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Assessment of general surgery resident study habits and use of the TrueLearn question bank for American Board of Surgery In-Training exam preparation☆

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ABSTRACT

Background: Little information exists on the value of online question banks in preparing residents for the American Board of Surgery In-Training Examination (ABSITE).
Methods: We reviewed surgical residents' use of an online question bank (TrueLearn) and compared it to their ABSITE performance.
Results: The 2016–2017 records of 44 PGY 2–5 general surgery residents were examined. The total number of TrueLearn questions answered significantly correlated ($p < 0.05$) with correct answers and percentile rank on the 2017 ABSITE. If a resident was to complete the entire online TL question bank consisting of 1000 questions, the overall percentage correct and overall percentile on the ABSITE is estimated to increase by 3% and 20%, respectively.
Conclusions: The use of the TrueLearn question bank is associated with an improved percentage of ABSITE questions answered correctly and improved PGY percentile scores.

Background

The American Board of Surgery (ABS) In-Training Examination (ABSITE) is administered each year to general surgery trainees to assess their depth of medical knowledge. It has become a significant part of the decision-making process regarding resident promotion and remediation, and it also serves as a measure of education program efficacy.[1,2] Moreover, performance on the ABSITE may predict the successful completion of the ABS Qualifying Examination,[2,3] which is becoming increasingly more important for residency accredidation.[4]

Surgical curricula typically consist of assigned readings, practice questions, and weekly conferences, which have been shown to improve ABSITE performance.[5–7] However, there is a paucity of data regarding the benefit of completing practice questions from medical exam question banks.

Recently, our general surgery department provided the TrueLearn (TL) question bank to its residents to aid in ABSITE preparation. The aim of this study was to determine if the use of TL had an impact on resident ABSITE performance. We hypothesized that more practice questions completed would correlate with improved ABSITE performance.

Methods

We performed a retrospective review of 2016 and 2017 ABSITE score reports containing the overall percentage of questions answered correctly and percentile scores for all categorical general surgery residents at the University of Texas Southwestern Medical Center. TL data, including the total number of questions completed and the percentage of questions correctly answered, were also obtained from stored data in the online question bank. Institutional review board approval was waived as this was considered a quality improvement project for surgical education.

In addition to the data obtained from the ABSITE score reports, all postgraduate year (PGY) 2–5 residents were surveyed online via SurveyMonkey (www.surveymonkey.com) to determine ABSITE

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study habits in 2016 and 2017.

This included gathering information on the use of TL prior to the departmental purchase, the use of a mobile TL application, and the percentage of time spend using TL or other study materials while preparing for the ABSITE. The results of the survey were not anonymous in order to link the results to resident ABSITE data. The survey can be found in Fig. 1. Interns and residents who did not take the ABSITE in 2016 were excluded. Thirteen residents were excluded in total.

Linear regression was used to determine the association of TL usage with the percent of correct responses and percentile rank on the 2017 ABSITE by postgraduate year (PGY), as well as the change in ABSITE scores from 2016 to 2017. A multivariate linear regression model was constructed using all variables that met a 0.20 significance level in univariate analysis. All analyses were performed at the 0.05 significance level using SAS 9.4 (SAS Institute, Cary NC).

Results

ABSITE and TL data from 44 PGY 2–5 general surgery residents were included in the analysis.

Correlation between TL usage and 2017 ABSITE percentage correct and percentile

On univariate analysis, the total number of TL questions completed in 2017 significantly correlated with the percentage of questions answered correctly ($R^2 = 0.11$, $p = 0.02$) and the overall percentile score ($R^2 = 0.18$, $p < 0.01$) on the 2017 ABSITE (Fig. 2). In addition, the total percentage of TL questions answered correctly on the online question bank correlated with the percentage of questions answered correctly ($R^2 = 0.27$, $p < 0.01$) and the overall percentile score ($R^2 = 0.18$, $p < 0.01$) on the 2017 ABSITE (Table 1).

In a multivariate model, the number of TL questions completed in 2017 was significantly associated with the percentage of correct questions ($p = 0.02$) and the overall percentile ($p < 0.01$) on the 2017 ABSITE. For every TL question completed in 2017, the overall percentage correct and percentile score on the ABSITE was estimated to increase by 0.003 and 0.02, respectively, after controlling for PGY level, percentile/percent correct on the 2016 ABSITE, and percentage of TL questions answered correctly in 2017 (Table 2).

