

New trends in general surgery training:



*Creating new training environments
to maximize the resident experience*

by

Heena P. Santry, MD, Chicago, IL, and Ted James, MD, Burlington, VT

William Halsted, MD, is credited for developing the traditional surgical residency model in the U.S. Much has changed since Dr. Halsted's era, and the task of imparting the core principles of general surgery to new trainees has met new challenges, including the installment of an 80-hour workweek, an ever-growing array of surgical technology, and the rising trend toward subspecialization. Surgical training programs have sought to meet these challenges by implementing innovative approaches to ensure that graduates complete residency training prepared to care for a wide range of surgical patients.

Rural surgery electives

Imagine being a patient in a small town with only one general surgeon. The nearest hospital with subspecialists is more than 75 miles away.

You are in a car accident. You suffer an epidural hematoma that must be decompressed immediately. You have a femur fracture that must be pinned. You are 38 weeks pregnant and need an emergent cesarean section for placental abruption. Will that one general surgeon be able to recognize and treat each of these emergent issues?

In the U.S., 25 percent of the population resides in rural areas; yet only 10 percent of the U.S. surgical workforce supplies these areas. Demographic analysis of this workforce suggests that rural communities in the U.S. are in danger of being severely underserved. As present-day rural surgeons retire, there are not enough new surgeons who wish to replace them. Although lifestyle issues certainly play a role in graduating residents' choice of practice location, another factor is the present-day training environment

in which most education occurs at the hands of highly specialized general surgeons. The majority of university- and community-based general surgery training programs in the U.S. today are not situated in rural areas, and their curricula do not provide exposure to the broad range of surgical problems that a rural surgeon may face.

The demands on rural general surgeons are quite different from the demands of general surgeons in urban and suburban areas. Rural general surgeons treat common general surgical problems as well as the communities' urologic, thoracic, obstetric, and vascular problems. They are often the primary endoscopists for their patients. They may be called upon to perform cesarean sections, burr holes, or to pin a fracture, if gynecologists, neurosurgeons, and orthopaedic surgeons do not serve their area. Modern general surgery residencies provide little, if any, exposure to these various subspecialties. When such exposure does occur, it is usually at the intern level and consists of floor work rather than operative experience.

In response to the dearth of rural surgeons in the state of Oregon and their belief that "many general surgeons leave their residencies feeling untrained to negotiate the variety of problems that the rural general surgeon encounters," John C. Hunter, MD, FACS, and Karen E. Deveney, MD, FACS, proposed a specialized training curriculum in 2003.¹ The goal of the program is twofold. The first is to provide "complete training in the wide range of procedures performed by rural surgeons during their career." The second is to provide the "external environment so critical to understanding the nature of practice in a small community."¹

At Oregon Health Sciences University (OHSU), residents interested in pursuing rural surgery spend a year between their third and fourth year of traditional general surgery training in a rural training curriculum in Grants Pass, OR, which has a population less than 30,000 and is located less than 50 miles from the nearest town with a population of at least 50,000. The hospital in Grants Pass has several active, broad-based general surgeons and subspecialists in orthopaedics, otolaryngology, and neurosurgery. However, there are no other surgical trainees at the hospital. Therefore, residents in the rural surgery train-

ing program (RSTP) have unfettered clinical and operative exposure to basic general surgical and subspecialty procedures performed in a small town.

At the October 2005 Clinical Congress, the two residents from OHSU currently in the RSTP—Nathan Kanning, MD, and Brian Wong, MD—described their experiences as overwhelmingly positive, both personally and professionally. They echoed the sentiments of the first-ever RSTP trainee, Garrett R. Vangelisti, MD, who wrote in the May 2003 *Bulletin* that his year spent in the RSTP would prove to be "the most valuable portion of [his] general surgical training."²

To our knowledge, the OHSU department of surgery's RSTP is the only one-year program of its kind. The general surgery residency at OHSU has petitioned the residency review committee to allow the year spent in the RSTP to be weighed equally as the standard PGY-4 surgical training year, thus allowing the rural surgeon to enter into practice fully prepared after five years of general surgical training.

As reported by Joseph B. Cofer, MD, FACS, at the 2005 Clinical Congress, there are 22 programs nationwide that offer rural surgery electives of a shorter duration (personal communication, October 2005). Some programs—such as the one at Iowa Methodist Medical Center under the leadership of program director Douglas B. Dorner, MD, FACS—offer simple, one-month rural surgery electives. These are generally in the PGY-3 or PGY-4 clinical year so that residents can get maximal operative and decision-making experience.

