Changes in Thoracic Surgery Experience During General Surgery Residency: A Review of the Case Logs From the Accreditation Council for Graduate Medical Education

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Background. **Although exposure to thoracic surgery is mandated in general surgery residency, little is known about the mix of cases that residents use to meet this requirement and how this has changed over time. We report the experience of general thoracic surgery among general surgery residents using the Accreditation Council for Graduate Medical Education (ACGME) database.**

Methods. **We performed a retrospective review of the prospectively maintained ACGME resident case log database from 2003 to 2013. Thoracic cases were categorized by procedure type, year, and level of resident participation. A linear regression model was used to determine if there was a significant trend in case volumes over time.**

Results. **First assist volumes decreased in the 90th (–1.46 cases/year, $p = 0.0012$), 70th (–0.77 cases/year, $p = 0.0005$), 50th (–0.46 cases/year, $p = 0.0013$), and 30th percentiles (–0.16 cases/year, $p = 0.0187$). Pneumonectomy volumes decreased for surgeons junior (–0.01 cases/year, $p = 0.0013$) and chief residents (–0.01 cases/year, $p = 0.005$), as did open lobectomy (surgeon junior, –0.202 cases/year, $p < 0.0001$; chief, –0.08 cases/year, $p \leq 0.0013$). Video-assisted (VATS) lobectomy increased for the surgeons junior (0.22 cases/year, $p < 0.0001$) and chief residents (0.045 cases/year, $p < 0.0001$). Surgeons junior also had increased volumes of VATS exploratory thoracoscopy (0.11 cases/year, $p = 0.0003$) and VATS pleurodeisis (0.13 cases/year, $p < 0.0001$).**

Conclusions. **Whereas total thoracic volumes on the whole have not changed significantly, resident participation as a first assistant and in key thoracic cases has decreased over the last 11 years, while participation in VATS and minor cases has increased.**

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We hypothesize that a variety of factors may negatively influence the exposure to general thoracic surgery during the current era of general surgery residency. These include challenges such as work-hour restrictions and the increased complexity and subspecialization of the general surgical field, which must compete for trainees' time during the fixed 60-month period of general surgery residency. Whereas thoracic operative experience is required to graduate from general surgery residency, the requirement is met by a self-reported minimum number of cases, which recently decreased from 20 to 15. There are no specific requirements that address ability to competently perform fundamentals of thoracic surgery, such as hilar dissection, control of pulmonary vascular bleeding, or ability to independently stage intrathoracic malignancies. Given the aging population, the increasing incidence of esophageal adenocarcinoma [1], and development of high-quality lung cancer screening programs, there is and will continue to be a need for a robust general thoracic surgical workforce. Data indicate that thoracic surgeons achieve superior outcomes compared with general and cardiac surgeons in the field of thoracic oncology [2–5], and other work has shown that residents' interest in cardiothoracic surgery as a field is strongly linked to mentorship and exposure during general surgery residency [4], making this period critical to engaging the future workforce. Although the total number of thoracic cases logged during general surgery residency has not significantly changed over the last 20 years [6], data about specific procedures, and how procedures are logged by general surgery residents, may describe subtle but

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Table 1. Trends in Thoracic First Assist Cases by 10th, 30th, 50th, 70th, and 90th Percentile

Percentile	Year											Average Cases Per Year Change	*p* Value for Trend
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		
10th	1	0	0	0	0	0	0	0	0	0	0	–0.05	0.1173
30th	3	2	2	1	1	1	0	1	1	1	1	–0.16	0.0187
50th	6	5	5	3	3	2	0	2	2	2	1	–0.46	0.0013
70th	11	9	8	6	6	5	1	4	4	3	3	–0.77	0.0005
90th	23	22	15	17	13	10	5	10	9	8	10	–1.46	0.0012

important trends over time. We sought to examine the data for differences in types of procedures coded by general surgery residents over time.

