Comparison of Urban and Rural General Surgeons: Motivations for Practice Location, Practice Patterns, and Education Requirements

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BACKGROUND: The purpose of this study is to determine the differences between rural and urban surgeons with regard to practice patterns, factors in choosing a practice location, and educational needs.

STUDY DESIGN: A list of surgeons obtained from the American Medical Association was examined using the Office of Management and Budget definition of *rural*. Seventeen hundred rural surgeons were mailed surveys; 421 responded. One hundred fourteen urban surgeons were contacted by telephone. Questions were designed to measure job and community satisfaction, factors influencing their decision to practice in their current location, spectrum and volume of cases, and their perceived educational needs.

RESULTS: Age distribution did not differ markedly between urban and rural surgeons. Motivation to practice in their current location varied considerably between urban and rural surgeons. Both groups equally rated quality of life as the leading factor influencing their current practice location. Urban surgeons rated other factors, such as income, practice growth, hospital facilities, and proximity to family, higher than rural surgeons. Practice patterns and educational needs also varied between the two groups. Rural surgeons performed more procedures per year with more variety in procedure type. Both groups felt that additional training in advanced laparoscopic techniques would be helpful, and rural surgeons felt that additional training in the surgical subspecialty areas was important.

CONCLUSIONS: Although rural and urban surgeons do not differ in age or the importance of lifestyle in deciding career location, different factors do impact their choice of location. Practice pattern and educational needs varied markedly between rural and urban general surgeons. (J Am Coll Surg 2005;201:732–736. © 2005 by the American College of Surgeons)

The issue of rural general surgery has been addressed in multiple forums over the last decade. There is a sense that there is a shortage of rural surgeons, although specific data are conflicting. There is increasing concern, as surgeons retire or leave rural communities, that they will be difficult to replace. It is generally accepted that the practice of general surgery in a rural environment is substantially different from that of an urban surgeon. The exact nature of these differences is not well understood, and the factors that lead a surgeon to choose a rural surgical practice have not been well examined. Additionally, training of rural surgeons during residency and the adequacy of that training to prepare them for the scope of work required in a rural practice have not been studied.

One factor leading to the paucity of data about rural surgeons relates to difficulty defining *rural*. The federal government has multiple definitions of rural, often used by different agencies. Most descriptions of rural surgery include a low population density in an area with limited medical resources. Depending on definition, rural sur-

Competing Interests Declared: None.

Funding for the Mithoefer Center for Rural Surgery and this survey from the Robert Keeler Foundation.

Received March 13, 2005; Revised June 16, 2005; Accepted June 20, 2005.
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ISSN 1072-7515/05/$30.00
doi:10.1016/j.jamcollsurg.2005.06.262

geons account for between 9.4% and 20% of the general surgical workforce.[1] The number of general surgeons per 100,000 population varies widely between rural and urban locations. This ratio is 4.48 in rural locations to 6.36 in urban locations.[1] Additionally, there is wide variation among rural areas, depending on proximity to a larger city.

There have been several reports suggesting that the practice patterns of rural surgeons differ from their urban counterparts.[2] The American Board of Surgery reported data on general surgeons taking the recertification examination showing that rural surgeons do more procedures in a year and perform a greater variety of cases than their urban counterparts.[3] Increasingly, because of increasing pressures to control resident work hours, residency-training programs provide graduating residents with little useful experience in subspecialty areas. The purpose of this article is to examine the factors that lead a surgeon to reside in a rural area, define the practice experience of rural general surgeons, and identify potential training needs of surgeons anticipating practicing in a rural location.

METHODS

A list of general surgeons was obtained from the American Medical Association Masterfile. The Office of Management and Budget (OMB) designation of metropolitan and nonmetropolitan was used to determine location status. OMB designates counties throughout the US as either metropolitan or nonmetropolitan, based on their proximity to cities of at least 50,000 residents. A modification of the OMB system developed by Goldsmith expands the rural definition to include rural locations within metropolitan counties.[4] A zip code-based system using the Goldsmith modification of rural was used to select surgeons for the survey. Seventeen hundred rural surgeons had a 52-question survey mailed to them. Nonresponders were phoned and encouraged to complete the survey. A random sample of urban surgeons was telephoned and administered the same questionnaire. Using a 1-to-5 Likert measurement scale, factors leading to the decision to practice in their current location were assessed. The same scale was used to assess the satisfaction of both practice and home location. Self-reported numbers of cases per year assessed annual procedure volumes in the categories of general surgery, laparoscopic surgery, vascular surgery, thoracic surgery, endoscopy, gynecology, obstetrics, orthopaedics, urology, otolaryngology, and plastic and hand surgery. They were also queried about potential benefit of additional training in the previously mentioned specialty areas before starting their practice.