Other programs provide rural surgery rotations throughout the five-year residency. Tim Pritts, MD, acting director of the general surgery residency at the University of Cincinnati, reports that third-year residents in his program routinely work with a group of four general surgeons and subspecialists in obstetrics/gynecology, urology, and plastic surgery in Gallipolis, OH, a town of 7,000 in the foothills of the Appalachians. Residents experience a starkly different atmosphere from that in Cincinnati and are able to advance their surgical training in a broad array of services in a rural area. In 2002, the general surgery program at the University of Arizona in Tucson, under the leadership of program director James Warneke, MD, FACS, started a six-week rural surgery elec-

tive during the PGY-3 or PGY-4 clinical year at the Yuba City Indian Health Hospital, a facility of the federal government's Indian Health Service. Roland Snure, MD, and Christopher Abbot, MD, the first residents to experience the elective, described their experience as "a great opportunity to work in a beautiful place and expand [their] surgical training."³ Their experiences included "bread and butter" general surgery, trauma, endoscopy, otolaryngology, urology, and orthopaedics for pediatric and adult patients, as well as exposure to the beliefs regarding medical and surgical care among members of the Navajo Nation.

Bassett Healthcare in Cooperstown, NY, has a long tradition of graduating residents who become rural surgeons.⁴ Residents in the rural track spend two to three months during the PGY-4 year training alongside a Bassett graduate in rural practice. Despite the group's well-developed plan to train rural surgeons, with the challenges of the 80-hour workweek, the program felt itself straying from its strength of providing "a structured, graduated experience in those subspecialty areas needed for a rural practice."⁴ Partly because of the desire to get back on track in this new era of surgical training and partly because of the group's own research showing great shortcomings nationwide for patients in need of surgical care in rural areas, the faculty at Bassett established the Mithoefer Center for Rural Surgery in 2004. With a mission of "ensuring that rural citizens have access to high-quality surgical services"⁵ through research, education, advocacy, and networking, Mithoefer promises to enhance the efforts of nationwide programs that are modifying their training curricula to meet the growing need for rural surgeons in the U.S.

International electives

More than 90 percent of the world's surgical needs exist outside Europe and North America.

Many programs are offering international electives to further meet the demands of broad-based surgical training, as well as to provide a unique learning opportunity for their residents. For example, residents in the department of

surgery at Brown Medical School in Providence, RI, have the opportunity to travel to Kenya for a two-month rotation at a mission hospital in Tenwek. Tenwek Hospital is a 300-bed facility run by the World Medical Mission with a full-time missionary surgeon, short-term visiting attendings, residents, and medical students, and local Kenyan doctors, students, and nurses providing patient care. Residents who complete the rotation may not find a more rewarding experience. The first resident to partake in this opportunity was a PGY-3 resident who logged 80 surgical cases ranging from thyroidectomies to esophagectomies. In addition to general surgery operations, the resident performed procedures in plastic surgery, neurosurgery, obstetrics/gynecology, orthopaedics, and endoscopy.

Another example is Mount Sinai School of Medicine, New York, NY, where an optional clinical rotation in the Dominican Republic has been developed. In this setting, senior residents develop valuable skills and learn lessons that can be incorporated into patient care back home. The residents are able to participate in the humanitarian effort to deliver care to underserved areas of the world, and at the same time benefit from working in a distinctly different environment with limited resources, requiring innovative approaches and reliance on basic clinical judgment.

Opportunities are also available for those residents who do not have a formal overseas or international rotation at their program. The American College of Surgeons, through Operation Giving Back, has created a resource of resident opportunities in both domestic and overseas volunteerism. These experiences not only increase the exposure to surgical pathology, but also provide insight into global health and health policy issues unattainable through the traditional residency experience. Organizations such as Global Health Outreach and Medical Ministry International provide supervised accredited rotations overseas in various locations throughout the world. A resident may elect to spend two weeks treating surgical patients in a remote village in South America or three months in a surgical ward in Africa or China. World Medical Mission offers the "Residents Assist Fund" for motivated residents in their last year of training with an interest in overseas medical mission service. Residents selected for the program serve on

a short-term basis to a mission hospital in a developing country. Not only does the resident obtain a unique cross-cultural experience and exposure to medical missionary work, he or she also provides practical help to often overworked physicians and hospitals overseas. International electives fill a certain void in the traditional surgery residency experience. They provide an opportunity to gain new insights into global health and obtain a broader perspective of surgery. Diagnostic and technical skills gained by residents with the latest technology in modern U.S. training programs are complemented by international electives with increased reliance on history and physical exam, as well as exposure to surgical pathology and techniques rarely observed in the U.S.

