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When rural is no longer rural: Demand for subspecialty trained surgeons increases with increasing population of a non-metropolitan area



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ABSTRACT

Background: Surgery in larger, non-metropolitan, communities may be distinct from rural practice. Understanding these differences may help guide training. We hypothesize that increasing community size is associated with a desire for subspecialty surgeons.

Methods: We designed a mixed methods study with the ACS Rural Advisory Council. Rural (<50,000 people), small non-metropolitan (50,000–100,000), and large non-metropolitan (>100,000) communities were compared. Quantitative and qualitative data were analyzed.

Results: We received 237 responses, and desire to hire subspecialty-trained surgeons was associated with practice in a large non-metropolitan community, OR 4.5, (1.2–16.5). Qualitative themes demonstrated that rural surgeons limit practices to align with available hospital resources while large non-metropolitan surgeons specialize according to interest and market pressures.

Conclusions: Surgery in rural versus large non-metropolitan communities may be more distinct than previously understood. Rural practice requires broad preparation while large non-metropolitan practice favors subspecialty training.

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Summary for table of contents

While often grouped under the umbrella of non-metropolitan practice, we hypothesized that the skills needed for surgical practice in larger non-metropolitan communities (population >100,000), are distinct from those needed in smaller non-metropolitan and rural practices (population <50,000). We designed a mixed methods study to investigate this hypothesis. Scope of practice exists on a spectrum from narrow to broad, and surgical practices in rural and smaller non-metropolitan areas are

far more distinct from those in larger non-metropolitan communities than commonly appreciated. As non-metropolitan areas grow in size, subspecialty trained surgeons are increasingly in demand. A rural practice demands unique, broad-based preparation, while residents considering careers in larger non-metropolitan communities may wish to pursue subspecialty training.

Introduction

The basic format of general surgery residency was established over a century ago, and while details have evolved with time, guiding principles remain unchanged.^{1–3} A significant majority of graduating general surgery chief residents now choose to pursue additional subspecialty training, often in the form of a fellowship.⁴ This occurs within a job market where most available jobs, at least

Abbreviations: ACS, American College of Surgeons; RUCC, Rural-Urban Continuum Codes; OR, odds ratio.

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nominally, do not require subspecialty training.⁵ This mismatch between residents' training decisions and the job market has been lamented by more experienced as a failure of modern general surgical training and reflective of inadequate recent trainee motivation or preparation.^{6,7} Our recent work on this topic, however, demonstrated that when controlling for town size and census subregion, the age of the responding surgeon is not related to their opinions regarding the need for subspecialty training for future surgeons interested in a non-metropolitan career.³

It may be that a belief that subspecialty training is not needed outside of major urban areas is rooted in a traditionally-held urban/rural dichotomy in which surgical practice in metropolitan environments is thought to require subspecialty training while practice outside of major cities is labeled "rural" and viewed as relatively uniform. In the modern era, where some rural areas are agriculture-centric and isolated from urban areas, but other rural areas are growing into exurbs and developing closer relationships with urban communities, this may be a false dichotomy. In the context of greater sub-specialization in surgery, an identified need for more advanced surgical skills outside of urban areas, and a worsening rural surgeon shortage, it is logical to more closely examine differences in surgical practices across rural and non-metropolitan communities.⁸

Despite what an apparent consensus among senior surgeons, resident motivations for pursuing subspecialty training after their surgical residency have not been rigorously investigated and may be far more complex and nuanced than a perceived lack of competence at the end of residency.^{3–14} When directly asked, surgeons specifically report improvements in their marketability as surgeons, improved clinical skills, and greater confidence to be benefits of subspecialty training.^{15,16} The majority of studies on subspecialty training, however, carry an implicit or explicit assumption that subspecialty surgical training is a bridge to an academic career in a large, metropolitan medical center. Our prior qualitative work on this subject, however suggested that practice context (practice size, community size, hospital resources etc) was a key factor in perceived need for subspecialty training in non-metropolitan areas, supporting prior work on the subject.^{3,17}

In this study, we sought to confirm and explore the qualitative observation from Hughes et al. that practice context was a key component of perceived need for subspecialty training in a non-metropolitan setting.³ We hypothesize that, outside of urban areas, increasing community size is associated with increasing desire to hire subspecialty surgeons as future partners. The findings of this study will help guide future surgical curriculum development, inform the career choices of surgical trainees and provide support for policy development.