Response rate among rural surgeons was 421 of 1,700 (24.7%). After data collection, 31 rural surveys were reclassified as nonrural because respondents indicated their practice community size was greater than 50,000. Of the urban surgeons contacted by phone, 74% completed the survey, resulting in 114 completed surveys. These responses, plus the 31 reclassified rural surveys, yielded 145 completed urban surveys.

With regard to statistical analyses and ease of interpretation, certain Likert-scale response levels were collapsed together. This was done for the surgeon's impact ratings, where "very low," "low," and "moderate" were collapsed into "moderate/low," and "very high" and "high" were collapsed into "high." Similarly, "strongly disagree," "disagree," and "neutral" were collapsed into "disagree/neutral," with "strongly agree" and "agree" collapsed into "agree."

Categorical variables were compared across the urban-rural dichotomy using chi-square tests. Continuous variables were compared using Student's *t*-test, with degrees of freedom estimated using Satterthwaite's approximation whenever necessary.

RESULTS

Demographic data

The OMB definition of rural and urban is based on commuting patterns and population density rather than population density alone. This leads to an overlap of the two practice types in the city size of 10,000 to 50,000, as depicted in Table 1. Using the Goldsmith modification definition of rural, 6% of rural surgeons worked in communities of less than 2,500, 50.7% worked in communities

Table 1. Distribution of Community Size for Urban and Rural Practices

Practice	>50,000 (%)	10,000–50,000 (%)	2,500–10,000 (%)	<2,500 (%)
Rural	0	43.3	50.7	6.0
Urban	69.4	24.3	4.9	1.4

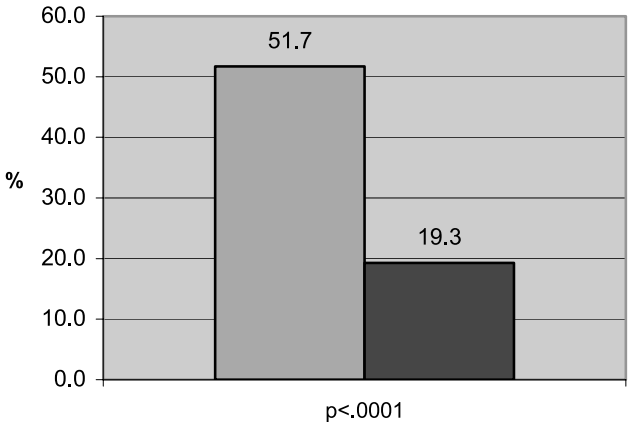

Figure 1. Rural surgeons rate professional isolation substantially higher than urban surgeons do.

of between 2,500 and 10,000, and 43.3% worked in communities of between 10,000 and 50,000 inhabitants.

Practice stability was nearly identical in the two groups, with one-third of both rural and urban surgeons stating an intention to leave their current practice in less than 5 years. Length of time in current practice also did not differ markedly, with means of 14.7 and 14.2 years in urban and rural groups, respectively.

The rural group had a slightly larger percentage of respondents in the 40-and-over age group (91.5% versus 86.9%, $p = 0.111$). This difference was not statistically significant. Mean age of respondents in the two groups (rural 53.7 and urban 53.1 years) was also virtually identical.

Impact of professional factors on practice preference

The importance of income as a factor in practice location was different between the two groups, with 36.1% of urban surgeons rating this as having a high impact on their decision to locate, versus only 19.8% of rural surgeons ($p = 0.0002$). The potential for professional growth also differed considerably between the groups, with 64.6% of urban surgeons rating this as important versus only 45.4% of rural surgeons ($p = 0.0004$).

Another important differentiating factor for practice preference was availability of hospital facilities, which 58.0% of urban surgeons rated as an important factor versus only 38.7% of rural surgeons ($p = 0.0003$). Large differences were also seen for both quality of the surgical community (58.0% urban versus 33.7% for rural, $p < 0.0001$), and quality of the medical community (60.4% urban versus 41.2% for rural, $p < 0.0001$).

Impact of other factors on practice preference

Quality of life was not an important differentiating factor for practice preference, with a high proportion of both rural (77.4%) and urban (77.6%) surgeons rating it as important in their decision to locate to their practice. In contrast, 51.1% of urban surgeons rated family proximity as having a high impact on practice preference, and only 34.6% of rural surgeons rated this as a high impact factor ($p = 0.0024$).