Simulated surgical training

Modern-day surgical training is faced with the unique dilemma of having to teach an ever-growing array of surgical procedures and new technology to trainees in significantly less time than ever before. Training programs struggle with how to integrate these rapidly evolving technological innovations into the standard five-year general surgery curriculum and prepare residents for a more educated, demanding, and litigious patient population.

The traditional method of operating room teaching is imminently threatened due to recent changes in surgical training including work-hour limitations, faculty time constraints, increased operating room costs, and liability issues—all prohibiting the extent of teaching that can occur in the operating theater. One could further argue that the operating room is the worst place to first acquire new technical skills. This was certainly evidenced by the increase in common bile duct injuries observed with the introduction of laparoscopic cholecystectomy. This recent historical example demonstrates the need for safe training grounds prior to patient exposure.

Other professions have long used simulators to develop and perfect skills that are required for real-world situations. The flight industry, for example, requires pilots to log a certain number of flight simulation hours before being licensed. These pilots must also demonstrate continued proficiency not only with their track record in the air, but also with ongoing simulator testing. One

of the benefits of this training is limitless practice in a safe environment, where the participant can learn from his or her mistakes under stress-free conditions and without any threat to patient safety. The resident is able to immediately repeat difficult techniques multiple times until a satisfactory level of competency is achieved.

The beneficial impact of surgical simulators was demonstrated for minimally invasive surgery in a study at Yale University School of Medicine. Surgical residents given presurgery simulation training made fewer mistakes and completed operations in less time than those who did not receive simulation training.⁶ Fewer mistakes translate into better patient outcome.

Many programs have developed formal surgical skills simulation centers to help residents quickly ascend the steep learning curve associated with particular procedures and technical skills. The majority of these simulators focus on laparoscopic skill development; however, simulators also exist for open hernia repair, breast biopsies, endoscopy, and surgical techniques in trauma management. Southern Illinois University in Carbondale, OHSU, Louisiana State University in Baton Rouge, and the University of Michigan in Ann Arbor, to name a few, have implemented surgical simulation training into their general surgery residency programs. They offer a safe, reproducible, and standardized method of both training and evaluating residents. Several other programs across the country are in the process of developing or expanding already existing surgery simulation centers and incorporating mandated simulation time into the main curriculum. As the technology advances, learning surgery outside of the operating room will no doubt become more widely adopted. Demonstration of technical proficiency with simulators may one day become part of the surgery board certification process.

Core competencies

My attending, Dr. X, flips out and throws instruments in the OR all the time.... Dr. Y never shows any compassion when he delivers bad news....

The examples of rural surgery, international surgery, and simulated surgery are signs that

Dr. Halsted's regimented surgical curriculum is now a part of surgical history rather than surgical practice. Surely, patient care and medical knowledge were at the root of Dr. Halsted's vision for highly skilled general surgeons. Teaching the clinical, technical, and didactic aspects of surgery encompass both patient care and medical knowledge, but these are just two of the six core competencies that the Accreditation Council for Graduate Medical Education (ACGME) mandates must be integrated in all residency programs. Surgical training programs must now educate their residents in these six competencies, as well as a broad spectrum of basic and advanced surgical procedures.

Although *fund of medical knowledge* and ability to *provide patient care* in and out of the operating room are difficult to measure, metrics can be created and tested for their validity. The annual American Board of Surgery In-Training Examination has just been altered to more appropriately measure relevant fund of knowledge during the more senior years of surgical training. The famed objective structured clinical examination of the American College of Surgeons' Advanced Trauma Life Support® certification course is just one example of measuring capacity to care for patients. Surgical simulators present the next frontier in measuring trainees' operative skills against an established baseline. However, the competencies of *practice-based learning and improvement* and *systems-based practice* are derived from modern health services research that are foreign to most trained surgeons and surgical residents. Whole academic departments exist to study practice-based and systems-based medicine, and there is little guidance on how surgical educators can effectively teach and measure these competencies.