1. During the 2015-2016 academic year (prior to department purchasing True Learn for you), did you use True Learn as part of your ABSITE preparation?
   a. Yes, but I completed less than 50 questions
   b. Yes, I completed approximately 50-200 questions
   c. Yes, I completed approximately 200-500 questions
   d. Yes, I completed more than 500 questions
   e. No, I did not use True Learn
2. During the 2016-2017 academic year, if you used True Learn to study, when did you complete most of the questions?
   a. On my phone as an app between work tasks
   b. At home during designated study time through out the year
   c. Whenever I had time in the weeks leading up to the ABSITE
   d. I did not use True Learn
3. During the 2016-2017 academic year, did you use a different question bank as part of your ABSITE preparation?
   a. Yes, I used SESAP
   b. Yes, I completed SCORE questions
   c. Yes, I completed questions from various sources
   d. No, I did not use practice questions to study
4. During the 2016-2017 academic year what percentage of your ABSITE studying involved True Learn?
   a. 0-25 %
   b. 25-50 %
   c. 50-75 %
   d. > 75 %
5. During the 2016-2017 academic year, what did you find to be the most helpful study tool?
   a. True Learn
   b. Board Review Books
   c. ABSITE Killer
   d. Other question banks or educational resources
   e. I did not use anything

Fig. 1. Resident survey to determine ABSITE study habits in 2016 and 2017.

Correlation between TL usage and change in ABSITE percentile and percentage correct from 2016 to 2017

On univariate analysis, the total number of TL questions completed in 2017 was correlated with the change in percentage of questions answered correctly ($R^2 = 0.20$, $p = 0.01$) and the overall percentile score ($R^2 = 0.34$, $p \leq 0.01$) from the 2016 to 2017 ABSITE. In a multivariate model, the number of TL questions completed in 2017 was associated with the change in ABSITE percentile ($p < 0.01$) and percent of questions answered correctly on the ABSITE from 2016 to 2017. For every TL question completed in 2017, the change in percentage correct and percentile score on the ABSITE was estimated to increase by 0.003 and 0.02, respectively.

The number of TL questions completed in 2017 was also significantly associated with a change in percent of questions answered correctly on the ABSITE from 2016 to 2017. Each additional TL question answered in 2017 was associated with an increase of 0.003 ($p = 0.02$) from the 2016 ABSITE percent correct to 2017% correct.

Residents who used TL in 2017 alone had a mean increase in their ABSITE percentile from 2016 to 2017, while those who used it both years had an overall mean decrease (11.6 ± 20.0 vs. -9.3 ± 29.2, $R^2 = 0.12$, $p = 0.04$). This was not significant on multivariate analysis ($p > 0.05$). Additionally, the percentage of questions correct on TL or the amount of time spent using TL in 2017 was not associated with a significant change in ABSITE percentile or percent correct.

Survey results

Survey data from 33 of 44 residents (75% response rate) were compiled. Of the respondents, 41% did not use TL in 2016 or completed ≤200 questions. In 2017, 100% of the surveyed residents used TL. Of these residents, 61% used TL as their only study tool, 33% used the affiliated mobile application to complete questions, and 79% believed that TL was the most helpful study tool that was used overall. Only 15% of surveyed residents used practice questions from various other sources. 76% of residents stated that they used TL for >50% of ABSITE studying.

Discussion

The aim of the current study was to determine if the use of an online question bank improved ABSITE performance. Our results show that the total number of TL questions completed was associated with ABSITE performance in 2017 and the total number of TL questions completed was associated with the change in percentile score and percentage correct from the 2016 to 2017 ABSITE. If a resident was to complete the entire online TL question bank consisting of 1000 questions, the overall percentage correct and overall percentile on the ABSITE is estimated to increase by 3% and 20%, respectively. This data support our hypothesis. Interestingly, on univariate analysis, those who did not use TL prior to 2017 had a mean increase in their ABSITE percentile and percent correct, suggesting that a benefit may be more pronounced in first-time users. The data points showing greater than 1000 questions answered, reflects residents who answered the question bank more than once.

To our knowledge this is the first study to evaluate the specific impact of an online question bank on ABSITE performance using objective measures. Chang et al. found that completing review questions correlated with higher ABSITE percentile scores for PGY 1 residents.[8] However, this study used a survey to estimate the number of questions completed prior to the exam. Additionally, the