Practice environment comparisons

Predictably, a high percentage of rural surgeons (51.7%) reported experiencing professional isolation, versus only 19.3% of urban surgeons ($p < 0.0001$) (see Fig. 1).

The proportion of surgeons who felt they had adequate clinical resources was universally higher in the urban group. This was true for support of medical and surgical specialists (77.9% urban versus 50.4% rural, $p < 0.0001$), advances in medical technology (80.0% ur-

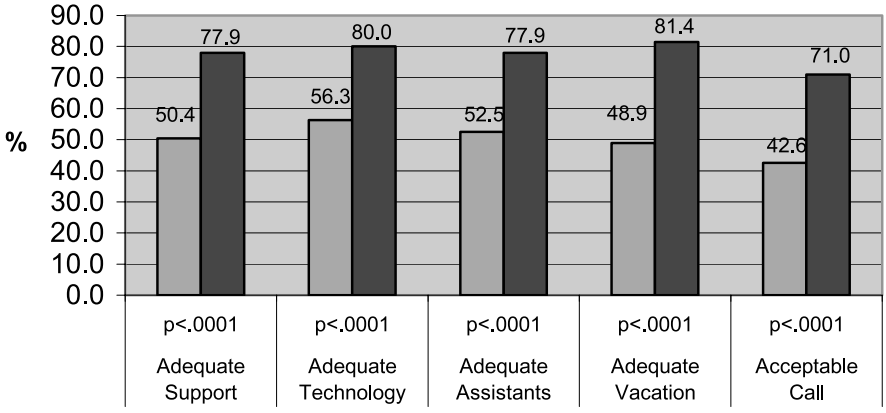

Figure 2. A comparison of the perceived satisfaction of services of rural and urban surgeons.

ban versus 56.3% rural, $p < 0.0001$), and availability of surgical assistants (77.9% urban versus 52.5% rural, $p < 0.0001$) (see Fig. 2).

A substantially higher proportion of urban surgeons reported having adequate coverage for vacation time (81.4% urban versus 48.9% rural, $p < 0.0001$). Urban surgeons also reported having an acceptable call schedule (71.0% urban versus rural 42.6%, $p < 0.0001$). A greater proportion of the rural group (56.8%) reported having difficulty recruiting a general surgeon than did the urban group (45.0%, $p = 0.016$).

Perceived training needs

Although a high proportion of both groups felt that their residency program had prepared them well for their current practice, there was a notable difference between the two groups (93.1% urban versus 80.4% rural, $p = 0.0009$).

Table 2 illustrates the proportion of surgeons within each group stating a need for additional training within certain surgical areas. For seven of the eight surgical areas; gynecology, cesarean sections, urology, thoracic, endoscopy, orthopaedics, and plastic and hand, there was a notably greater perceived need for additional training among the rural surgeons. The perceived need for advanced laparoscopy training was identical in the two groups at 73.2%.

Comparisons of surgical procedure volume

Urban surgeons reported statistically significantly greater volume for general ($p < 0.0001$), laparoscopic ($p = 0.016$), and vascular ($p = 0.007$) surgery. Urban surgeons reported slightly higher volume for thoracic surgery (5.2% versus 4.6%), but this difference was not statistically significant.

Rural surgeons had substantially higher volumes for endoscopy ($p < 0.0001$), gynecology ($p < 0.0001$), obstetrics ($p = 0.0003$), and urology ($p = 0.036$). Higher volumes that were not statistically significant were also seen in the rural group for orthopaedics, otolaryngology, and plastics and hand procedures as seen in Table 3.

Table 2. Perceived Need for Surgical Training in Rural and Urban Groups

Category of general surgery	Rural (%)	Urban (%)	p Value
Laparoscopy	73.2	73.2	NS
Gynecology	45.2	10.6	<0.0001
Cesarean sections	37.8	10.6	<0.0001
Urology	34.3	9.9	<0.0001
Thoracic	37.4	28.0	0.046
Endoscopy	62.0	45.8	0.0009
Orthopaedics	32.9	10.6	<0.0001
Plastic/hand	46.3	19.7	<0.0001

DISCUSSION

In rural communities throughout the US, the general surgeon is a critical member of the health care team. The general surgeon provides trauma and critical care, and is often the economic engine driving small rural hospitals. Rural general surgeons have a broader scope of practice as compared with their urban counterparts, often providing subspecialty surgical services that would otherwise be unavailable or require long travel times.

