The Effect of a Targeted Educational Activity on Obstetrics and Gynecology Resident In-Training Examination Scores

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Abstract

The objective of this study was to compare the examination scores before and after implementation of a study program based on high yield topics on the Council of Resident Education in Obstetrics and Gynecology (CREOG) In-Training Examination. This prospective cohort study compared scores from academic years 2012 to 2014 of University of Hawai'i obstetrics and gynecology residents who participated in a directed study program based on selected high yield topics from the CREOG Test Item Summary Booklet. Topics were considered high yield if more than 75% of the program residents answered the topic questions incorrectly during the immediately preceding CREOG In-Training Examination administration. Residents were assigned topics to research and present at monthly teaching sessions. The presentations were made accessible in a wiki website. The intervention was initiated in 2012 and discontinued in 2013. The primary outcome was the difference among CREOG In-Training Examination scores before the study program, during the study program, and after the study program was discontinued. Only scores of residents who sat for all three exams were included. Eleven residents were present during the duration of the study period and sat for all three CREOG examinations. During the year of the educational activity, paired individual resident CREOG exams scores increased significantly from the 2012 CREOG administration (mean = 194.7) to the 2013 CREOG administration (mean = 208.2). These findings demonstrate that the CREOG Test Item Summary Booklet and the wiki platform can be used to effectively direct educational efforts resulting in improvements in CREOG examination performance.

Keywords

CREOG, scores, residency training, wiki

Abbreviations and Acronyms

CREOG = Council of Resident Education in Obstetrics and Gynecology
ITE = In-training examination
OBGYN = Obstetrics and Gynecology
USMLE = U.S. Medical Licensure Examination
ABOG = American Board of Obstetrics and Gynecology
UH = University of Hawai'i

Background

As an important technological tool in education, the World Wide Web has evolved from being a static, one-way flow of information or "prepackaged knowledge" to an information super-highway, where users not only consume information but also become active producers and collaborators in the creation and contribution of information.[1] As a collaborative medium designed to promote content sharing,[2] Wiki-based websites allow users the ability and the responsibility of updating, editing, and maintaining content. Originated from the Hawaiian term "*wiki wiki*" (meaning quickly or swiftly), wikis allow users to become contributors in a collaborative fashion.[3] Rather than information coming from one sole editor, learners assume responsibility for constructing knowledge for others by taking on an active role in developing their own formations and representations of that knowledge. This allows for the incorporation of multiple perspectives and collaborative learning, which facilitates deeper understanding.

Wikis have become increasingly recognized as important educational and collaborative tools, with integration into residency education and curriculum being reported in several recent publications.[3,4] In 2008, residents at Beth Israel Deaconess Medical Center built a wiki, which contained institutional knowledge and reference information.[5] After three years, a survey revealed that all residents felt that the wiki improved their ability to complete tasks and improved their experience (90%), efficiency (89%), and education (57%). In 2011, second-year dermatology residents created the Dermatology Education Wiki (DermWiki) quality improvement project at the University of Colorado.[6] After implementation, dermatology residents and medical students were surveyed. Students rated their elective that used DermWiki higher than rotations without a wiki (8.12 vs 7.31) and residents reported unanimous increased satisfaction with the residency program after DermWiki institution. The faculty at the University of Pittsburg Medical Center also used wiki as an interactive teaching tool for a resident didactic course in pathology in 2011.[7] Residents' test scores improved 25% after the wiki course, compared to 16% improvement with the prior predecessor course that did not employ wikis ($P = .006$).

As the public increasingly turns to the Internet for medical information, several medical specialty groups have also developed their own wikis to organize and maintain core content. These include HemOnc.org (maintained by hematology-oncologists) and EyeWiki (maintained by the Academy of Ophthalmology). WikiEM, an emergency medicine wiki, was originally developed for residents at the Harbor-UCLA Medical Center emergency medicine program in 2009 and was also subsequently opened to the public in 2011.[8] Of the residents who contributed to WikiEM, 74.6% reported a positive impact on their understanding of emergency medicine content and 72.9% noted an improvement in their clinical efficiency. This wiki phenomenon has also expanded internationally, with the successful implementation of a Wiki Guide for Obstetric and Gynecology Trainees in Ireland.[9]

Introduction

The Council on Resident Education in Obstetrics and Gynecology (CREOG) in-training examination was developed in 1967 with the intention of assisting program directors with evaluating both residents' cognitive knowledge and the effectiveness of individual programs.[10] Both residents and program directors have found the CREOG ITE, which is administered yearly, to

accurately assess cognitive knowledge.[11] As such, it has become a standardized tool to assess the quality of training in obstetrics and gynecology.[12] The CREOG Test Item Summary booklet, which closely emulates the CREOG ITE, was subsequently developed. First released in 1993, it consists of several components: question categorization, focus points identified from key word phrases, and item-specific text references.[13] As an educational resource, this booklet can allow each program to identify potential gaps specific to their own curriculum.

