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## A multimodal approach improves American Board of Surgery In-Training Examination scores<sup>☆</sup>

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### ABSTRACT

**Background:** There are several factors that influence ABSITE scores, but the optimal approach for remediation of poor scores is unclear.

**Methods:** A structured academic curriculum and focused remediation program (FRP) were implemented to improve academic performances. Within a 15-year period, ABSITE and American Board of Surgery qualifying exam (ABS QE) results were compared before and after the establishment of the program using a paired T-test. Subgroup analysis was performed for residents who completed the FRP.

**Results:** After establishing the FRP, the mean scores increased from 49.3% to 60% ( $p = 0.001$ ). The proportion of first-time pass rates for the ABS QE increased from 89.5% to 100% ( $p = 0.18$ ). With the subgroup analysis of FRP residents, the average improvement on the next ABSITE exam score was 51 percentile points ( $p = 0.003$ ), raw score increased by 80 ( $p = 0.01$ ) and percent correct increased by 7 percentage points ( $p = 0.006$ ).

**Conclusions:** A structured academic curriculum and FRP improves ABSITE scores. Additional strategies utilizing the self-regulated learning method can further assist trainees who remain struggling learners. Further study is required to determine direct correlation to the ABS QE.

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## 1. Background

The American Board of Surgery In-Training Examination (ABSITE) was first established in 1975 by the American Board of Surgery (ABS) and has been used not only to evaluate resident progress and medical knowledge, but also as a way for program directors to assess their individual academic programs.<sup>1,2</sup> Several studies have demonstrated strong correlation between ABSITE

scores and first time pass rates on the ABS Qualifying Exam,<sup>3</sup> thus many residency programs are looking for ways to better their resident ABSITE scores. The optimal approach to achieving such improvements continues to be debated and is constantly evolving.

To improve our residency education experience, our program instituted two changes: a newly structured academic program and a mandatory focused remediation program (FRP). The structured academic program utilized a multimodal approach for all trainees while the FRP addressed potential specific deficiencies for struggling learners. The purpose of this study was to evaluate our institution's results in relation to these implemented programs. We hypothesized that the FRP would directly correlate with improved ABSITE scores. The results of this study may lend to additional knowledge of how to improve academic performances in general surgery residency training programs.

## 2. Methods

In 2012, several changes were implemented to improve performances on medical knowledge as measured by the ABSITE. The changes to the academic program are noted on [Table 1](#).

**Abbreviations:** ABS, American Board of Surgery; ABSITE, American Board of Surgery In-Training Examination; ACGME, Accredited Council of Graduate Medical Education; CE, certifying exam; FRP, Focused remediation program; JIT, Just-in-time teaching; QE, qualifying exam; REDP, Resident Education and Development Program; SCORE<sup>®</sup>, Surgical Council on Resident Education; SRL-MAT, Self-regulated learning microanalytic assessment and training; SRLM, Self-regulated learning method.

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**Table 1**  
Implemented Changes in New Structured Academic Program (implemented in 2012).

-Strict conference attendance policy
-Morbidity and mortality conference with quarterly quizzes for medical knowledge retention
-Problem-based learning conference
-Just in Time interactive resident conference with 20–25 questions based on assigned weekly readings
-Weekly recording of quizzes to monitor medical knowledge on resident conferences
-Minimum expectation of >30th percentile on annual American Board of Surgery In-Training Exam (ABSITE)
-Mandatory remediation program for residents who score ≤30th percentile on ABSITE

Restructuring began with adaptation of a Resident Education and Development Program (REDP) using a defined curriculum with a heavy emphasis on high yield ABS Topics. REDP included a multimodal approach with learning from weekly Morbidity & Mortality conferences, problem-based learning conferences, and a Just-in-time teaching (JIT) curriculum. JIT consisted of learning objectives that provided structured and focused reading assignments and interactive resident responses using clickers to answer reading related questions. In addition, a minimum expectation on the annual ABSITE was established at greater than the 30th percentile. A focused remediation program (FRP) was mandated for poor performance on ABSITE exams, which was defined as participants scoring at or below the 30th percentile. Later in 2015, we added a Self-Regulated Learning Method (SRLM) Program to the FRP that utilized a micro-analytic assessment and pre-ABSITE mock testing.

