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Daniel M. Avery Jr
College of Community Health Sciences, davery@ua.edu

Joseph C. Wallace
College of Community Health Sciences, jwallace@ua.edu

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RURAL SURGERY TRAINING PROGRAMS IN THE UNITED STATES: A REVIEW OF THE LITERATURE

INTRODUCTION

Rural surgery training programs have been developed to train general surgeons for community rural service. There are 11 rural surgery training programs in the United States discussed below that are recognized by the Advisory Council for Rural Surgery for the American College of Surgeons (1-10, 11). In addition to these, there are other training programs around the country with rural emphasis who train general surgeons to practice in rural areas. The terms “general surgeon” and “rural surgeon” are not synonymous (2). Core training for a rural surgeon is an accredited general surgery residency but is insufficient and more surgical experience is needed (2). Rural surgery is very broad based and some of the skills needed are not even Accreditation Council for Graduate Medical Education (ACGME) required rotations for board certification in surgery (2).

There are many advantages to rural general surgery training programs. A well-trained rural surgeon with OB/GYN experience can handle 66% of all inpatient operations in a rural hospital (2). Vascular, head and neck and urology experience improves that number to 71% (2). Rural surgeons typically perform many surgical procedures and endoscopic and laparoscopic procedures. Rural surgeons perform surgical subspecialty operations, many out of necessity. Trauma is an integral part of rural general surgery, as most surgeons are an integral component of the trauma system in rural areas (2).

A major problem facing both general surgery and rural surgery is the national shortage of general surgeons, leaving rural surgery in a crisis over the deficit of providers, which is discussed elsewhere (1-3, 12-16). Less medical students are choosing general surgery (17, 18). Less practicing general surgeons are being produced each year (15, 19). The number of general surgeons

has decreased 26% over the last 25 years (15, 19). Some 80% of the graduating chief residents in general surgery pursue fellowships (1-3, 15, 16). There is an increased demand for general surgery with the growing and aging population (2). Many suggestions have been recommended to improve the number of general surgery graduates including increasing the number of general surgery positions, importing foreign surgery graduates, and improved reimbursement for general surgeons, especially for those practicing in rural areas (15).

The critical shortage of general surgeons in this country translates to a critical shortage of rural surgeons. Rural surgeons are aging and recruits are not behind to fill the deficits (14). Less general surgeons are going to rural areas (18). Rural surgeons are leaving rural areas and moving to more heavily populated areas where there are better opportunities, better reimbursement and better lifestyles (2, 20). Graduating general surgery chief residents do not practice in rural areas because they feel unprepared (21). Most general surgery graduates today are not capable of practicing general surgery on their own and need mentoring for two years after residency much like a fellow (22). Other problems include limitation of operative resources, early specialization in surgery, minimal exposure to surgical subspecialties, lack of broad-based training, lack of exposure to trauma and lack of endoscopic and laparoscopic cases and experienced staff to teach these (23).

Rural surgery programs have been developed to address the above problems and attract graduating general surgeons to communities and rural areas. These programs provide broad experiences, rural general surgery, and endoscopic and laparoscopic procedures (1). Rural preceptors are able to mentor and proctor surgery residents and serve as surgery role models (3). Yet, those training in rural programs have more autonomy in both decision making and surgical management (9).

RURAL SURGERY TRAINING PROGRAMS

The general surgery residency at Gundersen Lutheran Medical Center in LaCrosse, Wisconsin began in 1974 (1, 2, 11). The residency is an unopposed general surgery residency with a long term emphasis in preparing general surgery graduates for rural practice (4). Some 76% of graduates have entered general surgery practice with 40% to 50% of these in rural practice (2, 5, 11). Ten other institutions have subsequently developed rural general surgery training. Programs are listed below. Rotations in the various training programs are found in Table 1.

Components of Rural Surgery Training Programs are found in Table 2. Some rural general surgery training programs are associated with family medicine residencies in which rural surgery residents and fellows share clinics, conferences and weekly morbidity and mortality conferences with family medicine residents and provide surgical consultation for family medicine patients in their clinics (1). The call schedule for rural surgery residents and fellows must be Residency Review Council (RRC) compliant with work hours (1). The call schedule may be from home and allows for subspecialty call coverage for emergencies and consultations (1). Call may be one night a week from home and two weekends a month. The day shift should be 7 am to 5 pm. The details are outlined in Table 2. The Accreditation Council for Graduate Medical Education (ACGME) requirement for surgery training programs must be followed. Those requirements are found at the ACGME website. The ACGME Core Competencies must be followed and are listed in Table 3. The American Board of Surgery (ABS) developed 10 Core Areas of Training that require competency as part of a General Surgery Residency (3). These are listed in Table 4. Case logs and portfolios documenting cases and experience are signed off for privileges (1).

