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Continuity of care in a rural critical access hospital: Surgeons as primary care providers

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Abstract

BACKGROUND: The question of volume and outcomes has perfused the surgical literature. Hopedale Hospital is a critical access hospital located in central Illinois. The authors elected to review surgical outcomes to establish quality benchmarks for similar facilities. They also propose a practice model in which general surgeons provide primary care.

METHODS: The authors consecutively reviewed retrospectively 100 each of 5 commonly performed procedures. These included carotid endarterectomy, laparoscopic cholecystectomy, laparoscopic Nissen fundoplication, hysterectomy, and inguinal hernia repair. Demographic data, c-morbidities, and outcomes up to 30 days postoperatively were summarized.

RESULTS: The overall complication rate was 4%. This exceeded any benchmarks found in a surgical literature review through Medline.

CONCLUSIONS: Critical access hospitals are capable of producing excellent surgical outcomes. Having a surgeon totally involved in perioperative management may contribute to the improved outcomes. This practice model could be used to recruit medical students into surgical training, perhaps alleviating shortages of rural surgeons and primary care physicians simultaneously.

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Twenty percent of Americans reside in rural communities, where they are served by only 11% of the nation's physicians.¹ Critical access hospitals are rural facilities that provide vital health care services to millions of patients. By definition, a critical access hospital must be an acute care facility with ≤ 25 beds and designated "rural" by federal guidelines established under the Balanced Budget Act of 1997.

Hopedale Hospital, in central Illinois, has been a critical access hospital since 2003. The facility is located in a town of 1,000 people and serves a surrounding rural community of approximately 15,000 people. Seventy percent of the

inpatient population is covered under Medicare. Primary care is delivered by 3 board-certified general surgeons.

The question of volume and outcomes has perfused the surgical literature. Many recent articles have proposed a direct relationship between higher surgeon volume and improved patient outcomes that appears to be independent of hospital volume.² Much of the data used in these studies are obtained from large administrative databases, which impose inherent limitations on analysis due to the inability to control for many clinical variables that can have an impact on outcomes.³ This lack of specificity has caused many to question the validity of these studies.⁴

Recent articles have shown that volume and outcome need not be linear, and it is possible for lower volume centers and surgeons to achieve results that equal or exceed those of their higher volume counterparts.⁵ Accordingly, we undertook an evaluation of our surgical practice to deter-

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mine outcomes from 5 commonly performed surgical procedures at Hopedale Hospital: carotid endarterectomy, laparoscopic cholecystectomy, laparoscopic Nissen fundoplication, total abdominal hysterectomy, and inguinal hernia repair.

Methods

For each procedure, we performed an evaluation of 100 consecutive cases, ending in August 2009. Data were collected on each patient's demographic information, comorbidities, complications, and 30-day outcome. Complications specific to each procedure were determined by retrospective chart review. To gauge the overall quality of surgical care at Hopedale Hospital, a Medline search was performed, and articles analyzing large cohorts of patients undergoing each of the 5 aforementioned procedures were reviewed for comparative data.

For each procedure evaluated, the demographic information collected was the same and included age, gender, body mass index (BMI), and smoking history. Additionally, patients who underwent carotid endarterectomy were categorized as symptomatic or asymptomatic, and laparoscopic cholecystectomies were classified as elective or emergent. Comorbidities (hypertension, diabetes, chronic lung disease, congestive heart failure, and chronic kidney disease) were documented as present or absent at the time of surgery. Outcomes <30 days after surgery were defined in terms of mortality, length of hospital stay, readmission, wound infection, blood transfusion, unexpected admission to the intensive care unit (ICU), and procedure-specific perioperative complications.

