
What Surgical Skills Rural Surgeons Need to Master

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BACKGROUND: As new technology is developed and scientific evidence demonstrates strategies to improve the quality of care, it is essential that surgeons keep current with their skills. Rural surgeons need efficient and targeted continuing medical education that matches their broader scope of practice. Developing such a program begins with an assessment of the learning needs of the rural surgeon. The aim of this study was to assess the learning needs considered most important to surgeons practicing in rural areas.

STUDY DESIGN: A needs assessment questionnaire was administered to surgeons practicing in rural areas. An additional gap analysis questionnaire was administered to registrants of a skills course for rural surgeons.

RESULTS: Seventy-one needs assessment questionnaires were completed. The self-reported procedures most commonly performed included laparoscopic cholecystectomy (n = 44), hernia repair (n = 42), endoscopy (n = 43), breast surgery (n = 23), appendectomy (n = 20), and colon resection (n = 18). Respondents indicated that they would most like to learn more skills related to laparoscopic colon resection (n = 16), laparoscopic antireflux procedures (n = 6), laparoscopic common bile duct exploration/ERCP (n = 5), colonoscopy/advanced techniques and esophagogastrosopy (n = 4), and breast surgery (n = 4). Ultrasound, hand surgery, and leadership and communication were additional topics rated as useful by the respondents. Skills course participants indicated varying levels of experience and confidence with breast ultrasound, ultrasound for central line insertion, hand injury, and facial soft tissue injury.

CONCLUSIONS: Our results demonstrated that surgeons practicing in rural areas have a strong interest in acquiring additional skills in a variety of general and subspecialty surgical procedures. The information obtained in this study may be used to guide curriculum development of further postgraduate skills courses targeted to rural surgeons. (J Am Coll Surg 2013;217:919–923. © 2013 by the American College of Surgeons)

Although 20% of the US population resides in rural areas, only 9% of physicians and 10% of surgeons practice in rural areas.¹ The density of surgeons in rural areas (defined as a metropolitan core under 10,000) is 4.67 per 100,000 compared with 6.74 nationally.² This disparity has resulted in limited access to surgical care for rural residents

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that is expected to worsen over the next decade. The demand for general surgical services is expected to rise by more than 30% by the year 2020.³ The average age of surgeons practicing in rural America is greater than 50 years old.² When these surgeons retire there will be fewer young surgeons to replace them. Fewer medical graduates are choosing general surgery as a profession. Those who do choose general surgery face several barriers to practicing in rural areas.^{4–6} In addition to lifestyle factors and poor reimbursement, commonly cited barriers to practice in rural areas include insufficient training and limited access to continuing medical education.^{6–8}

The rural general surgeon plays many vital roles in small hospitals including those in trauma, critical care, obstetrics, gynecology, orthopaedics, vascular, urology, and head and neck surgery.^{9,10} As new technology is developed and scientific evidence demonstrates strategies to improve the quality of care, it is essential that surgeons keep current with their skills. Although some knowledge may be gained

from independent study, technical skills are best learned by hands-on mentored training.^{11,12} Rural surgeons have relatively limited opportunities to interact with other surgeons and to participate in continuing medical educational activities. Barriers include their need to travel long distances and the difficulties of leaving a practice with no clinical coverage while the surgeon is away. Time away from the practice also translates into lost income. Given the variety of procedures that rural surgeons perform and advances in surgery and surgical technology, they need efficient and targeted continuing medical education that matches their broader scope of practice. Developing such a program begins with an assessment of the learning needs of the rural surgeon. The aim of this study was to assess the learning needs considered most important to surgeons practicing in rural areas.