Selection of appropriate campus, hospital and attending staff is critical for the educational experience to be maximal (1). Attending surgeons need to be general surgeons, rural surgeons and subspecialty surgeons (1). Fellows and residents must be evaluated on a 360 degree evaluation for

fund of knowledge, patient care and surgical competence (1). Case lists and portfolios are used for credentialing and privileging (1). Input from rural surgery training shows that this training is highly important in their education with strongest correlation being in endoscopy (1). Recommended rotations include endoscopy, OB/GYN, urology, burn care, ENT, cardiothoracic surgery, orthopedics, trauma, neurosurgery, oncology, gastroenterology, anesthesia with supervision of nurse anesthetists and plastic surgery. These are found in Table 5. Some programs have more rotations than others.

Housing should be free of charge and large enough to accommodate a spouse and children to attract the family to this or a similar area (1). Meals are free for fellow or resident and family when they are present at the hospital cafeteria or some similar arrangement (1). The hospital laundry should launder scrubs (1). Salary, malpractice insurance coverage and health/dental/vision benefits should come from the residency program (1). Time off should allow the fellow or resident to explore the community and participate in recreational activities as desired such as hunting and fishing (1).

Funding for a fellow after completion of residency training will be different. There may be funding like during residency, grant funding for training, funding through a future employing hospital, state agency funding like the Alabama Family Practice Rural Health Board, an endowment or malpractice coverage only/non-funded salary in which the fellow may need to “moonlight” to pay his way. Training programs have used fellows as junior faculty members who can bill and collect for the procedures that he does (3). Where this has been done, the fellow has averaged 200 cases/year (3). It also is an opportunity to practice independently (3).

ADVISORY COUNCIL FOR RURAL SURGERY

The American College of Surgeons (ACS) and the American Board of Surgery (ABS) have recognized the need for rural general surgery and made a concerted effort to prepare residents for rural practice (24). The American College of Surgeons (ACS) has developed the Advisory Council for Rural Surgery (ACRS). The ACRS has maintains a repository of rural training experiences and training sites in the United States (25). There are five different types of rural training experiences which are described below. Several institutions offer more than one type of rural surgery training.

TYPES OF RURAL SURGERY TRAINING PROGRAMS

There are five different types of training experiences. Rural experiences range from rural rotations to dedicated tracts to postgraduate fellowships (25). Rural training during a general surgery residency may take the place of a research or laboratory year.

1. **Rural Surgery Rotations** (25) are one to three month elective or required rotations usually in a community setting.
2. **Dedicated Rural Surgery Tracks** (25) are 9 months of surgical subspecialty and rural surgery rotations over PGY 2, 3 and 4 years.
3. **Immersion Approach** (25) is a one year rural experience instead of a research year with rotations throughout residency with a high volume operative experience. There are subspecialty and endoscopy rotations.
4. **Fellowships** (25): were designed for surgeons in practice or at completion of a general residency with a focused experience in a particular area such as endoscopy.

5. **Transition to Practice Program** (25) are useful for residents finishing a general surgery residency who want additional experience in practice development, subspecialty exposure and rural surgery (15).

MAJOR RURAL SURGERY TRAINING PROGRAMS IN THE UNITED STATES

There are 11 rural surgery training programs in the United States recognized by the Advisory Council for Rural Surgery of the American College of Surgeons. Rotations at each training program are listed in Table 1.

Gundersen Lutheran Medical Center at LaCrosse, WI (1-3, 5, 11) has an unopposed general surgery residency that was established in 1974 with an emphasis on rural surgery careers. It has subspecialty rotations and no other surgical specialty or fellowships (1, 2). Rotations include general surgery, orthopedics, neurosurgery, otolaryngology, burn surgery, plastic surgery, cardiothoracic surgery, urology, obstetrics, gynecology, gynecologic oncology, and endoscopy. Residents average 150 colonoscopies and 50 upper gastrointestinal endoscopies (11). There is an emphasis on rural and international rotations. Some 76% of graduates have entered general surgery practice with 40%- 50% of these in rural practice (2, 5, 11).

