

American Board of Thoracic Surgery examination: Fewer graduates, more failures

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Background: The American Board of Thoracic Surgery (ABTS) has noted a yearly decrease in the number of examination certificates being awarded, with only 93 certificates awarded in 2011. In 2003, the Accreditation Council for Graduate Medical Education required all programs to implement the 80-hour residency workweek. We hypothesized that this requirement has resulted in trainees being less capable of becoming successfully certified.

Methods: We examined the ABTS board scores, both written and oral, from 2000 to 2011. We divided the interval into 2 periods: 2000 to 2005, representing the 6-year, pre-80-hour workweek, and 2006 to 2011, the 6-year period post-80-hour workweek implementation. We analyzed whether a significant difference would be present in the pass rate before and after the 80-hour workweek for both the written and the oral boards.

Results: An inflection point of examination failures was found that started in 2006, correlating with the first examination year the 80-hour workweek would have affected. The written examination failure rates increased from 2006 to 2009 but have since decreased. The actual percentage failing the written component was less than the percentage failing the oral examinations in both periods. The oral examination failure rates have continued to increase at an alarming rate.

Conclusions: An increase has occurred in the failure of the ABTS board examinations that has been significantly greater after implementation of the 80-hour workweek. The failure rate for the written examination was not as significant as that for the oral examination. Because we are now training fewer, and perhaps less successful, cardiothoracic surgeons, it is our duty to develop strategies to improve and promote innovation in the methods of training. (*J Thorac Cardiovasc Surg* 2014;147:1464-70)

It has previously been published that we can expect an imminent shortage of cardiothoracic surgeons as early as 2020.^{1,2} Cardiothoracic surgeons will continue to be of tremendous importance to all healthcare systems, because cardiovascular disease is likely to remain the leading cause of mortality and morbidity for the elderly, with about 600,000 people dying of heart disease in the United States every year.³ Similarly, thoracic surgeons will remain a vital part of all preventative and intervention strategies, with lung cancer the second most common type of cancer among both men and women.⁴ The applications for fellowship in the specialty of cardiothoracic surgery has decreased at an alarming rate.¹ The concern we have is that, not only have fewer surgeons been training to become cardiothoracic surgeons, but also that fewer have actually been successful

once admitted to the residency training program. Since 2000, the American Board of Thoracic Surgery (ABTS) has awarded 1476 new certificates, averaging 123 annually. The number has decreased from 126 certificates in 2000 to 93 certificates in 2011.

The Accreditation Council for Graduate Medical Education required all training programs to implement the 80-hour residency workweek in 2003, thereby potentially affecting the cardiothoracic surgery graduates taking the 2006 board examinations.⁵ Early comparative studies indicated that the 80-hour resident workweek did not adversely affect or improve patient outcomes or resident education.^{6,7} Concerns regarding outcomes, in particular, as they have become more publically reportable and scrutinized, has established a need for another review of the expectations of residents and attending surgeons. A tension now exists between the ability to learn to perform complex procedures, service “scut work,” and the value of midlevel providers.^{8,9} These concerns will prevail as we strive to create safe hospitals, train competent physicians and surgeons, and preserve the sanctity of the physician-patient relationship.¹⁰ The effects of the 80-hour workweek on residency and fellowship training have been very real.^{11,12} Reducing the weekly hours translates into a 6- to 12-month reduction of in-hospital experience during a 5-year residency.¹¹ Applied to a 2- or 3-year cardiothoracic surgery residency, 3 to 7 months of training can be lost.

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Abbreviations and Acronyms

ABTS = American Board of Thoracic Surgeons
 CABG = coronary artery bypass grafting

Most of this reduced time will correspond to night and weekend experience when residents would be more likely to see high acuity and urgent conditions and have a greater degree of independent assessment and patient treatment. We hypothesized that this reduction in experiential learning would affect the success rate of cardiothoracic surgery residents in completing their examinations. In particular, the oral examinations would be most affected, reflecting the inexperience of being first responders in cardiac or thoracic patient scenarios. We have reviewed the examination results of residents before and after the 80-hour work week implementation.

