)	13	(35.1%)	37	15.8%
More than 100,000	14	(50.0%)	14	(50.0%)	28	12.0%
Total (no response, n = 2)	140	(59.8%)	94	(40.2%)	234	100.0%

Census Sub-Region
(Percentages in parentheses represent the proportions of each cohort by category)

	Older Cohort		Younger Cohort		Total	% of Total
New England	8	(53.3%)	7	(46.7%)	15	6.5%
Middle Atlantic	9	(81.8%)	2	(18.2%)	11	4.7%
East North Central	28	(59.6%)	19	(40.4%)	47	20.3%
West North Central	27	(67.5%)	13	(32.5%)	40	17.2%
South Atlantic	17	(53.1%)	15	(46.9%)	32	13.8%
East South Central	15	(75.0%)	5	(25.0%)	20	8.6%
West South Central	10	(41.7%)	14	(58.3%)	24	10.3%
Mountain	10	(45.5%)	12	(54.5%)	22	9.5%
Pacific	15	(71.4%)	6	(28.6%)	21	9.1%
Total (no response, n = 4)	139	(59.9%)	93	(40.1%)	232	100.0%

Table 2
Practice characteristics of respondents by generational cohort.

Which of the following best describes your current practice environment?						
	Older Cohort		Younger Cohort		Total	% of Total
Solo	48	(68.6%)	22	(31.4%)	70	30.3%
Small (<4)	49	(52.1%)	45	(47.9%)	94	40.7%
Large (≥4)	29	(52.7%)	26	(47.3%)	55	23.8%
Other	11	(91.7%)	1	(8.3%)	12	5.2%
Total (no response, n = 5)	137	(59.3%)	94	(40.7%)	231	100.0%
Did you pursue sub-specialty training?						
	Older Cohort		Younger Cohort		Total	% of Total
No	113	(62.1%)	69	(37.9%)	182	77.8%
Immediately after residency	24	(52.2%)	22	(47.8%)	46	19.7%
Within 5 years of residency	1	(25.0%)	3	(75.0%)	4	1.7%
Five or more years after residency	2	(100.0%)	0	(0.0%)	2	0.9%
Total (no response, n = 2)	140	(59.8%)	94	(40.2%)	234	100.0%
Does your practice include cases that, in a tertiary hospital, could be restricted to sub-specialty-trained surgeons?						
	Older Cohort		Younger Cohort		Total	% of Total
No (none)	18	(66.7%)	9	(33.3%)	27	11.6%
Yes (at least one sub-specialty)	120	(58.5%)	85	(41.5%)	205	88.4%
Total (no response, n = 4)	138	(59.5%)	94	(40.5%)	232	100.0%

Table 3
Perspectives on sub-specialty training by generational cohort.

Would you hire a sub-specialty-trained surgeon as your next partner?						
	Older Cohort	Younger Cohort	Total	% of Total		
Would not	109	(78.4%)	80	(85.1%)	189	(81.1%)
Would	30	(21.6%)	14	(14.9%)	44	(18.9%)
Total	139	(59.7%)	94	(40.3%)	233	(100.0%)
Is sub-specialty training ideal for any future rural surgeon?						
	Older Cohort	Younger Cohort	Total	% of Total		
No	130	(93.5%)	93	(98.9%)	223	(95.7%)
Yes	9	(6.5%)	1	(1.1%)	10	(4.3%)
Total	139	(59.7%)	94	(40.3%)	233	(100.0%)

that a respondent would prefer hiring a partner who is sub-specialty-trained (OR 0.59, p = 0.17, 95% CI 0.28–1.24), nor whether a surgeon stated sub-specialty training would be ideal for any future rural surgeon (OR 0.14, p = 0.07, 95% CI 0.02–1.19).

To test whether town size and region combined would affect the significance of being in the younger cohort, an interaction term for town size and Census sub-region was added to the logistic regression model. The result was that a respondent being in the younger cohort decreased the odds of wanting to hire a sub-specialty-trained surgeon as his or her next partner by a factor of 0.34 (OR 0.34, p = 0.02, 95% CI 0.14–0.84). Other tests of this interaction term were consistent with the previous two logistic regression models.