Material and Methods

We performed a retrospective review of the prospectively maintained, self-reported Accreditation Council for Graduate Medical Education (ACGME) resident case log database mandated for general surgery residents enrolled in ACGME-certified general surgery residencies. The proposed study was submitted to the Internal Review Board at the Medical College of Wisconsin and determined to meet defined criteria of a public data set and was therefore deemed exempt from the Internal Review Board review. Case logs were analyzed from 2003 to 2013. Cases were categorized by type of procedure, chronological year, and level of resident participation in the case (first assistant, surgeon junior, chief or teaching assistant). We used a linear regression model separately for total thoracic cases and for each procedure individually, determining whether the year (from 2003 to 2013 converted to a 1 to 11 continuous variable) or the level of training (surgeon junior or chief resident) had a statistically significant impact on average number of cases logged. In the first assist category, a linear regression model was also used to determine whether a statistically significant trend existed over time.

Results

In the first assist category over the study period, the 90th percentile saw an average decrease of 1.46 cases/year ($p = 0.0012$), the 70th percentile decreased by 0.77 cases/year ($p = 0.0005$), the 50th percentile decreased by –0.46 cases/year ($p = 0.0013$), the 30th percentile decreased by 0.16 cases/year ($p = 0.0187$), and the 10th percentile decreased by 0.05 cases/year ($p = 0.1173$). The results are summarized in Table 1. For pneumonectomy, there was an average decrease of 0.01 cases/year for both surgeon junior and chief resident ($p = 0.0013$ for surgeon junior; $p = 0.005$ for chief). For open lobectomy, there was an average decrease of 0.20 cases/year for surgeon junior ($p < 0.001$) and 0.08 cases/year for chief resident ($p = 0.0013$). For video-assisted (VATS) lobectomy, there was an increase of 0.22 cases/year at the surgeon junior level and 0.05 cases/year at the chief resident level ($p < 0.0001$ for both). For esophagectomy, there was a decrease of 0.02 cases/year for surgeons junior ($p = 0.34$) and 0.05 cases/year for chief residents ($p = 0.11$). For VATS exploratory thoracoscopy, there was an increase of 0.11 cases/year for surgeons junior ($p = 0.003$) and 0.003 cases/year for chief residents ($p = 0.509$). For thoracoscopic pleurodesis, there was an increase of 0.13 cases/year ($p < 0.0001$) for surgeons junior and 0.006 cases/year for chief residents ($p = 0.349$). For the category of "other major thoracic" there was a decrease of 0.02 cases/year for surgeons junior ($p = 0.969$) and 0.03 cases/year for chief residents ($p = 0.718$). From 2005 to 2009, wedge resection (open and VATS) and exploratory thoracotomy were not available as case log options. These were likely logged as "other thoracic," which saw increased volumes during that time period. This inconsistency in the database limits the validity of these findings (summarized in Table 2).

Comment

We found several significant trends when examining types of thoracic procedures coded by general surgery residents from 2003 to 2013. Although as a broad category, thoracic cases did not significantly change over the study period, there are trends on the individual case level, which may represent a decline in the quality of exposure to general thoracic surgery during general surgery residency. Declines seen at the chief resident and teaching assistant levels—the category available to residents in their final year of training—may reflect a belief that newly graduating residents will not independently perform thoracic surgery without pursuing a traditional cardiothoracic fellowship, and program directors may choose to increase exposure to community general surgical cases rather than rotate a fifth-year clinical resident in thoracic surgery. This may also reflect the fact that fifth-year general surgery residents will not rotate on a service that is also covered by a cardiothoracic fellow. The decrease in thoracic cases logged at the chief resident and teaching assistant levels are not balanced by like increases at the surgeon junior and first assistant levels. The resident case log system cannot provide information about the educational milieu in which a general surgery resident meets the mandatory minimum thoracic cases. Given the broad scope of general thoracic surgery, there are a variety of ways in which general surgery residents can meet the minimum case requirements, with cases of varying degrees of technical complexity. Apart from the 15 required cases, there is no requirement that residents be supervised by an attending surgeon who is certified by