METHODS

The Advanced Skills for Rural Surgeons course was developed by a multidisciplinary advisory group consisting of rural surgeons, academic surgeons, and individuals with expertise in adult education. The initial planning involved numerous discussions with rural surgeons, both one-on-one and in groups, to brainstorm potential topics for course content. A needs assessment questionnaire was designed based on these results, a review of the literature, and on a practice analysis based on interviews and document review. Through an iterative process, the questionnaire was reviewed for content validity and form by members of the advisory group. The questionnaire consisted of 9 items including 3 open-ended questions asking respondents which procedures they most commonly performed and which procedures they did not routinely perform, but would like to learn. They were also asked to indicate additional topics considered important to learn. A fourth open-ended question asked how many years the respondent had been in practice. One item asked the respondents to rate the usefulness of 10 potential topics on a 1-to-7 semantic differential scale. One multiple choice question asked which component of a course (background material, simulation, or hands-on practice) would be most valuable. Three additional multiple choice questions asked how many days the respondent would expect to spend at the course, how much the respondent would be willing to pay to attend, whether their hospital would help cover the costs of attending the course, and who would cover their practice while they were away. A paper questionnaire was administered to attendees of the Rural Surgeon's Forum at the American College of Surgeon's Clinical Congress in 2009. Based on the results of the needs assessment

surveys, a pilot skills course was developed. The pilot course was held in conjunction with a rural surgery symposium covering clinical and nonclinical topics related to rural surgical practice. After reviewing the results of the initial questionnaire and receiving additional feedback after the initial pilot course, 4 additional items were added to the question that asked respondents to rate the usefulness of topics. Some items were collapsed and minor wording changes were made. The questionnaire was administered a second time to the attendees of the Rural Surgeon's Forum at the 2011 American College of Surgeons Clinical Congress.

A second pilot skills course was held in conjunction with the 2012 American College of Surgeons Clinical Congress. Before this second skills course, an additional gap analysis questionnaire was electronically sent to all registered participants. This survey was designed to determine the level of experience and/or confidence with each of 3 topics addressed in the course including breast ultrasound, management of fingertip injury, and repair of facial soft tissue injury. Participants were asked to list 3 things they would most like to learn in the breast ultrasound, hand injury, and face injury modules. We also queried the participants regarding their usual practices for central line insertion including the use of ultrasound, use of a procedure checklist, and compliance with the Centers for Disease Control (CDC) 2011 guidelines for the prevention of intravascular catheter-related infection.¹³

RESULTS

Seventy-one needs assessment questionnaires were completed by attendees of the 2009 and 2011 rural surgery forums. The results of both questionnaires were collated. The self-reported procedures most commonly performed included laparoscopic cholecystectomy ($n = 44$), hernia repair ($n = 42$), endoscopy ($n = 43$), breast surgery ($n = 23$), appendectomy ($n = 20$), and colon resection ($n = 18$). Other procedures indicated by 4 or fewer respondents included skin lesion excision, hemorrhoidectomy, tonsillectomy, port insertion, trauma, Nissen fundoplication, and wound care. Open-ended responses to the question, "What procedures that you do not routinely perform would you like to learn?" and "Other topics you would like to see?" included laparoscopic colon resection ($n = 16$), laparoscopic antireflux procedures ($n = 6$), laparoscopic common bile duct exploration/ERCP ($n = 5$), colonoscopy/advanced techniques and esophagogastrosopy ($n = 4$), breast surgery ($n = 4$), cesarean section ($n = 3$), laparoscopic trauma evaluation ($n = 3$), and thyroidectomy ($n = 3$). Additional procedures with 2 or fewer responses included

Table 1. Usefulness of Topics

Topic	Response average based on 7-point scale of 1, "not useful" to 7, "very useful"	
	2009 version	2011 version
Ultrasound	—	5.8
Endomucosal resection of colonic polyps (2009)/ advances in upper and lower endoscopy (2011)	4.6	5.7
Breast update	—	5.7
Hand	—	5.3
Leadership and communication	4.6	4.7
Urology: suprapubic tube insertion, urethral dilation, and management of testicular torsion	—	4.7
Suprapubic tube insertion	4.2	—
Urethral dilation	3.7	—
Ureteral stent insertion	3.7	—
Management of testicular torsion	4.2	—
Facial plastic surgery		
Facial laceration repair	4.6	4.8
Excision of facial lesion	4.4	4.9
Obstetrics and gynecology		
Ectopic pregnancy	3.9	4.2
Management of ovarian torsion	4.1	3.9
Management of ectopic pregnancy	3.9	4.2
Management of postpartum hemorrhage	3.8	3.8
Anal fistula plug	—	4.1