Materials and methods

We obtained institutional review board approval, collaborated with the American College of Surgeons (ACS) Advisory Council for Rural Surgery and designed a mixed-methods study that included an online, anonymous, 15-item survey distributed through the ACS Rural Surgery Listserv (Supplementary Figure 1) and a follow-up semi-structured interview in selected participants, as previously detailed.^{3,8}

Quantitative data were analyzed using univariate and bivariate testing as well as multi-variate logistic regression. Our dependent variable came from a survey item asking respondents whether subspecialty training would be ideal in the next surgeon he or she hired. Co-variables used in regression analyses corresponded to closed-ended survey questions including variables such as community size, defined as rural ($\leq 50,000$ people), small non-metropolitan ($>50,000$ and $\leq 100,000$), and large non-metropolitan ($>100,000$)

and region. We used U.S. Census Bureau definitions for geographic region. The Census Bureau does not precisely define rural areas.¹⁸ All quantitative tests were run using Stata SE14 (StataCorp LLC, College Station, TX). Data are presented at medians with 1st and 3rd quartiles and percentages were rounded to the nearest whole percentage point.

In phase two, all survey respondents who indicated a willingness to participate and qualitative interviews were digitally recorded, transcribed, then analyzed using grounded theory principles and facilitated by NVivo 11 (QSR International, Melbourne, Australia).^{3,8,19–21} Qualitative themes are presented with selected illustrative quotes.

Results

Quantitative analysis

We received 237 responses to our anonymous survey, representing surgeons in 49 states. At the time of our survey distribution, the ACS rural listserv had approximately 450 active participants – yielding a roughly 50% response rate. We found that 59% (141/237) of respondents had been in practice for more than 20 years with an additional 26% (62/237) in practice for between 10 and 20 years. The distributions of respondents by practice type (e.g. solo versus group practice or private versus hospital-employed) and hospital size (<25 , $26–99$, ≥ 100 beds) were reasonably even, with no single practice type or hospital environment describing more than 30% of respondents' settings, full details of respondents demographics have been previously reported.^{3,8}

When asked about their community size, the majority, 170/237 (72%) of surgeons practiced in a rural environment, with 16% (37/237) and 12% (28/237) practicing in small non-metropolitan and large non-metropolitan settings, respectively (Table 1). As anticipated, the overwhelming majority, 76% (181/237), of surgeons responding to this survey did not pursue subspecialty training after their residency, while 20% (47/237) pursued subspecialty training immediately after residency and 3% (7/237) returned for additional training after several years of practice.

When asked to rank the reasons why they decided to pursue subspecialty training, the three most commonly reported reasons reported were to "obtain knowledge I didn't already have," "obtain technical skills I didn't already have," and "improve my technical competence in skills I already had." The three least commonly reported considerations were: "improve my competence," "improve my ability to gain hospital privileges for certain procedures," and "improve my ability to obtain referrals."

When asked about the next generation of rural and non-metropolitan surgeons, 51% (121/237) of responding surgeons agreed that there was a benefit to additional subspecialty training for a general surgery resident interested in a career in rural surgery. The top three reasons for recommending additional subspecialty training for residents interested in a rural or non-metropolitan career were acquiring technical skills, improving confidence and improving one's ability to obtain hospital privileges, although there was a wide diversity of reasons (Table 2).

Interestingly, when asked what the ideal training for a young surgeon interested in a rural career would be, 81% (191/237) of

Table 1
Community practice size of survey respondents.

Community Size	N = 235 (%)
Rural (<50K)	170 (72%)
Small Non-Metropolitan (50–100K)	37 (16%)
Large Non-Metropolitan (>100K)	28 (12%)

Table 2
Reported Benefits to Subspecialty Training (Survey respondents picked all that applied).