Oregon Health & Science University (OHSU) at Portland, OR (1, 2, 11, 14) was established in 2001 and has the only general surgery residency in Oregon (26). There is a one-year rotation during the 4th year of residency training in Grants Pass, Oregon with experience in general surgery, OB/GYN, orthopedics, otolaryngology and urology (11). One third of the surgery graduates go to rural areas (2).

University of North Dakota at Grand Forks, ND (1, 2, 6, 11) was established in 1982. This is an unopposed surgery residency that supplies surgeons for North Dakota, Montana, Wyoming and

South Dakota. It has a rural training program with a specialized curriculum (1) including general surgery, OB/GYN, ENT, Rural Elective, Orthopedics, Urology, and Endoscopy. Some 41% of graduates practice in rural communities (2, 11).

East Tennessee State University at Johnson City, TN (7, 11) has a broad based general surgery residency at Quillen College of Medicine utilizing 4 hospitals with experience in general and vascular surgery (11). There is an optional one year rotation after the third or fourth year for residents interested in rural surgery with rotations in orthopedics, urology, ENT and gynecology.

Bassett Medical Center at Cooperstown, NY (1, 2, 3, 11) was established in 2004. Bassett Medical Center is a major teaching hospital of Columbia University and a medical school clinical site (11). It has an increased experience in rural areas and surgical subspecialties (1). Residents live and train in a small town (11). There are no subspecialty residents or fellowships (2). There is a general surgery training program with a post-residency mini-fellowship, rural hospital rotations, and medical student rotations. (2) This broad experience training program (27) was designed to supplement general surgery training in neurosurgery, orthopedics, urology, plastic surgery, cardiothoracic surgery, and otolaryngology/ head and neck surgery (11). Almost 50% of graduates practice general surgery (11, 13).

University of Tennessee College of Medicine at Knoxville, TN (8, 11) has a one month elective in a rural or international location during the PGY3 year and a three month rural surgery rotation for PGY4 residents in a rural hospital (11). Rotations include gynecology, non-operative orthopedics and trauma (11). Currently 58% of graduates have chosen rural general surgery practices (8).

University of Tennessee College of Medicine at Chattanooga, TN (1, 2, 3, 9, 11) is a 6 year traditional general surgery residency with 5 clinical years and 1 year of research located at the Erlanger Campus (11). There is a 3 month PGY III rural site rotation for all third year surgery residents in the towns of Athens and Etowah (1, 2, 11). Rotations include general, thoracic and vascular surgery with subspecialty rotations. Residents get to perform a large number of procedures (2). The rural rotation increases the number of graduating residents considering a rural practice (9). The resident is exposed to a rural general surgery practice and gets to decide firsthand if a rural practice is right for him (2).

University of Utah at Salt Lake City, Utah (11) was established in 2007 to increase general surgery exposure to the rural experience (1, 2, 11). The University of Utah General Surgery Residency has a one year rural surgery fellowship for PGY III residents interested in a rural experience and possible rural practice at Ogden Regional Medical Center. There are rotations in gynecology, obstetrics, and orthopedics. There is also a two month experience at a rural hospital.

University of Minnesota, Duluth, MN (11) is a general surgery residency with a General Surgery Residency Rural Training Track at Essentia Health St. Mary's Medical Center on Lake Superior in Duluth, MN. The first three years are traditional general surgery at the Twin Cities and the last two are rural surgery at Duluth. The rural track includes rotations in obstetrics, gynecology, endoscopy, emergency and trauma surgery triage, stabilization and transport, thoracic surgery and vascular surgery (11).

East Carolina University at Greenville, North Carolina (10, 11) has a surgery residency sponsored by Vidant Medical Center. There is a one month community rural surgery rotation and elective for PGY 4 residents at Edenton, NC. (10, 11).

University of Nebraska Medical Center at Omaha, Nebraska (11) has a general surgery residency with a one month PGY3 rural rotation at the Great Plains Regional Medical Center in North Platte, NE. There is extensive minimally invasive general surgery and endoscopy (11).