pacemaker placement, carpal tunnel release, trauma thoracotomy, cystoscopy, hand tendon repair, liver resection, advanced ultrasound, laparoscopic hernia repair, sentinel node biopsy, laparoscopic cholecystectomy, laser vein treatment, flap rotation and closure, esophagectomy, tonsillectomy, hip fracture management, endometrial ablation, and CT reading. Table 1 shows the ratings of the usefulness of various topics.

The average time in practice was 18 years. The most valuable component of a skills course was noted to be hands-on practice (n = 32) compared with background material (n = 10) and simulation (n = 9).

Respondents indicated most frequently that they would expect to spend 2 to 3 days at a skills course (1 day n = 6, 2 days n = 26, 3 days n = 20, 4 days n = 1, 5 days n = 7). The amount the respondents were willing to spend to attend a course is indicated in Table 2. Twenty-five of 66 respondents indicated that their hospital would likely help cover the cost of attending the course, 17 indicated "no," and 24 indicated "maybe." While they were away,

Table 2. How Much Money Would You Be Willing to Pay to Attend a Course?

Course length, d	<\$250,	\$250–\$500,	\$500–\$750,	\$750–\$1,000,
	n	n	n	n
1	7	12	5	0
2	1	11	14	4
3	1	11	14	4
4	0	1	6	3
5	0	0	6	9

n, number of respondents in 2009 and 2011 combined.

respondents indicated that their practice would be covered by a practice partner (n = 34), a surgeon from another practice (n = 9), a locum tenens surgeon (n = 8), or the practice would go uncovered (n = 15).

Twenty-three of 26 course participants in the 2012 pilot course completed the precourse gap analysis questionnaire. Their responses reflected a range of experience with ultrasound in general and breast ultrasound in particular (Table 3). The level of confidence in fingertip repair and repair of facial injuries also varied (Tables 4 and 5). Representative answers to, "What would you most like to learn from the breast ultrasound module?" included how to differentiate benign from malignant lesions, efficiency in the use of ultrasound, systematic

Table 3. Gap Analysis Results for Breast Ultrasound (n = 23)

Questions and answer choices	n	%
How much experience have you had using ultrasound in the treatment of breast disease?		
1. Little to no experience with ultrasound	3	13
2. Some experience with ultrasound (such as trauma FAST scan) but no experience with breast	4	17
3. Limited experience with breast ultrasound	6	26
4. Some experience with breast ultrasound	6	26
5. Extensive experience with breast ultrasound	4	17
How confident are you with performing ultrasound on the breast?*		
1	7	30
2	5	22
3	7	30
4	2	8
5	2	8

n, how many of each response there were; %, percentage of the total.

*Questionnaire used a 5-point scale: 1, little or no confidence; 3, moderately confident; 5, very confident.

FAST, focused assessment with sonography for trauma.

Table 4. Gap Analysis Results for Hand Injury (n = 23)

Please indicate your level of confidence with the following procedures:					
Procedure	1	2	3	4	5
Administering digital anesthesia, n (%)	0	2 (9)	4 (17)	5 (13)	12 (47.6)
Nail bed repair, n (%)	5 (22)	7 (30)	7 (30)	2 (9)	2 (9)
Revision amputation, n (%)	4 (17)	8 (35)	8 (35)	1 (4)	2 (9)

Questionnaire used a 5-point scale: 1, little or no confidence; 3, moderately confident; 5, very confident.

methods of performing ultrasound, how to select the best ultrasound machine for the office, and how to set the machine for optimal images. From the hand module, course participants indicated that they would most like to learn tendon repairs, how to use K wires to repair associated fractures, decision making regarding amputation vs reimplant, when to refer to specialty care, and post hand injury physical therapy. Regarding facial trauma, the participants indicated that they most wanted to learn how to achieve the best cosmetic result, what injuries are commonly missed, suture selection and handling techniques, anesthesia for these injuries, especially in children, and how to identify injuries that require transfer to a specialist.