Perceived Benefit	Subjects Identifying as a Benefit (n = 235 survey responses)
No Benefit	111 (47%)
Increased Technical Skills	107 (46%)
Increased Confidence	88 (37%)
Increased ability to get Hospital Privileges	68 (29%)
Increased Marketing to Referring Providers	65 (28%)
Increased Marketing to Patients	56 (24%)
Increased Ability to Get a Job	39 (17%)

respondents agreed that general surgery training with a dedicated rural track or significant rural experience would be ideal while only 4% (10/237) reported that general surgery with formal subspecialty training would be the ideal training. In line with these findings, 80% of respondents (191/237) reported that their ideal next hire would be a general surgeon without sub-specialty training, while 19% (44/237) were looking to recruit a sub-specialty trained surgeon and 1% (2/237) did not respond. When asked about which subspecialty would be most useful for a graduating resident, a wide variety of specialties were cited, the most common was trauma/critical care, although very few respondents answered this question, limiting applicability.

We next sought to understand the relationship between a desire to hire a subspecialty trained surgeon and community size. We performed a multi-variate logistic regression and found that respondents in large non-metropolitan communities were far more likely to have a desire to hire a subspecialty trained surgeon as their next partner compared to those in rural communities (OR 4.5, 95% CI 1.2–16.5) The relationship between hiring preference and small non-metropolitan size was statistically insignificant. This demonstration of an increased desire to hire subspecialty-trained surgeons as population size increased was statistically significant even after controlling for respondents' own subspecialty training, their opinions on rural training specifically, their practice type, and their Census region.

Qualitative analysis

In order to further elucidate the factors driving the difference in perceived need for subspecialty training across varying community sizes, we further analyzed transcripts from a diverse group of 16 surgeons purposively sampled from survey respondents who volunteered to participate.³ An in depth analysis of the qualitative themes that emerged from these interviews has been previously published highlighting the unique nature of rural surgery with the need for broad based surgical training with extensive endoscopic experience and confidence to practice independently.^{3,8} In this work, we expanded our prior qualitative analysis, identifying the following additional key theme pertinent to our quantitative finding above.

“Rural surgeons limit the scope of their practice to align with available hospital resources while Non-metropolitan surgeons in larger communities specialize in response to market pressures from patients and other physicians and their own clinical interests.”

Rural surgeons, i.e. practicing in towns <50,000, commonly cited limitations in the hospital infrastructure as the primary limit on their ability to take on patients and cases. Critical care, blood banking and human capital figured prominently. Illustrative quotes are as follow:

“anything that would need an ICU, real sick patients I send them down to [urban center]”

“it makes sense to ship the patient to the blood rather than bring the blood to the patient.”

“[needle localization] is typically done by a radiologist. If you're in a rural place that doesn't have a radiologist, you're really kind of behind the eight ball being able to provide a standard of care procedure for your patient.”

“just me in a 25-bed hospital with a nurse anesthetist, no assistant and a weak blood bank...that's a situation where you're better off sending somebody away.”

As community size grew, however, surgeons began to report increasing pressure to sub-specialize and limit their scope in response to pressure driven primarily by a perception of skill from the community. There was little discussion about whether subspecialty training resulted in superior outcomes, although there was recognition that the lay public and referring physicians may think it does. Illustrative quotes are as follow:

“the term general surgeon has a connotation of a general practitioner who doesn't have specialty training”

“the subspecialties...especially in the large communities, give people legitimacy.”

“[the] public has probably bought into that a little bit as well... there's an assumption on the part of many people in the public that the guy with the specialty training is going to do better”

“surgeons finishing [now] feel like they have to have a specialty because they want to be more marketable to the community more maybe than to their partners.”

There was a secondary pressure to subspecialize in larger non-metropolitan communities according to a surgeon's clinical interests and desire for work/life balance. Illustrative quote is follow:

“if you're a specialist, you're automatically going to take less call, your call is gonna [sic] be more specific to just that more limited specialty”

Discussion

In this study, we demonstrate there does indeed appear, within conventional definitions of “rural” surgery, to be at least two distinct types of practices. The high proportion of respondents who had been in practice for more than ten years lends credence to this finding as this experienced group of surgeons presumably have a nuanced and detailed understanding of the medical and social landscape within which they practice.

