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Does surgery residency prepare residents to work at critical access hospitals?

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Abstract

BACKGROUND: Operations performed by surgeons working at Critical Access Hospitals (CAHs) and surgery residents have not been compared.

METHODS: Procedure codes logged by general surgery residents graduating from our institution in 2013 and 2014 were obtained. Procedure codes were obtained for all CAHs in our state for 2012 to 2013. Clinically relevant categories were compared among residents and general surgeons at CAHs.

RESULTS: A total of 34,246 procedures logged by general surgeons at CAHs were compared with 31,977 procedures logged by surgery residents. Endoscopy comprised 56.1% of cases done by general surgeons versus 9.1% of cases by residents ($P < .001$). Excluding endoscopy, rural surgeons had higher percentages in hernia, skin/soft tissue, cholecystectomy/common bile duct, rectal/anal, and breast cases. Residents who completed a rural surgery rotation had higher numbers in small/large bowel, hernia, breast, and endoscopy.

CONCLUSIONS: Surgery residency provides less exposure to endoscopy compared with a general surgery practice at CAHs. A rural rotation increases endoscopic exposure.

There is a predicted shortage of 30,000 surgeons at the national level by 2030[1]. This shortage will be more acute in rural communities[1] in which surgeon numbers are already declining and makes recruitment and retention of surgeons in rural areas particularly important. At the same time, there is an increasing number of surgical residents pursuing fellowships.[2] Of the residents who decide to go into general surgery practice, before or after fellowship, a smaller subset go into practice as rural general surgeons. Through this study, we wanted to describe the procedures that surgery residents have done after graduating from a general surgery residency and compare them with procedures done by general surgeons at small rural hospitals in the same state. We wanted to determine if general surgery residency provides a similar training experience to procedures currently performed in a rural practice. In addition, we wanted to determine if a rural rotation offers additional preparation for such practice.

We chose to study Critical Access Hospitals (CAHs) because there are over 1,300 hospitals nationwide and they meet standardized eligibility criteria.[3] To be eligible, a hospital must have fewer than 25 inpatient beds and be located in a rural or frontier area. Once the designation is

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attained, a CAH is able to get cost plus 1% reimbursement from Medicare and can have flexibility in staffing as well as other benefits.[4]

Patients and Methods

After obtaining Institutional Review Board approval, we accessed the Oregon Association of Hospital and Health Systems (OAHHS) database for the calendar years 2012 and 2013. CAHs were identified in the database and their Current Procedural Terminology (CPT) codes and International Classification of Diseases, Ninth revision (ICD-9) codes were extracted for both inpatient and outpatient procedures. We then obtained a list of CPT codes entered into the Accreditation Council for Graduate Medical Education Resident Case Log by general surgery residents graduating from our program in 2013 and 2014. Residents who completed the rural surgery elective were identified. All residents met the American Board of Surgery training requirements for certification in general surgery. Procedures from residents and surgeons were combined into one database.

We used Clinical Classification Software (CCS)[5] to condense CPT and International Classification of Diseases, Ninth revision codes into 244 unique CCS codes. Codes 245 and 246 were created to cover liver and pancreas procedures not included in CCS codes as done by Harris et al.[6] The CCS codes were further classified into clinically relevant categories as previously described,[6,7] including 14 general surgery and 8 specialty procedure categories (Table 1, Fig. 1).

To identify procedures performed by general surgeons at each CAH, we used the National Provider Identification (NPI) number associated with each procedure in the OAHHS. We accessed the National Plan and Provider Enumeration System Downloadable File[8] and matched NPI numbers to taxonomy codes. Procedures were identified based on which primary taxonomy code of each NPI number corresponded to the code for general surgeon "208600000x".

IBM SPSS statistics for Windows, Version 22.0 (IBM Corp, Armonk, NY) was used to build the databases. Chi-square was used to compare frequency distributions between general surgeons and residents and a Mann–Whitney *U* test was used to compare case medians of residents with or without a rural rotation.

Results

There were 31,977 procedures logged by 21 general surgery residents graduating in 2013 and 2014 from our program, while general surgeons working at CAHs logged 34,246 cases in 2012 and 2013. Residents logged a smaller percentage of general surgery procedures than CAH general surgeons: with those procedures constituting 77.8% of their caseload (n = 24,914) versus 92.4% (n = 31,691) for CAH surgeons ($P < .001$).

Table 1 Clinically relevant categories and corresponding Clinical Classification Software codes

General surgery procedures	CCS codes
Appendix	80
Breast	165–167, 174, 175
Cholecystectomy/ common bile duct	84
Endocrine	41924
Endoscopy	68–70, 76, 82
Esophagus/stomach	71, 74, 93, 94
Hernia	85, 86
Liver/pancreas	245, 246
Other abdominal	87–90, 97, 99
Rectal/anal	77, 81
Skin/soft tissue	168–173
Small and large bowel	72, 73, 75, 78, 79, 92, 95, 96
Spleen/lymph	66, 67
Trachea	34, 35
Surgery specialty procedures	**CCS codes**
Cardiothoracic	36–42, 44, 48, 49
Neurosurgery	41707
Obstetrics and gynecology	119–132, 134, 137, 140
Ophthalmology	19
Orthopedics	142, 143, 145–148, 152, 153, 155–164
Otolaryngology	23, 25–27, 30–33
Urology	100, 104, 106, 109–112, 114–118
Vascular	51–57, 59–61, 63

CCS = Clinical Classification Software.

The comparison of procedures performed by graduating general surgery residents and by general surgeons at CAHs is displayed in Table 2. All categories differed significantly. The largest difference was seen in the endoscopy category, where

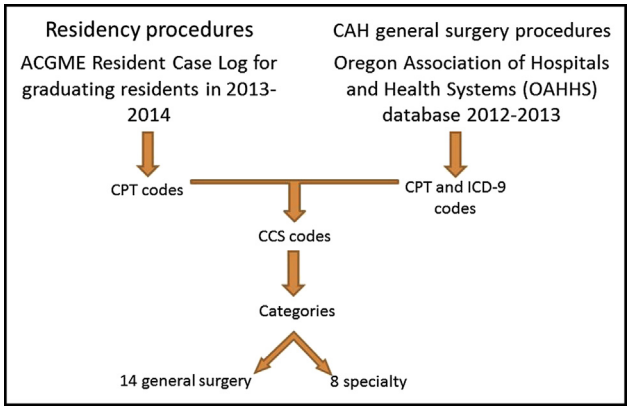

Figure 1 Steps used to convert data from procedure codes to clinically relevant categories.