Our study was a retrospective cohort review at a single institution aimed to look at our restructured academic program and its potential impact on academic performance as measured by the ABSITE. A mixed-methods approach was applied to evaluate the effect of these changes using qualitative and quantitative data. General surgery resident ABSITE scores from 2002 to 2016 were collected and the mean percentile, percentage correct and raw scores for each year before and after the establishment of the restructured academic program were compared using a paired T-test and Cohen's *d* effect size. To evaluate for academic caliber of each group (pre and post FRP) during medical school, the mean USMLE or COMLEX scores were compared using a paired T-test. The percentage of residents scoring at or below the 30th percentile was also reviewed to compare before and after the established changes.

A subgroup analysis was determined for those residents scoring at or below the 30th percentile. These residents were assigned to the mandatory FRP, which consisted of regular meetings with an assigned faculty member and administration of one-on-one sessions to assess the learner in their abilities to review, analyze and learn through a series of step-wise questions specific to a given ABSITE clinical scenario. Based on the assessment, the teacher identified any particular deficits that the learner possessed and provided structured feedback to the learner to allow for a more refined approach in studying and completion of assigned SCORE<sup>®</sup> (Surgical Council on Resident Education) modules/questions. Later in 2015, a SRLM was added to further improve the remediation curriculum. Mean ABSITE scores for those remediated residents were compared for those who did not experience SRLM versus those who did.

Lastly, survey data was also collected to evaluate residents' perceptions after completion of the FRP. A survey was not feasible for residents before 2011. Residents who completed the FRP (N = 4) consented to complete a survey about their remediation

experience. Due to the small number, simple statistics was performed.

### 2.1. Focused remediation program (FRP)

Our remedial approach included mentorship, evaluation for potential distractors, close monitoring with weekly quizzes and the self-regulated learning micro-analytic assessment and training (SRL-MAT). There were two phases in our FRP: evaluation for distractors and the SRLM. For those remediation candidates, a meeting with an assigned mentor was the first step. This one-to-one mentorship was performed to identify learner deficits and distractors, and identify any reasons why the trainee may be struggling especially on standardized tests. The common reasons for struggling learners are listed in Table 2.<sup>4</sup> Lucey et al. described additional distractors as the "7Ds" (Table 3).<sup>5</sup> This information was purely voluntary by each remediated resident.

We added the self-regulated learning micro-analytic assessment and training (SRL-MAT) protocol for residents who scored below the 30th percentile on the ABSITE exam. Self-regulated learning is a self-generated critique on perceptions and actions to be taken to achieve a personal goal. In this case, the goal was educational development for general surgery trainees. Plans were generated and adapted based on perceived outcomes. This system requires forethought on tasks and motivational beliefs essential to obtain the objective. Performance requires self-control and self-observation. The final phase is afterthought which requires self-judgment and subsequent adaptive response that feeds back into forethought and continues a cyclical adaptive response.<sup>6,7</sup>

The SRL-MAT format was used to assess learner behaviors. It is an educational tool designed for one-on-one use between learner and teacher that utilizes a question review format to identify any struggling test-taker subtypes. This question review format was developed by academic leaders at the Uniformed Services University of the Health Sciences.<sup>7</sup> As an example: a typical ABSITE question is presented to the learner, they read the stem aloud and then are presented with a series of questions leading toward identification of the disease script. Next, questions about the disease severity are asked and the learner is challenged to identify specific factors that do or do not support their initial conclusions from the stem. Throughout the back and forth dialogue and break down of the clinical stem, the teacher can help identify deficits in how the learner analyzes the question and ultimately arrives at a final answer. Confidence is continually assessed and feedback is given to aid the learner in performing their own self-monitoring as well. With repeated self-assessment and practice using this protocol, learners can adjust their learning styles and improve upon individual learning deficits.

Identification of common struggling test taking subtypes leads to specific self-regulated learning strategies that allows for potential long-term learning skills. Several of our remediated residents commented on multiple subtypes. Based on our candidates who completed the FRP, the most common test taker subtypes encountered were underconfidence, premature closure and lack of script recognition. A candidate with *underconfidence* would tend to "overthink" the answer and tends to convince himself/herself that the answer is incorrect. This becomes evident to the teacher as the learner explains their thought process during the question review format. The specific strategy would be to assess weekly test-taking results with confidence scores to gradually build the learner's confidence. This allows the learner to adjust his/her level of confidence over time. Residents who demonstrate *premature closure* subtype will make early decisions on test questions and fail to recognize the significance of conflicting information within the review format. During teacher observations, the learner must read

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