Rural surgery is practiced in communities of less than 50,000; and large non-metropolitan practices exist in non-urban communities of greater than 100,000. There is a continuum of practices between these sizes, and traditional, dichotomous definitions of rural versus urban practice may no longer adequately describe the diversity of non-metropolitan general surgery being practiced in the United States. The most rural areas are not the only non-metropolitan areas suffering from a shortage of surgeons, and in order to address this problem across this wide range of communities, more attention must be paid to the nuances of non-metropolitan surgery. While long decried as reflective of inadequate training, the large number of general surgery residents

pursuing subspecialty training following residency may actually be a rational response by residents to changing demands across a wider range of practice models than previously thought.

Our analysis in this paper and prior related work suggests surgeons in rural areas maintain broad-based general surgery practices with a strong focus on endoscopy and are primarily limited in their practice by hospital resources.^{3,8} As communities grow, however, surgeons are increasingly responding to market pressures from patients and referring physicians as well as their own desires to control their lives by progressively subspecializing. An important finding in these data is that in approximately a quarter of non-metropolitan surgeons subspecialty training is about building a successful practice or referral network rather than substantive improvement in outcomes.

The increasing shift towards subspecialty training has been poorly understood.⁵ A consistent finding has been that only about a third of posted surgery jobs formally require subspecialty training, although recent research highlights the need for extensive endoscopic and advanced laparoscopic skills in a rural setting.^{5,8} This seemed to be discordant with the vast numbers of surgery residents pursuing additional subspecialty training and, in the absence of data, many have assumed this was related to resident competency gaps.^{4–7,9–14} This assumption about competency stands in contrast to findings that general surgery residents are confident in the quality of their training and are choosing fellowships to match their interest in a subspecialty.¹¹ If there is a crisis of confidence among general surgery residents, it is likely more reflective of residents' evolving understandings of the high-stakes nature of a surgical practice and appropriate caution about completeness of their training.^{10,12,13} Addressing this confidence gap has been noted to drive subspecialty training.²²

Recent work has extended our understanding and found that surgery graduates have obtained fellowships and academic positions without dedicated research time, perhaps reflecting shifting fellowship opportunities away from the urban, academic, tertiary care jobs for which they were long viewed as preparation.¹⁷ The findings of this study support this interpretation, particularly the association between increasing community size and increasing desire to hire subspecialty-trained surgeons. While very few surgeons who pursued subspecialty training reported that improved referrals were a motivating factor, a key theme was a trend toward referring physicians and patients seeking out subspecialty-trained surgeons predicated on a perceived improvement in quality that may or may not actually exist. A key area of future research could focus on the differential outcomes between experienced subspecialty and non-subspecialty trained surgeons in non-metropolitan practice.

There is an anticipated shortfall in general surgeons over the coming years, a shortfall that will disproportionately impact rural communities of various sizes.^{5,23} This highlights the need to understand the training needs of surgery residents preparing for a career in a rural or community setting, the factors that impact a surgeon's decision to enter rural practice, changing resident demographics and desires as well as the logistical realities of training.⁷ Rural practices have historically consisted of substantially more endoscopy, breast surgery, hernia repairs and office-based procedures than surgeons typically see in residency or an urban surgery practice.^{14,24,25} In an effort to support the development of residents interested in rural general surgery, several residency programs have introduced graduate medical education tracks focused on training residents for the unique challenges of surgery in smaller hospitals.^{26–32} These efforts have been supported by the development of the Mastery of General Surgery Program, formerly the Transition to Practice Fellowship), a mentored transition to independent general surgery practice focused on autonomy and

practice management supported by the American College of Surgeons.^{33,34} While likely applicable to practices outside of urban areas, the Mastery of General Surgery Program is not designed to produce rural surgeons and a similar program administered through the Royal Australian College of Surgeons largely did not remain in a rural practice, instead choosing to move back to larger cities.³⁵ A key finding from this work that may inform future curriculum development is that the capability of surgeons to take on complex cases in rural and non-metropolitan areas is often limited by their hospitals' critical care capabilities.³⁴ This suggests a potentially important role for general surgeons with added certification in critical care. While the sub-specialty training area mostly strongly recommended by our respondents was surgical critical care, the absolute number of responses favoring this subspecialty area was low and thus this question remains open for further investigation.