Our bivariate testing largely showed no relationship between being younger and favoring sub-specialty training for any future rural surgeon. Regarding the desire to hire sub-specialty-trained surgeons into one's own practice, bivariate testing and logistic regression results were consistent: there was no relationship between being in the younger cohort and desire to hire a sub-specialty-trained surgeon. This ran counter to our initial hypothesis, which was that younger rural surgeons – since they are sub-specializing at higher rates than their predecessors – would favor hiring sub-specialty-trained surgeons.[18]

Regarding whether sub-specialty training is ideal for any future rural surgeon, bivariate testing and logistic regression results were inconsistent. Bivariate testing indicated older surgeons were more likely to favor sub-specialty training, whereas logistic regression found no relationship. Adding the interaction term for town size combined with region to the regression model appeared consistent with bivariate testing: it showed younger surgeons did not want to hire sub-specialty-trained surgeons as their next partners, the inverse of which is that older surgeons did. This indicated that the combination of town size and Census sub-region affects the importance of generational cohort in relation to specific hiring preferences but not overall, more conceptual views of the necessity of sub-specialty training in rural surgical practice. (See Table 3)

The qualitative interviews were instrumental in understanding the meaning of this interaction term: how it manifests in real life. Sixteen interviews were conducted by phone with surgeons purposively sampled from those who had completed the survey and expressed willingness to participate. Seven interviewees had been in practice for over 20 years, with one being fully retired and one semi-retired and serving as a locum tenens surgeon. Nine had been in practice for fewer than 20 years. The interviews averaged 41 min, the shortest lasting 25 min, and the longest being just over one hour, for a total of 11 h of recorded time.

The most-frequently coded theme was “Scope (Specialties and Sub-specialization),” and in this theme interviewees emphasized

Table 4
Top Five Themes in Qualitative Analysis Same Across Generational Cohorts: Frequency of Coding (% out of all coded items by cohort).

Themes	Older Cohort	Younger Cohort
Scope (Specialties or Specialization)	83 (15.9%)	113 (15.9%)
Yes, There is a Shift Toward Sub-specialization	43 (8.2%)	51 (7.2%)
Location and Population	29 (5.6%)	39 (5.5%)
Hospital Characteristics	28 (5.4%)	39 (5.5%)
Interviewee's Training	21 (4.0%)	39 (5.5%)
All Other Themes	429 (60.4%)	318 (60.9%)
Total Coded Items per Cohort	710 (100.0%)	522 (100.0%)

the need for broad-based general surgery training for rural practice (see Table 4). They used phrases like, "community-based," "broadly trained," "bread and butter surgery," "the fundamentals," and "true general surgery," to describe the nature and scope of their practices and the skills necessary to be successful in such a practice. One interviewee asserted:

> *If you want a rural hospital to be open, have open doors, you have to have a general surgeon … somebody who feels comfortable managing a lot of things.*
> *— Washington, older cohort*

When asked what in their current scope of practice might fall into other specialties or sub-specialties if they were in a larger area, by far endoscopy was the area of practice most frequently stated, followed closely by breast and colorectal surgery. There was consensus that future rural surgeons would need to be comfortable in these areas of practice. One example from the younger cohort is:

> *I think that general surgeons in rural areas need to be much more broadly trained … than a traditional general surgery residency program allows.*
> *— Iowa, younger cohort*

One interviewee characterized sub-specialty training as wasted time, unnecessarily delaying starting a practice and, potentially, standing in the way of becoming one's own boss. Others stated that confidence and a new hire's ability to operate confidently and independently was more important than specialized training. Both of these perspectives reflect a desire to hire a rural surgical partner who has not pursued sub-specialty training, and both perspectives appeared in the older and younger cohorts. Some emphasized the importance of confidence by discussing the isolation of some rural areas. For example:

> *It depends on … what kind of hospital you're in … you may be in a small hospital where you need to know all that 'cause [sic] there's no one else to help you.*
> *— Kentucky, older cohort*

There was consensus about confidence and the rural scope of practice, but when asked about hiring new partners, interviewees largely were not specifically seeking new general surgeons trained in rurally-oriented residency programs. One interviewee summed up why not:

> *Is that [rural training] what I'm going to look for? No. And the reason I say no is because that is a small sub-set of people … So that would limit you, 'cause [sic] there are just so few programs where you can actually get further rural surgical training.*
> *— Maryland, younger cohort*

This seems to indicate that while rural surgeons may see value in rurally-oriented training, they recognize graduates of such programs are in short supply.

Previous research has not examined differences in generational perspectives regarding the skills necessary in rural surgical practice. However, work has been done on perceived resident readiness for practice in relationship to generational cohort. Napolitano and colleagues, using data from the American Board of Surgery, found that younger surgeons did believe residents were ready, whereas older surgeons did not think so.[19] This difference is consistent with our finding that younger rural surgeons did not see the need to hire a sub-specialty-trained surgeon. It can be extrapolated that these younger surgeons believe their colleagues are ready to join them immediately after completing general surgery residency. There has also been work on surgical trainee confidence showing that those in community programs and programs with fewer or no fellowships are more confident in their abilities.[20] Our qualitative data reflected this as well in interviewees' comments on confidence coming with experience. They maintained that trainees gain more experience in programs with fewer or no fellows competing for cases. Both cohorts expressed that the range of surgical knowledge has increased greatly over time, as have advances in surgical technology. They noted that a trainee's ability to cover this breadth is directly related to this issue of less competition for cases and that with more cases comes more confidence.