Results

Carotid endarterectomy

Medical records for 100 consecutive patients undergoing carotid endarterectomy from April 2001 to August 2009 were examined to determine 30-day outcomes, including the incidence of cranial nerve damage, stroke, myocardial infarction, or death. The median age of patients undergoing carotid endarterectomy was 73 years (range, 54–91 years). Fifty-nine of the patients were asymptomatic, and 41 were symptomatic. There were 59 men and 41 women. The median BMI was 29 kg/m² (range, 19–49 kg/m²). Sixty-two of the patients had histories of smoking. Ninety-two of the patients had ≥ 1 comorbidity. There were 0 mortalities, 0 wound infections, 2 postoperative blood transfusions, 0 unexpected ICU admissions, and 1 hospital readmission within 30 days of surgery. The median length of hospital stay was 1 day (range, 1–8 days). There was 1 mild nonfatal postoperative hemorrhagic stroke. There were 2 instances of cranial nerve damage because of surgery; the deficits re-

solved completely. Therefore, the overall complication rate was 3%, with a 1% rate of stroke, no myocardial infarction within 30 days of treatment, and 0% mortality. The American Heart Association guidelines for performing carotid endarterectomy suggest that the risk for stroke and/or death resulting from treatment should be <6% in symptomatic patients and <3% in asymptomatic patients.⁶

Laparoscopic cholecystectomy

Medical records for 100 consecutive patients undergoing laparoscopic cholecystectomy from May 2005 to August 2009 were examined to determine 30-day outcomes. The median age of patients undergoing cholecystectomy was 48 years (range, 17–88 years). Eighty-seven of the procedures were elective, and 13 were emergent. There were 25 male and 75 female patients. The median BMI was 30 kg/m² (range, 19–56 kg/m²). Forty of the patients had histories of smoking. Forty-one of the patients had ≥ 1 comorbidity. There were 0 mortalities, 1 wound infection, 0 blood transfusions, 0 unexpected ICU admissions, and 3 hospital readmissions within 30 days of surgery. The median length of hospital stay was 1 day (range, 1–6 days). The overall complication rate was 3%, with 0% common bile duct injury and 0% mortality. A study by Shea et al⁷ cited 38 articles in which the incidence of wound infection was documented in a total of 13,724 patients undergoing laparoscopic cholecystectomy. The range of wound infection reported in these articles was .51% to 1.1%.

Laparoscopic Nissen fundoplication

Medical records for 100 consecutive patients undergoing laparoscopic Nissen fundoplication from April 2004 to August 2009 were examined to determine 30-day outcomes, including the incidence of gastric or esophageal perforation, esophageal stricture, hemorrhage, pneumothorax, and reoperation to revise the fundoplication. The median age of patients was 46 years (range, 12–82 years). There were 36 male and 64 female patients. The median BMI was 30 kg/m² (range, 15–46 kg/m²). Thirty-eight of the patients had histories of smoking. Forty-one of the patients had ≥ 1 comorbidity. There were 0 mortalities, 0 wound infection, 0 blood transfusions, 0 unexpected ICU admissions, and 6 hospital readmissions within 30 days of surgery. The median length of hospital stay was 1 day (range, 1–6 days). There was 1 contained gastric perforation with septicemia and right lower lobe pneumonia that necessitated drainage of an intra-abdominal abscess and takedown of the fundoplication. There was 1 instance of significant postoperative nausea and vomiting causing edema at the fundoplication and necessitating reoperation for revision. There was 1 functional esophageal stricture requiring endoscopic dilation. The overall complication rate was 3%, with 0% mortality. A study by Eshraghi et al⁸ in 1998 examined 157 patients who underwent laparoscopic Nissen fundoplication

at Oregon Health & Science University and the Portland VA Medical Center. They reported an intraoperative complication rate of 8%. In this study, 3.2% of patients required postoperative esophageal dilation, and 3.2% required reoperation.