The final two competencies, *interpersonal and communication skills* and *professionalism*, seem more like traits than learned skills. Certainly, strong interpersonal skills, effective communication skills, and high professional standards can be modeled, but the question remains how acquisition of these skills can be documented in an objective manner. Furthermore, there might be certain personality types that are incapable of learning these skills even through the most effective modeling. Should these trainees not

be allowed to sit for their board examinations even if they display outstanding patient care skills both in and out of the operating room and have demonstrated expert knowledge in general surgery?

How surgical residencies will implement the ACGME's core competency mandate is a work in progress and the ACS is leading the way in designing the curricula to teach and measure the competencies. It is another facet of the multi-dimensional nature of modern-day general surgery training.

Practice management

Numerous skills beyond those directly influencing patient care are also needed by graduating surgical residents. Another area that is rarely taught in modern-day residencies is practice management, including associated billing and coding issues, liability issues, and partnership negotiations. Yet, these skills are all necessary for the vast majority of surgical trainees who do not enter academic medicine or become hospital employees. Today's residency programs must also teach their trainees how to be good businesspeople. Few training programs are equipped to handle this task, especially because those teaching are generally inexperienced in such matters as they are academic appointees with hospital or university salaries. To meet this need, the ACS has numerous practice-management offerings in the form of short courses, seminars, and CD-ROMs that young surgeons can use as they begin their first few years of practice.

Dr. Santry is a resident in general surgery at the University of Chicago, Chicago, IL. She is a member of the RAS Communications Committee.



Conclusion

General surgery training is at a crossroads. Training programs are making a variety of efforts to ensure that their graduates are capable of providing the highest quality of surgical care, whether they choose to pursue subspecialty training independent of particular practice settings. Both rural and international electives expose residents to an environment where the local general surgeon may be the only health care provider in the area with operative skills delivering a wide variety of surgical care. Surgical simulations further enhance the educational experience by creating a virtual training reality allowing residents to develop and perfect difficult technical skills. By taking surgical training outside of the traditional realm of the residency program hospital system, programs are enhancing the clinical experience of trainees. These innovative steps are allowing for the acquisition of clinical and technical skills that might not otherwise mature successfully in today's five-year general surgery residency.

However, meeting the dynamic demands for general surgery education is a difficult task. In contrast to the mission of "broadening skills," there are forces promoting truncated or streamlined training for residents seeking to concentrate in a subspecialty of general surgery. Some advocate establishing separate training tracks and certification for residents wishing to specialize versus those pursuing true "general" surgery careers. The debate over acute care surgery also has an impact on the training of general surgeons. Would trauma care and emergency surgery become yet another area of specialization mastered only by those pursuing fellowships in these areas? These are controversial issues affecting the future of surgical training and general surgery as a specialty.

While these debates continue, it is vital to remember that broad-based general surgery training is essential to producing surgeons capable of competently handling an extensive range of surgical pathology. To do no less would be to fail in the primary objective of general surgery training and the propagation of the specialty. The role of the general surgeon is an important one, both locally and abroad. To maintain this role, it is critical that we continue to produce surgeons who can master a wide variety of common and

life-saving surgical operations. Fortunately, there are pioneers in the field of surgical education who are committed to seeing that general surgery continues to fulfill the important role it has held for so many years in health care and train exceptionally qualified young surgeons who will continue to do the same. Ω

References

1. Hunter JC, Deveney KE. Training the rural surgeon: A proposal. *Bull Am Coll Surg.* 2003;88(5):14-17.
2. Vangelisti GR. Training in rural surgery: A resident's perspective. *Bull Am Coll Surg.* 2003;88(5):18-20.
3. The University of Arizona Health Sciences Center Office of Public Affairs. Available at: <http://www.ahsc.arizona.edu/opa/>. Accessed April 24, 2006.
4. The University of Arizona Health Sciences Center Office of Public Affairs. Available at: <http://www.ahsc.arizona.edu>. Accessed April 24, 2006.
5. Gold MS, Zuckerman R, Dietz P, et al. Cooperstown surgeons throw a pitch for rural surgery. *Bull Am Coll Surg.* 2004;89(9):16-20,50.
6. Mithoefer Center for Rural Surgery. Available at: <http://www.centerforruralsurgery.org/mission.htm>. Accessed April 24, 2006.
7. Seymour NE, Gallagher AG, Roman SA, et al. Virtual reality training improves operating room performance: Results of a randomized, double-blinded study. *Ann Surg.* 2002;236(4):458-463.

Dr. James is assistant professor of surgery, University of Vermont division of surgical oncology, Fletcher Allen Health Care, Burlington, VT. He is Secretary of the RAS-ACS.