Comments from our interviewees about confidence often came with caveats about on-the-job training or mentorship. Many said it would not be advisable for a surgeon right out of residency to go into solo rural practice. Instead, they advised that new general surgeons should join at least one other partner, ideally more. They stated that operating alongside these partners at the start of their practice could add to the experiences gained in residency and serve a function similar to a fellowship. While these data were compelling, we believe exploring mentorship further is beyond the scope of this particular paper.

There was broad consensus on the confidence and broad-based training needed in a new hire, as well as the scope of rural practice. However, differences in perspectives emerged once the interaction term from the quantitative analysis was taken into account: the combination of town size and region. In the interviews, this interaction term manifested as the size of the interviewee's practice (number of partners, if any) and the capabilities of his or her hospital. One interviewee in a small non-metropolitan setting stated there had been enough people in his practice that he was able to become a de facto breast surgeon. Another surgeon stated he does only trauma surgery because of his practice size, and his practice assists outlying general surgeons at critical access hospitals. Other interviewees in both rural and small non-metropolitan settings discussed the importance of a prospective partner being able to take general surgery call and either plainly stated or alluded to a sub-specialty-trained surgeon not being able to do so. Their reasoning was that someone who has spent time in sub-specialty training focusing on a very specific area of surgery would not be able to readjust to a broad scope of practice afterward. These

results, which indicate an association between larger practices and the ability to sub-specialize, are consistent with previous analyses of the surgical job market which indicate sub-specialty training is required at a higher rate in urban environments than in rural.[10]

The most significant generational difference found in the qualitative data was the older cohort spoke more generally about the profession and how it and surgical training have evolved. This is to be expected since they have lived through technological advances, such as those in laparoscopic and vascular surgery. They were able to speak to what training they received versus what they had to learn on their own as advances occurred during their time in practice. They also were able to comment on procedures they perceived as having been 'phased out' of general surgery as sub-specialization has become more prevalent. Younger surgeons, although they were able to describe a similar arc in the evolution of the profession and its advances, were not able to articulate well what procedures are no longer done in rural areas. They had not experienced the same 'phasing out' as their older colleagues. In addition, the younger cohort is closer to the residency experience; therefore, they spoke with more specificity about their training experiences. At the same time older surgeons have experienced a 'phasing out' of certain procedures, younger surgeons have been trained on a wider and wider variety of procedures because of advances in surgery. The finding of largely no difference between the older and younger cohorts, in terms of their perceptions of the necessity of sub-specialty training, suggests these two trends are canceling each other out. The breadth of surgical ability is growing, but what is needed in rural areas is not changing.

The primary limitation in this research is selection bias. The sample frame was surgeons who subscribe to the ACS Rural Listserv, and the sample consisted of subscribers who elected to respond to the survey. The interviewees consisted of volunteers who had responded to the survey. The sample is not representative of the entire rural surgeon population, but with 263 survey responses from 47 states and one Canadian territory, a wide range of perspectives has been captured. Similarly, interviewees were from both generational cohorts and offered many different perspectives. Being from 14 states and one Canadian territory, they represented a variety of practice environments and experiences. We recognize that in terms of statistical power, our sample size is a limitation as well. There would be value in surveying a larger, representative sample of rural and non-metropolitan surgeons using a similar instrument and following up with a larger interview sample. For this study, probability sampling was neither practical nor necessary, as the objective was to shed light on practicing rural surgeons' perspectives about the necessity of post-residency training in rural surgical practice.

Conclusion

Across generations, rural surgeons largely show no difference in perception of the skills needed to practice rural surgery. Quantitative data suggest generational perceptions of necessary training do differ when specific practice contexts are considered. Contrary to our initial hypothesis and anecdotal opinion, older surgeons show a stronger preference for hiring sub-specialty-trained surgeons as their next partner than younger surgeons. Qualitative data suggest practice context is composed of practice size and hospital resources and that this interaction plays a critical role in understanding expressed preferences for sub-specialty-trained partners. When advising surgical trainees who want to practice in a rural setting, surgical educators should discuss with trainees the type of setting the trainees will be entering including town size, region, practice size, and potential hospital resources. With these additional variables in mind, educators will be able to better prepare future rural surgeons for a successful rural surgical practice.

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