ADVANTAGES OF RURAL GENERAL SURGERY TRAINING PROGRAMS

There are many advantages to rural general surgery training programs. A well-trained general surgeon with OB/GYN experience can handle 66% of all inpatient operations in a rural hospital (2). Vascular, head and neck and urology experience improves that number to 71% (2). One third of the procedures performed by rural surgeons are procedures not required by ACGME for surgical training (2). Rural rotations give residents more autonomy while under attending surgeon supervision (9). It is important that rural training programs have a rural experience for medical students interested in rural surgery (2). There are 242 general surgery training programs in the U.S. (1). Responding to a survey about rural training, 58 or 24% responded to the survey and only 21 or 8% responded that their program included rural training (1). Training during residency is a major part of the preparation for practice (24).

Rural Surgeons Perform More Procedures than Urban Surgeons

Data from the American Board of Surgery taken from recertification data reveals that rural surgeons performed more procedures than the urban counterparts including endoscopy, laparoscopy, gynecology, urology and orthopedics (1). Rural surgeons typically perform many procedures such as endoscopic procedures, biliary tract procedures, herniorrhaphies, GI procedures and laparoscopies (2). General surgeons who plan on a rural career may not get the training they need from a traditional general surgery residency (24). The ACGME mandates that graduating general surgery residents must report 750 operations with 150 of them performed in

the chief year (3). The Residency Review Committee (RRC) has developed 16 defined areas of procedures and minimal numbers to qualify for the certification examination (3). Rural surgery training help meet these numbers.

Rural Surgeons Have a Broader Scope of Practice

Rural surgeons have much broader scope of practice (17). Rural general surgeons have a different practice than urban general surgeons with a greater variety of type of specialty procedures (24). Broader training and subspecialty surgical exposure are essential to prepare for these careers (4, 13). The need is for broad-based training with abdominal, breast and endocrine surgery, trauma, oncology and simulation with emphasis on quality and patient safety (3).

Subspecialty Surgical Exposure is Essential

Rural surgeons perform more surgical subspecialty operations than their urban counterparts (4). They have a strong interest in acquiring additional skills in general and subspecialty surgery (17). Development of rural physicians does not compete with medical research or subspecialty medicine (9). Rural general surgeons have a different practice than urban general surgeons with a greater variety of type of specialty and subspecialty procedures (12). Specialty procedures are a significant component of a rural surgery practice (24).

More Endoscopic and Laparoscopic Cases

Rural surgeons perform 25% of their procedures endoscopically compared to 10% for urban surgeons (1). Many graduating surgery residents do not feel competent in advanced laparoscopy because of the lack of cases and of experienced staff to teach this skill (23). Community-based rural programs can train surgery residents in advanced laparoscopy including herniorrhaphy, splenectomy, colectomy, Nissen fundoplication, and adrenalectomy with confidence on the part of

the residents (23). Lacking in most general surgery residencies is OB/GYN, orthopedics, urology and ENT which are not usually taught (24).

Exposure to Trauma, Burns and Wound Care

Rural surgery training allows residents to gain experience in trauma, burns and wound care. Trauma is an integral part of rural general surgery, as most surgeons are an integral component of the trauma system in rural areas (2). Their role is usually to coordinate trauma care, resuscitation and stabilization and prioritization of patients for transfer to higher levels of care and definitive care for patients that do not need subspecialty surgery (2).

More Surgical Autonomy

Rural rotations give fellows and residents more autonomy in surgery procedures and surgical decision making while under attending surgeon supervision (9). This is important as experience, skill and autonomy come with the numbers of procedures.

Critical Care

Critical Care is an important function of rural surgeons. Critical care usually falls to the responsibility of the general surgeon along with primary care providers including airway management, central line access and placement, management of shock, treatment of transfusion reactions, intubations, chest tube placement, management of hemodynamic instability and hyperalimantation (2). While many of these skills may have not been obtained during a surgery residency, they can be obtained in a rural surgery fellowship.

Primary Care

General surgery is an integral part of primary care especially in rural areas along with family physicians, general internists and pediatricians (28). In many areas, general surgeons may provide primary care especially where medical care is insufficient and providers are scant (2). Rural general surgery is an opportunity to provide primary care as a surgeon (26).

CONCLUSIONS

Rural surgery training programs are a mechanism to attract more medical students to general surgery residencies, more graduating chief general surgery residents to private practice in community and rural areas, improve the case numbers and confidence of graduating surgery residents, and improve the quality of surgical care in this country. Programs like the Gundersen Lutheran program have been very successful with 76% of their graduates practicing general surgery and 50% of these in rural areas (1). Some 41% of graduates of the North Dakota program go to rural or small communities (2). We must mentor those in surgical training, serve as role models, and encourage and validate general surgery as a career.