METHODS

We examined the ABTS board scores, both written and oral, for a 12-year period from 2000 through 2011. We divided this interval into 2 periods: 2000 through 2005, representing the examinees who would have taken the examination before the implementation of the 80-hour workweek, and 2006 through 2011, representing those who would have taken the certifying examinations after the implementation of the 80-hour workweek. We analyzed whether a significant difference was present in the overall pass rate between the 2 groups. Additionally, we analyzed the written and oral board pass rates for these 2 groups. Chi-square analysis was performed to compare the experimental groups.

RESULTS**Reduction in Residency Applications Paralleled a Reduction in Cardiothoracic Surgery Residency Programs**

In 2006, 95 programs were offering cardiothoracic surgery training positions. By 2012, that number had decreased to 72 (Figure 1). Also, in 2006, 139 training positions were offered, but by 2012, only 102 training positions were offered. The applicant numbers have also decreased from 2006 to 2012.¹³ In 2006, there were 104 applicants and in 2012, only 78 applications for cardiothoracic surgery training positions.

Number of Examination Certifications Awarded to Cardiothoracic Surgery Trainees has Declined During the Past Decade

In 2000, more than 120 certificates were successfully granted to eligible trainees by the ABTS. From 2000 to 2011, the number of candidates who successfully completed their training and were awarded examination certification had decreased to 92 (Figure 2). From 2000 to 2006, an oscillating pattern was seen, with ≤ 160 examination certifications awarded. The inflection point was 2006; since then, a steady decline has occurred in

successful cardiothoracic surgery examination certification. The ABTS examination scores from 2000 to 2011 are listed in Table 1. The first year that the examination results would have been affected by the 2003 implementation of the 80-hour workweek rules was 2006.

Oral Versus Written Examination Success was Notably Different After 2006

The examination year of 2006 was the first year when cardiothoracic surgery residents who had started programs in 2003 could take the board examinations. The results showed a trend toward increased examination failures in 2006 (Table 1). The written examination failure rate increased from 2006 to 2009 but has recently decreased to about the same level seen in 2005 (Figure 3). This initial increase in the written examination failure rate might have reflected the disruption of the new duty hour expectations that the trainees ultimately learned to accommodate. Only in 2003 did the written examination failure rate exceed the oral failure rate. From 2000 and 2005, 903 candidates took the written examination, with a $10.6\% \pm 3.7\%$ failure rate. From 2006 to 2011, 672 candidates took the written examination, with a failure rate of $17.4\% \pm 3.4\%$, significantly greater during for the latter period, despite eventually achieving success rates similar to those of the 2005 examination year ($P < .01$; Figure 4).

The oral examination failure rate started to increase in 2006 and has continued to increase (Figure 3). From 2000 to 2005, 955 candidates took the oral examination, with a failure rate of $14.4\% \pm 4.1\%$. The chi-square statistic was 5.92 ($P < .02$). From 2006 and 2011, 693 candidates took the oral examination, with a $28.1\% \pm 4.6\%$ failure rate, significantly greater ($P < .001$; Figure 5).

DISCUSSION

We have previously presented the concern that the number of trained cardiothoracic surgeons will not be sufficient to care for the increasing American population.¹ The timing of that shortfall has been projected to occur as soon as 2020—only 6 years away.^{1,2} The reasons for the decrease in the number of applicants have included personal choices, lifestyle, remuneration, and financial constraints.^{1,2,14}

The present study has allowed us to further the discussion on the eventual shortage of surgeons as a result of residents not passing the qualifying examinations. We hypothesized that the 80-hour workweek Accreditation Council for Graduate Medical Education requirement has potentially resulted in less successful graduates because of less experiential learning. From 2000 to 2011, the number of candidates who successfully completed their training and were awarded examination certification decreased to 92. Additional analysis revealed that from 2006 to 2011, 672 candidates took the written examination, with a failure rate of 17.4%. After implementation of the 80-hour

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