Total abdominal hysterectomy

Medical records for 100 consecutive patients undergoing total abdominal hysterectomy from March 2001 to August 2009 were examined to determine 30-day outcomes, including incidence of bladder, ureter, or bowel injury, hemorrhage, urinary tract infection, ileus, hematoma, and seroma. The median age was 42 years (range, 20–89 years). The median BMI was 29 kg/m² (range, 18–52 kg/m²). Forty-one of the patients had histories of smoking. Twenty-eight of the patients had ≥ 1 comorbidity. There were 0 mortalities, 0 wound infections, 1 postoperative blood transfusion due to a drop in hemoglobin, 0 unexpected ICU admissions, and 1 hospital readmission within 30 days of surgery. The median length of hospital stay was 3 days (range, 1–9 days). The overall complication rate was 7%, with 0% mortality. A study by Meltomaa et al⁹ in 1999 evaluated 516 women who underwent abdominal hysterectomy at a single hospital between October 1993 and September 1994. The overall postoperative complication rate reported in this study was 28%.

Inguinal hernia repair

Medical records for 100 consecutive patients undergoing open inguinal hernia repair from September 2002 to August 2009 were examined to determine 30-day outcomes, including injury to spermatic cord, urinary retention, urinary tract infection, hemorrhage, orchitis, and neuralgia. The median age of patients was 59 years (range, 5–89 years). There were 92 male and 8 female patients. The median BMI was 27 kg/m² (range, 20–40 kg/m²). Thirty-one of the patients had histories of smoking. Forty of the patients had ≥ 1 comorbidity. There were 0 mortalities, 1 wound infection, 1 postoperative blood transfusion, 0 unexpected ICU admissions, and 4 hospital readmissions within 30 days of surgery. There were 3 instances of postoperative urinary retention and 1 instance of left groin edema and pain requiring readmission and intravenous antibiotics. The overall complication rate was 4%, with 0% mortality. A study by Neumayer et al¹⁰ in April 2004 evaluated 994 men who underwent open inguinal hernia repair. This study reported a 19% rate of immediate postoperative complications, including a 2% rate of urinary retention, a 1% rate of wound infection, a .4% rate of urinary tract infection, a 14% rate of hematoma or seroma, a 4% rate of neuralgia or other pain, and a 1% rate of orchitis.

Summary

The overall complication rate was 4% (see Table 1).

Table 1 Summary (n = 500)

Variable	Value
Patient data	
Age (y)	55 (5–91)
Male/female	212/288
BMI (kg/m ²)	29 (15–56)
Smoking history	212 (42%)
Total with comorbidities	242 (48%)
Hypertension	214 (43%)
Diabetes	53 (11%)
Chronic lung disease	48 (10%)
Arteriosclerotic heart disease	82 (16%)
Heart failure	8 (2%)
Chronic kidney disease	14 (3%)
30-day outcome data	
Mortality	0
Length of stay (days)	1 (1–9)
Readmission	15 (3%)
Wound infection	2 (.4%)
Blood transfusion	4 (.8%)
Unexpected ICU admission	0
Complications	
Total number of complications	20
Overall complication rate	4%

Data are expressed as median (range) or as number (percentage).

Comments

Outcome data from small hospitals, particularly critical access hospitals with ≤ 25 beds, are in effect nonexistent in the surgical literature. Larger rural and urban centers can participate in the National Surgical Quality Improvement Program to benchmark their outcomes with pooled data from many similarly large facilities. However, the \$30,000 annual cost of this program makes it prohibitive for most critical access hospitals to participate, thus leaving them with virtually no opportunity for comparative benchmarking.

Hopedale Hospital undertook a review of 5 common surgical procedures, for a total of 500 cases, to establish a benchmark for outcomes. The 4% complication rate compares very favorably with any published outcomes for similar procedures. Complex operations, such as carotid endarterectomy and laparoscopic Nissen fundoplication, are safely performed at our rural facility.

Having a general surgeon function as the primary care provider in small rural facilities contributes to increased patient compliance and significantly improves continuity of surgical care, as denoted by the 100% follow-up.

Whether having a general surgeon provide primary care actually explains these excellent outcomes is a viable question. Considering the acute manpower shortage of general surgeons in the rural workforce, as presented by Doty et al,¹¹ wherein one third of rural facilities were at risk for losing their surgeons within 2 years, this practice model could be viewed as a potential recruiting tool. Students with an interest in rural practice may find this pathway more appealing than either specialty individually.