Eleven (48%) surgeons reported routinely using ultrasound for central line insertion and 8 (35%) routinely used a procedure checklist. Hand washing was routinely used by all surgeons when inserting central lines. The majority of surgeons used maximal sterile barrier precautions (use of cap, mask, sterile gown, sterile gloves, and sterile full body drape), chlorhexidene skin preparation, and sterile dressings at the catheter site.

DISCUSSION

The results of the needs assessment provide further insight into the types of procedures performed by surgeons practicing in rural areas. Our results are consistent with those from previous studies that have demonstrated that rural surgeons perform a broad range of subspecialty procedures.⁹ Sticca and colleagues¹⁴ reported that subspecialty procedures comprise 12% of the procedures performed by rural surgeons. These include vascular surgery, obstetrics and gynecology, orthopaedic, urologic, cardiothoracic, and

otolaryngology procedures. The respondents in our survey reported that endoscopy is among the most commonly performed procedures. The surgical logs of surgeons recertifying in general surgery reflect that the individual rural surgeon performs 200 to 300 endoscopic procedures annually.¹⁵ Harris and colleagues¹⁶ reported that endoscopic procedures comprise 40% of the procedures performed by surgeons in rural North and South Dakota.

The survey respondents ranked ultrasound as the most useful topic. Their responses reflected the increasing use of ultrasound in surgical applications. Ultrasound for central line insertion is considered by many to be essential standard practice for central line insertion.¹⁷ Other common uses of ultrasound include abdominal ultrasound for assessing trauma patients and ultrasound for evaluating breast lesions. Emerging ultrasound techniques applicable to surgeons include the use of ultrasound to diagnose pneumothorax and echocardiography to evaluate shock.^{18,19}

An often stated learning goal of the course participants was to gain a clearer understanding of what conditions were appropriate to be managed locally and what findings required transfer to specialist care. This distinction is critical. Although specialists may provide greater expertise, transfer of care may be logistically and financially challenging to the patient. When the need for transfer to a specialist is recognized, it is important for the rural surgeon to know how to optimize the patients before transfer.

One limitation of this study is that the needs assessment questionnaire did not include demographic information about the respondents. We opted not to collect this information in order to maintain confidentiality of the participants. Although the authors had personal knowledge that

Table 5. Gap Analysis Results for Facial Injuries (n = 23)

Please indicate your level of confidence with the following procedures:					
Procedure	1	2	3	4	5
Repair of eyelid laceration, n (%)	4 (17)	3 (13)	8 (35)	8 (35)	0
Repair of full-thickness lip laceration, n (%)	0	3 (13)	9 (39)	8 (35)	3 (13)
Repair of cheek laceration, n (%)	0	5 (22)	6 (26)	9 (39)	3 (13)

Questionnaire used a 5-point scale: 1, little or no confidence; 3, moderately confident; 5, very confident.

many of the attendees of the rural surgery forums were indeed in rural practice, we could not verify that each respondent was practicing in a rural area. Also, we could not verify duplicate respondents in 2009 and 2011. An additional limitation is that the questionnaire reached a relatively limited number of surgeons who had the time and resources to attend a professional meeting.

CONCLUSIONS

In conclusion, we assessed the learning needs (knowledge and surgical skills) for surgeons practicing in rural areas. Our results demonstrated that surgeons practicing in rural areas have a strong interest in acquiring additional skills in a variety of general and subspecialty surgical procedures. Our results also showed differences in experience among course participants. Future curriculum design should consider learners of varying levels of knowledge and experience. It should also leverage the effectiveness of distance learning technology in order to optimize in-person, hands-on experiential learning. The information obtained in this study may be used to guide curriculum development of further postgraduate skills courses targeted to rural surgeons.

Author Contributions

Study conception and design: Halverson, Hughes, Borgstrom, DaRosa

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