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# Association Between Flexible Duty Hour Policies and General Surgery Resident Examination Performance: A Flexibility in Duty Hour Requirements for Surgical Trainees (FIRST) Trial Analysis

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- BACKGROUND:** Concerns persist about the effect of current duty hour reforms on resident educational outcomes. We investigated whether a flexible, less-restrictive duty hour policy (Flexible Policy) was associated with differential general surgery examination performance compared with current ACGME duty hour policy (Standard Policy).
- STUDY DESIGN:** We obtained examination scores on the American Board of Surgery In-Training Examination, Qualifying Examination (written boards), and Certifying Examination (oral boards) for residents in 117 general surgery residency programs that participated in the Flexibility in Duty Hour Requirements for Surgical Trainees (FIRST) Trial. Using bivariate analyses and regression models, we compared resident examination performance across study arms (Flexible Policy vs Standard Policy) for 2015 and 2016, and 1 year of the Qualifying Examination and Certifying Examination. Adjusted analyses accounted for program-level factors, including the stratification variable for randomization.
- RESULTS:** In 2016, FIRST trial participants were 4,363 general surgery residents. Mean American Board of Surgery In-Training Examination scores for residents were not significantly different between study groups (Flexible Policy vs Standard Policy) overall (Flexible Policy: mean [SD] 502.6 [100.9] vs Standard Policy: 502.7 [98.6];  $p = 0.98$ ) or for any individual postgraduate year level. There was no difference in pass rates between study arms for either the Qualifying Examination (Flexible Policy: 90.4% vs Standard Policy: 90.5%;  $p = 0.99$ ) or Certifying Examination (Flexible Policy: 86.3% vs Standard Policy: 88.6%;  $p = 0.24$ ). Results from adjusted analyses were consistent with these findings.
- CONCLUSIONS:** Flexible, less-restrictive duty hour policies were not associated with differences in general surgery resident performance on examinations during the FIRST Trial. However, more years under flexible duty hour policies might be needed to observe an effect. (J Am Coll Surg 2017;224:137–142. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)
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In 2003, the ACGME introduced resident duty hour requirements and added regulations in 2011 in response to public concerns about patient safety and resident well-being.<sup>1,2</sup> However, there have been concerns about the quality of resident education and training after these reforms.<sup>3,4</sup> This has been debated in the surgical community in particular, where limitations on duty hours were thought to adversely affect clinical experience and technical skills. Numerous studies have analyzed the impact of duty hour reform on surrogate measures of resident competence, such as operative volume, clinical acumen, and written and oral surgery board examination performance, but these studies have had methodological limitations and produced conflicting results.<sup>5,6</sup>

**Abbreviations and Acronyms**

ABS	= American Board of Surgery
ABSITE	= American Board of Surgery In-Training Examination
CE	= Certifying Examination
QE	= Qualifying Examination

The Flexibility in Duty Hour Requirements for Surgical Trainees (FIRST) trial was a prospective cluster-randomized trial that compared standard ACGME duty hour policies (Standard Policy) to flexible, less-restrictive duty hour policies (Flexible Policy), where daily duty hour limits and time off between shift requirements were waived for general surgery residents. The FIRST trial surveyed residents and found that residents under flexible duty hour policies were less likely to perceive negative effects of duty hour policies on various aspects of resident education (eg resident autonomy, clinical skills acquisition, operative volume, and participation in educational conferences) compared with residents working under standard policies.<sup>7</sup>

Little is known about how different duty hour policies impact resident education, particularly with respect to American Board of Surgery In-Training Examination (ABSITE), the American Board of Surgery (ABS) Qualifying Examination (QE, written boards) and ABS Certifying Examination (CE, oral boards). Our objective was to examine whether flexible duty hour policies were associated with a difference in examination scores compared with standard policies.

**METHODS****Data and sample**

Data for this study came from the FIRST trial. The study sample included general surgery residents in 117 general surgery residency programs in the US and 151 affiliated hospitals that participated in the FIRST trial.<sup>7,8</sup> Programs were randomly assigned to either Standard Policy, which required adherence to all current ACGME duty hour requirements, or Flexible Policy, in which the daily duty hour limits (eg 16 hours for interns and 28 hours for senior residents) and minimum time off between shift requirements (8 hours between daily shifts and 14 hours off after a 24-hour call) were waived through a formal waiver from the ACGME. All programs, regardless of study arm assignment, were required to adhere to the requirements for the 80-hour work week, 1 day off in 7, and call no more frequently than every third night.

We obtained data for residents in the trial on their performance on the ABSITE, QE, and CE. The ABSITE is a

standardized examination that is offered nationally every year to general surgery residents to test the acquisition of surgical knowledge and management of clinical problems related to surgery. It also provides data for program improvement in educational activities. It is standardized to a mean (SD) of 500 (100). The QE is offered to residents who have graduated from accredited general surgery residencies. The QE is a multiple-choice examination testing clinical knowledge and judgment. Passing the QE is required to take the CE. The CE is an oral examination focused on assessing clinical judgment and decision making. Passing both QE and CE is required for board certification by the ABS.

Deidentified ABSITE, QE, and CE scores were obtained from the ABS, along with limited program-level information. The ABSITE data included the January 2015 and January 2016 examinations. The QE and CE data were from 2015, as there was a lag and variation in when these examinations were taken after residency graduation during the 2015–2016 academic year. We only examined QE and CE performance for the first time a resident took the examination.

**Statistical analyses****Unadjusted analyses**

Mean ABSITE scores across study arms were compared using *t*-tests, stratified by PGY. Pass rates on QE and CE were compared between study arms using chi-square tests. All tests were performed with program-level clustered SEs to account for clustering of residents within programs.

**Adjusted analyses**

A mixed linear regression model with random program-level intercepts was developed to estimate the association between study arm and mean ABSITE performance, adjusting for program-level tertile of death or serious morbidity from the previous year (stratification variable in the FIRST trial).<sup>8</sup> The unit of analysis was at the resident level. We explored the inclusion of various resident- and program-level characteristics in the model, such as sex, geography, and academic vs nonacademic program status. Results from these models were qualitatively similar to those from a more parsimonious model that only adjusted for program-level tertile of death and serious morbidity. We report estimates from the more parsimonious model only.

To assess the association between study arm and board examination performance (pass/fail), we estimated logistic regression models with program-level clustered SEs and adjustment for the trial stratification variable. The unit of analysis was at the resident level. Separate models

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