Because 75% of general surgeons elect specialty training, this practice model could serve to attract more trainees into true "general surgery." The misconception that small hospitals have poorer outcomes can be corrected with appropriate data collection and publication, perhaps encouraging general surgeons to look favorably toward practicing at one of the >1,300 critical access hospitals throughout the country.

Conclusions

The Hopedale Hospital practice model uses general surgeons as primary care providers in a hospital-based practice. Surgeons serve as generalists and specialists, reducing the number of physicians involved. The improved outcomes speak for themselves. Encouraging medical students to mentor with general surgeons in rural areas and modifying residency programs for physicians interested in such a career path would create increased access to quality care in rural health care facilities and allow millions of Americans to continue to receive care in the critical access hospitals that currently serve them. Having a general surgeon totally involved in perioperative management likely contributes to improved outcomes.

References

1. Size T. Rural health can help lead the way. *Wisconsin Med J* 2002; 101:10-1.
2. Boudourakis LD, Wang TS, Roman SA, et al. Evolution of the surgeon-volume, patient-outcome relationship. *Ann Surg* 2009; 250:159-65.
3. Pearce WH, Parker MA, Feinglass J, et al. The importance of surgeon volume and training in outcomes for vascular surgical procedures. *J Vasc Surg* 1999;29:768-78.
4. Birkmeyer JD, Siewers AE, Finlayson EVA, et al. Hospital volume and surgical mortality in the United States. *N Engl J Med* 2002;346: 1128-37.
5. Kozower BD, Stukenborg GJ, Lau CL, et al. Measuring the quality of surgical outcomes in general thoracic surgery: Should surgical volume be used to direct patient referrals? *Ann Thorac Surg* 2008;86:1405-8.
6. van der Vaart MG, Meerwaldt R, Reijnen MMPI, et al. Endarterectomy or carotid artery stenting: the quest continues. *Am J Surg* 2008; 195:259-69.
7. Shea JA, Healey MJ, Berlin JA, et al. Mortality and complications associated with laparoscopic cholecystectomy: a meta-analysis. *Ann Surg* 1996;224:609-20.
8. Eshraghi N, Farahmand M, Soot SJ, et al. Comparison of outcomes of open versus laparoscopic Nissen fundoplication performed in a single practice. *Am J Surg* 1998;175:371-4.
9. Meltomaa SS, Makinen JI, Taalikka MO, et al. Vaginal, and laparoscopic hysterectomies: complications One-year cohort of abdominal, and subjective outcomes. *J Am Coll Surg* 1999;189:389-96.
10. Neumayer L, Giobbie-Hurder A, Jonasson O, et al. Open mesh versus laparoscopic mesh repair of inguinal hernia. *N Engl J Med* 2004;350: 1819-27.
11. Doty B, Zuckerman R, Finlayson S, et al. General surgery at rural hospitals: a national survey of rural hospital administrators. *Surgery* 2008;143:599-606.

Discussion

Dr. Jack Gibbs: First, what percentage of patients operated in your hospital are operated on by the surgeon who is also their primary physician, and is this practice model preferable and transferrable to larger medical communities? Second, are any of the surgeons certified by or belong to the American Academy of Family Practice (AAFP)? Third, how do you maintain proficiency in family medicine? And, fourth, do the surgeons assist each other on major cases, and if so, do you feel that it contributes to the excellence of your outcomes?

Alfred Rossi, M.D. (Hopedale, IL): First, 100% of the patients operated had us as primary physicians. I think the practice models can be transferred not to big institutions but to critical access hospitals with 25 beds or less. Second, we do not have AAFP certification, but it's a very easy thing for a general surgeon who is well trained to do primary care. And, we stay up with CME. Lastly, we do assist each other, and there is no question it improves outcomes. I think any surgeon will tell you he/she would much rather have a surgeon across the table than a nonsurgical assistant.