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Table 1: Rotations in the Various Rural Surgery Training Programs

Programs	OHSU (1)	WI (2)	ND (3)	ETSU (4)	NY (5)	Knox (6)	Chat (7)	Utah (8)	MN (9)	NC (10)	NEB(11)
Rotations											
Gen Surg	X	X	X	X	X	X	X	X	X	X	X
GYN	X	X	X	X		X		X	X		
Orthoped	X	X	X	X	X	X		X			
Urology	X	X	X	X	X						
ENT	X	X	X		X						
Endoscop	X	X	X						X		X
OB	X	X	X					X	X		
Emergenc	X	X							X		
Rural	X	X	X	X	X		X		X		
Trauma		X				X			X		
Crit Care		X									
Neuro Sur		X			X						
Plastics		X			X						
Cardio Th		X			X						
Anesthes											
Patholog											
Ped Surg											
Thoracic							X		X		
Vascular				X			X		X		
Oncology		X									
Transplan											
GI											
Hand											
Ano Rectal											
Skin/Soft											
Endocrine											
Breast											
Pulmonar											
Ophthalm											

- (1) Oregon Health & Science University in Portland, OR
- (2) Gundersen Lutheran Medical Center in LaCrosse, WI
- (3) University of North Dakota in Grand Forks, ND
- (4) East Tennessee State University in Johnson City, TN
- (5) Bassett Medical Center in Cooperstown, NY
- (6) University of Tennessee College of Medicine in Knoxville, TN
- (7) University of Tennessee College of Medicine in Chattanooga, TN
- (8) University of Utah in Salt Lake City, UT
- (9) University of Minnesota in Duluth, MN
- (10) East Carolina University in Greenville, NC
- (11) University of Nebraska Medical Center in Omaha, Nebraska

Table 2: Components of Rural Surgery Training Programs (1, 9)

1. 1 year clinical fellowship in rural surgery for 4th year general surgery residents.
2. Subspecialty rotations
3. Academic environment with conferences
4. Case lists or portfolios of procedures signed off for privileges
5. Flexible surgery and subspecialty call compliant with Residency Review Committee (RRC) compliant work hours
6. Must meet ACGME requirements for surgery training
7. Close relation with family medicine residency
8. Joint clinic with family medicine as a surgical consultant
9. Joint conferences and morbidity and mortality conference with family medicine
10. Rotations: Endoscopy, OB/GYN, urology, burn care, otolaryngology, cardiothoracic surgery, orthopedics, trauma, neurosurgery, oncology, gastroenterology, anesthesia with supervision of nurse anesthetists, plastics
11. General surgery in rural area with selected general surgeons
12. Housing free of charge and large enough for spouse and family to attract spouse to area; meals are free for resident/fellow and family at hospital; scrubs suits with laundry
13. Evaluation by feedback from attending surgeons on fund of knowledge, patient care and procedural competence. 360 degree evaluation.
14. Portfolio of patients and procedure.
15. Case list for American Board of Surgery
16. Recommended Call: 1 week night a week from home and 2 weekends per month .
Day shift is 7am to 5pm.
17. Rural general surgery mentors.
18. Office hours in the afternoon once a week with attending surgeons.
19. Malpractice coverage from the residency program.
20. Salary from residency program.

21. Health/dental insurance from residency program (1, 9).

Table 3: ACGME Core Competencies (16)

Professionalism

Practice Based Learning

Systems Based Practice

Medical Knowledge

Clinical Skills

Interpersonal and Communication Skills

Table 4: American Board of Surgery (ABS) 10 Core Areas of Training that Require Competency as Part of a General Surgery Residency (3)

Alimentary tract including bariatric surgery

Abdomen and contents

Endocrine

Solid organ transplantation

Pediatric surgery

Surgical critical care

Surgical oncology

Trauma, burns and emergency surgery

Vascular surgery

Table 5: Recommended Rural Surgery Rotations (2)

SURGICAL ROTATIONS

Abdominal and Anorectal Surgery

Minimally Invasive Surgery (MIS)

Trauma

Endocrine Surgery

Breast Surgery

OB/GYN

Endoscopy

Rural Rotations

Vascular Surgery

Orthopedics

Otolaryngology

Plastics/Burn Surgery

Urology

NONSURGICAL ROTATIONS

Anesthesia

Critical Care

Nutrition

Practice-Based Learning

Research Experience

System-Based Practice

Practice Management