It remains unclear, however, if additional subspecialty training is desirable for residents intending to pursue a rural surgical career and if this additional training provides a societal benefit to the hospitals and patients these surgeons will serve.^{5,17} Rural surgery has traditionally been viewed as broad based general surgical practice with referral of certain complex procedures to high volume centers.³⁶ One unanticipated outcome of the volume/quality relationship data in complex general surgery is that smaller hospitals, and their general surgeons, progressively lose patients to larger hospitals.³⁷ While it remains critical for rural general surgeons to be capable of providing care across the breadth of general surgical problems, additional subspecialty training may help rural surgeons in medium sized hospitals provide optimal care to their patients, appropriately serve their communities and remain economically viable.^{37,38} This influences not only the practice mix of the general surgeon but also the financial bottom line of the surgeon and the hospital.^{14,37}

The findings of this study raise an important question, namely: what can residents do to prepare for a rural practice if general surgery residency as it is currently constructed is inadequate? Importantly, opinions regarding the needed training for a rural career appear largely stable across generations, suggesting there is validity to asking older surgeons what surgeons of the future will need.³ While a full discussion is beyond the scope of this work, seeking out training programs with a strong rural focus, customizing the later year of training and taking a first job with a strong senior partner interested in mentorship would all seem reasonable.⁸

The results of this study must be interpreted with several important limitations in mind. Although the U.S. Census Bureau identifies urbanized areas and urban clusters, it does not precisely define rural. In essence, the Census's tradition has been to define rural as anywhere that is not urban.¹⁸ Many rural researchers rely on U.S. Department of Agriculture definitions of rurality, such as Rural-Urban Continuum Codes (RUCCs) assigned at the county level.³⁹ In RUCC terms, metropolitan counties are those with 250,000 or more people. Counties with fewer people are distinguished not only by population size but also by adjacency to more populated areas. In our broad categories of rural, small non-metropolitan, and large non-metropolitan, we sought to encompass the diversity of practice across various non-metropolitan communities that are not traditionally conceived of as "cities." We also relied on surgeons' reporting of the population size of their practice areas. We were unable to control for proximity to large urban centers and tertiary or quaternary referral centers. One might assume that small towns and those that might otherwise be categorized as "rural" in our work that are located close by the large urban centers might have a different practice mix or need for specialists than a similarly sized, but highly geographically isolated

town. While this topic occasionally came up in the qualitative interviews, we did not anticipate this concern when constructing our quantitative survey. The qualitative data on this topic were not rich enough to allow for saturation and future work could focus on the need for subspecialty surgeons in health systems that are increasingly integrated across a variety of communities. We also observed that a sizeable fraction of our responses were from surgeons more than 20 years out of training and presumably of a generation where sub-specialty training was not as commonly pursued as it is today. We did not specifically gather data on how closely respondents were involved in graduate surgical education or how recently they had directly interacted with a recent surgical graduate. As a result we cannot comment upon how well their opinions correlate with reality, that being said, however, surgeons make hiring decision on the data available to them and thus their opinions may be reasonably assumed to impact future partner hiring practices. Unfortunately with the available data, we are not able to comment further on the direction this limitation would bias results. As with all survey-based studies, a response bias is unavoidable, and we did not control for a surgeon's exposure to rural practice within their residency training. It is difficult to know in which direction and to what extent this bias exists, although the results of the qualitative analysis are generally concordant with the quantitative data suggesting internal validity within the study.

Conclusion

In conclusion, we demonstrate through this large, varied, experienced and geographically diverse sample of surgeons on the ACS rural surgery listserv, there does appear to be more variation within "rural" practice than traditionally appreciated. While bright lines between practice types are unlikely, there do seem to be two key types of practices: small, rural surgeons who take care of a wide variety of patients and have practices primarily limited by hospital resources and surgeons in larger non-metropolitan areas who are responding to increasing societal pressure to subspecialize. These findings challenge the traditional dichotomous conception of urban versus rural surgical practice and encourage a more nuanced approach to exploring surgical scope of practice issues along a rural-urban continuum.

These findings may help shed light on the large number of residents pursuing subspecialty training as the market for subspecialists may be far larger than previously appreciated. These findings may also inform curriculum development and career guidance for residents interested in a practice outside of urban centers.

Conflicts of interest and source of funding

The authors report no pertinent conflicts of interest.

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Appendix A. Supplementary data

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