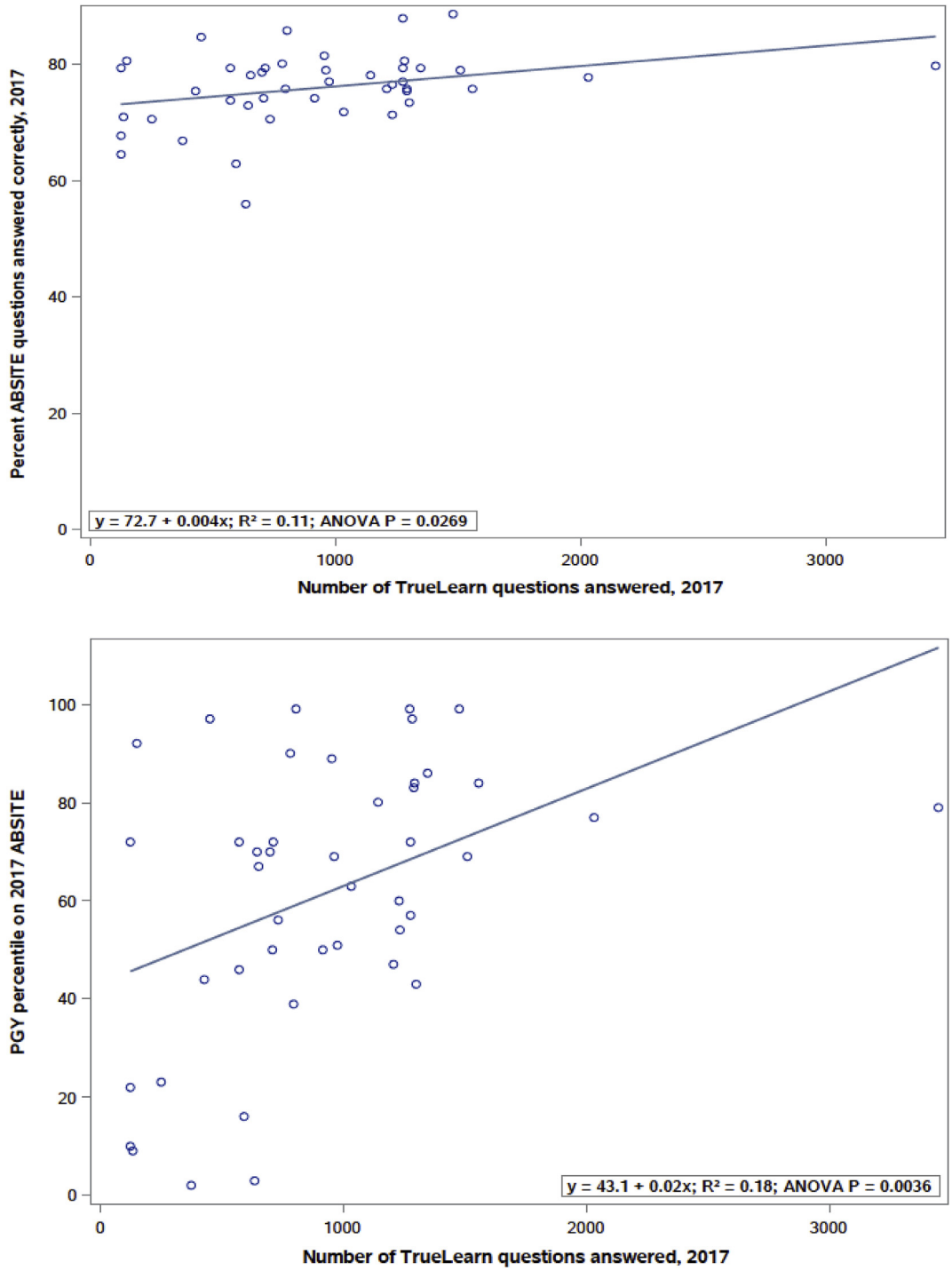

Fig. 2. Correlation between TrueLearn usage and 2017% of correctly answered questions on the American Board of Surgery In-Training Examination (ABSITE) and PGY percentile.

ABSITE percentile was used without consideration for the percentage correct and the authors did not cite the source of review questions used. Buckley et al. reported that using a multifactorial approach to ABSITE studying improved ABSITE performance. In Buckley's study, one of the interventions employed was the use of rapid-fire questions based on key concepts identified from previous ABSITEs to prepare their residents.[9] Studies in nonsurgical specialties have showed improved in-training exam scores after completing practice questions as well.[10,11] Therefore, an educational resource such as TL may provide an avenue to address gaps in knowledge and to potentially increase the overall number of test questions answered correctly. This is particularly important on the ABSITE, as a small increase in the percent correct can result in dramatic shifts in the percentile score.[1]

Prior to 2017, the UT Southwestern general surgery residency did not provide study tools to residents beyond the traditional didactic teaching sessions, assigned readings, and a short multiple-choice practice exam which was written by the institution. Offering a readily available online question bank for all residents alleviated the burden of developing original practice questions and

Table 1
Association of parameters with percent correct and percentile on ABSITE.