There is a projected increasing shortage of rural general surgeons. Thompson and colleagues[1] found that general surgeons in the smallest rural communities (2,500 to 10,000) were more likely to be older than 50 years of age, male, and a foreign medical graduate. They projected that the most rural of areas would experience loss of general surgeons first. This will be compounded by an aging workforce and the fact that many surgeons are retiring earlier. These rural positions are difficult to recruit for, with younger, more recently trained surgeons lacking the interest and training to fill these positions.

Our data indicates that both rural and urban surgeons chose their current practice location based on issues related to quality of life. The reason surgeons perceived a rural or urban locale, as enhancing their quality of life is not defined. Urban surgeons rated income, sophistication of the medical communities and available facilities as more important than rural surgeons did as factors in

Table 3. Average Number of Procedures Per Year in Rural and Urban Groups

Category of general surgery	Rural	Urban	p Value
General	210.9	305.2	<0.0001
Laparoscopic	93.9	119.1	0.016
Vascular	9.5	22.0	0.007
Thoracic	4.6	5.2	NS
Endoscopy	219.7	76.5	<0.0001
Gynecology	17.9	5.4	<0.0001
Obstetrics	5.5	1.4	0.0003
Orthopaedics	4.6	3.4	NS
Urology	3.4	1.7	0.036
Otolaryngology	3.5	2.5	NS
Plastics/hand	13.1	6.3	0.074

selecting a practice location. Considerable differences in the acceptability of the call schedule, availability of vacation coverage, and having adequate surgical assistants were apparent between the two groups.

Although many authors have used databases of individual rural states to study the practice patterns of rural surgeons, ours is the first national survey specifically addressing rural issues. This data shows that the practice of rural surgeons is more varied than the practice pattern of urban surgeons.[5-9] Our data also confirms the long-held belief that rural surgeons perform a wider variety of cases than urban surgeons. This wider variety of cases is usually felt to be a result of the lack of subspecialty surgeons in smaller communities. Although not proved by our data, the lower number of general surgical cases in rural communities may have a negative financial impact for rural surgeons. Subspecialty cases and endoscopy can provide needed income to allow a general surgeon to have a successful practice in a small rural hospital.

Our data confirm that the experience of an average rural general surgeon includes a considerable number of skills not adequately taught in current residency programs. General surgery residencies, faced with manpower shortages and a contracted number of hours that residents can work, have been reducing resident's time on subspecialty services. The "broadly trained" general surgeon really does not exist anymore.[10] Rural surgeons themselves felt that they would have been better served with more experience in many subspecialty areas before their arrival to their current community. Interestingly, even some urban surgeons felt that additional training in subspecialty areas would have been helpful, even though their practice volume numbers indicate they rarely perform such cases.

The complexity of defining rural complicates discussions of issues related to rural populations. The federal government currently has as many as eight different definitions of rural, used by different agencies. Although on both sides of the definition of rural and urban there is clarity, inevitably there is overlap in the mid ranges. We assumed the postal zip code as listed indicated practice locale. It is difficult to clearly distinguish suburban from truly rural. Additionally, geographic differences in parts of the country with rural communities, often farther from urban centers in the west versus the east, are additional compounding factors.

Our data confirm the fact that the practice pattern of rural general surgeons is more varied than their urban counterparts. It also suggests that current training programs do not provide graduates the skills needed for the breadth of practice necessary to provide the surgical care needed in rural communities. With general surgeons being a core element of rural health care, additional understanding of the challenges of rural surgical practice is important. This understanding will allow solutions to be developed to address the challenges of rural surgical practice. These include better linkages with academic centers for continuing medical education, quality improvement, consultations, and locum tenens coverage for vacation. Additionally, students from rural backgrounds should be recruited to medicine, as they might be more likely to return to rural areas to practice. Medical students and residents must be exposed to rural surgery, and surgeons interested in rural practice need broad training to effectively practice in rural communities. Without better understanding of this important health care issue, availability of adequate surgical services in rural areas may decline.

Author Contributions

Study conception and design: Heneghan, Bordley, Dietz, Gold, Jenkins, Zuckerman

Analysis and interpretation of data: Heneghan, Bordley, Jenkins, Zuckerman

Drafting of manuscript: Heneghan

Critical revision: Bordley, Dietz, Gold, Zuckerman

Obtaining funding: Bordley

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