	Estimate (95% CI)	R^2	p
Percent Correct on 2017 ABSITE PGY			
2	reference	0.33	<0.01
3	4.8 (0.2, 9.3)		
4	9.8 (5.2, 14.4)		
5	6.7 (2.1, 11.2)		
Percent correct on 2016 ABSITE	0.7 (0.5, 0.8)	0.53	<0.01
PGY percentile on 2016 ABSITE	0.1 (0.03, 0.2)	0.17	<0.01
TL questions answered, 2017	0.004 (0.0004, 0.006)	0.11	0.02
Percent TL questions correct, 2017	0.6 (0.3, 0.8)	0.27	<0.01
Percentile Score on 2017 ABSITE PGY			
2	reference	0.06	0.47
3	0.8 (−23.0, 24.6)		
4	15.1 (−8.7, 38.9)		
5	−1.3 (−25.1, 22.5)		
Percent correct on 2016 ABSITE	2.1 (1.1, 3.1)	0.28	<0.01
PGY percentile on 2016 ABSITE	0.6 (0.3, 0.8)	0.29	<0.01
TL questions answered, 2017	0.02 (0.01, 0.03)	0.18	<0.01
Percent TL questions correct, 2017	1.9 (0.6, 3.2)	0.18	<0.01

posttest explanations. Moreover, this year we have also included a 250 question practice test from TL for our residents which is available with the database. However, surgical residency programs have limited resources, and the annual purchase of a question bank for each resident is a significant financial commitment. A one-year subscription for TL has a retail cost of $299 per resident.[12]

In addition to providing references and learning points for each question, a TL subscription also includes complete explanations as well as a mobile application for convenience.[12] Our survey found that 33% of residents used the mobile application to complete questions between work tasks. The ability to complete questions on the go allows some residents to use their downtime more efficiently when they might have otherwise spent the time on nonacademic endeavors. Residents appeared to value the availablity of TL as only 15% used practice questions from various other sources and 76% of residents stated that they used TL for >50% of their ABSITE studying.

Our study has several limitations which we plan to address in future studies. This data was initially collected to determine the ideal way to allocate resources provided by the department of surgery for ABSITE studying. We have shown that there is likely some benefit provided from the use of an online question bank; however the sample size was small. The department of surgery at our institution now purchases TL each year for all residents and in order to provide more data we would have to prospectively alternate the years which we purchased TL. This would be difficult as many of our residents have stated in a recently sent out survey (data not published) that they would continue to purchase TL on their own even if the department stopped providing it. Moreover, a direct quantification of time spent studying and preparing for the ABSITE was not possible; the absence of this objective data is recognized as a limitation of the study. Additionally, it is possible that residents who completed more review questions were generally more likely to study compared to those who completed fewer questions, which may have contributed to the results of our analysis.

Regarding the survey data, resident study habits were determined retrospectively, which is subject to recall error. However, the impact of this on our study may be minimal, as the survey was sent out and collected within one year of taking the 2016 ABSITE. Lastly, this study was not designed to assess all of the approaches to ABSITE performance improvement. Determining the impact of an online question bank when used in conjunction with other preparation modalities for the ABSITE is necessary.

Moving forward, evaluations of ABSITE performance after other commonly used question banks should be performed to determine the generalizability of these results. Ideally, a prospective investigation of ABSITE performance in residents using alternative learning tools and strategies would ultimately lead to a standardized set of recommendations for optimal ABSITE preparation and mastery of general surgery fundamentals.

Table 2
Multivariate model of percent correct and percentile on ABSITE, $R^2 = 0.55$.

	Estimate (95% CI)	p
Percent Correct on 2017 ABSITE PGY		
2	reference	0.3264
3	1.79 (−1.58, 5.15)	
4	2.81 (−1.00, 6.62)	
5	0.40 (−3.55, 4.35)	
Percent correct on 2016 ABSITE	0.55 (0.34, 0.76)	<0.0001
TL questions answered, 2017	0.003 (0.001, 0.005)	0.0269
Percent TL questions correct, 2017	0.18 (−0.04, 0.40)	0.1067
Percentile Score on 2017 ABSITE		
PGY percentile on 2016 ABSITE	0.55 (0.32, 0.77)	<0.0001
TL questions answered, 2017	0.02 (0.01, 0.03)	0.0005
Percent TL questions correct, 2017	0.98 (−0.08, 2.03)	0.0689

Conclusion

The use of the TL question bank is associated with an improved percentage of ABSITE questions answered correctly and improved PGY percentile scores. Overall, it appears that residents benefit from completing practice questions, and this online tool may be useful for other surgical residency programs.

Short summary

The main objective of this study was to determine if the use of the TrueLearn question bank had an impact on resident ABSITE performance.

Disclosure

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector.

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