Performance on the CREOG ITE has also been correlated with U.S. Medical Licensure Examination (USMLE) step 1 scores,[14] with USMLE scores >200 associated with both CREOG ITE performance and passing score on the American Board of Obstetrics and Gynecology (ABOG) written examination.[12] Furthermore, CREOG ITE scores of at least 200 have also been shown to predict success on the ABOG examination.[15]

In 2012, University of Hawai'i OBGYN resident CREOG ITE scores were noted to be discordant with their USMLE scores. In the same cohort of residents, 2 of 11 (18%) scored <200 on the USMLE step 1 while 9 of 11 (82%) scored <200 on the 2012 CREOG ITE. Residents perceived a lack of structure to the curriculum as a cause of the low CREOG ITE scores while faculty were concerned that residents were not invested in their own education. In an effort to increase CREOG ITE scores in our program, various options for our residents to learn CREOG topics were considered and a CREOG-review Wiki project was started.

The purpose of this study was to investigate whether the implementation of a targeted educational activity, in the form of a resident-run wiki website (CREOG Wiki Project), would have a positive effect on resident CREOG ITE scores.

Methods

This was a prospective cohort study conducted at the University of Hawai'i John A. Burns School of Medicine Residency Training Program in Obstetrics and Gynecology. OB/GYN faculty identified high-yield topics from the CREOG test-item summary booklet. Topics were identified as high-yield or as potential gaps in the UH OBGYN curriculum if >75% of UH residents answered the topic incorrectly during the 2012 CREOG ITE.

The CREOG Wiki project was started shortly after the 2012 CREOG ITE and each resident was assigned a topic to research to present at monthly teaching sessions. Each topic was entered as a single Wiki entry, which was searchable and accessible by our residents through an internally hosted department Wiki website. A Wiki Challenge was also implemented as a way to encourage participation in the project. Each month, a Jeopardy-styled game, moderated by faculty, was played to encourage and incentivize residents to review the wiki entries. The CREOG Wiki project required considerable effort on the part of a few resident champions and was discontinued in August 2013, after the 2013 CREOG ITE was taken, with scores returned, and during the 2014 CREOG ITE preparation period, due to decreased interest.

CREOG ITE scores from 2012 to 2014 were examined and only the scores of the residents who were present for the entire three-year period were included. Test scores were obtained through a search of computerized program records by the principal investigator and were recorded on a password-protected Excel spreadsheet. All subjects were de-identified and a key with codes that linked the subjects to their individualized scores were kept in a separate password-protected Word document that only the principal investigator had access to. Only de-identified data was used for statistical analysis. In all, 11 residents were present for all three CREOG ITE administrations. Paired t-test analysis was performed on the 11 resident's level-specific standardized scores, using GraphPad's QuickCalcs (www.graphpad.com). The mean level-specific standardized scores over the three-year period was also analyzed using ANOVA statistical analysis, using the Social Science Statistical online calculator (www.socscistatistics.com).

Results

The raw scores for 11 residents from 2012-2014 are shown in Table 1. ANOVA analysis of the raw scores over the three-year period demonstrated a statistically significant difference ($P = .0018$). Figure 1 shows a pattern, in which most of the residents' scores increased in 2013 and decreased again in 2014 when the wiki project was discontinued. Paired t-test analysis of resident scores between 2012 and 2013 demonstrated significant difference ($P = .0014$). However, there was no statistical difference between 2013 and 2014 scores ($P = .075$) and also, no significant difference when comparing 2012 (before the wiki project was started) and 2014 scores ($P = .051$). This suggests that scores after the wiki project was discontinued approached baseline or pre-wiki 2012 project scores.

During the year of the study program (2012-2013), mean level-specific CREOG in-training exam standardized scores increased significantly in 2013 compared to 2012 (208.2 vs 194.7, $P < .05$) (as seen in Figure 2). The program was discontinued in the 2013-2014 academic year due to waning interest and mean level-specific standardized score for 2014 was shown to decrease to 201.6 from 208.2 although this was not significant ($P > .05$).

Table 1. Raw CREOG Test Scores from 2012-2014

	CREOG Scores		
Resident	**2012**	**2013**	**2014**
1	191	199	189
2	186	194	189
3	196	205	216
4	184	188	192
5	196	227	208
6	186	208	188
7	179	204	210
8	195	191	191
9	211	228	220
10	223	232	222
11	195	214	193
Mean	194.7273	208.1818	201.6364
Standard Deviation	12.04605	14.65865	12.98442
ANOVA	*P* = .0018		

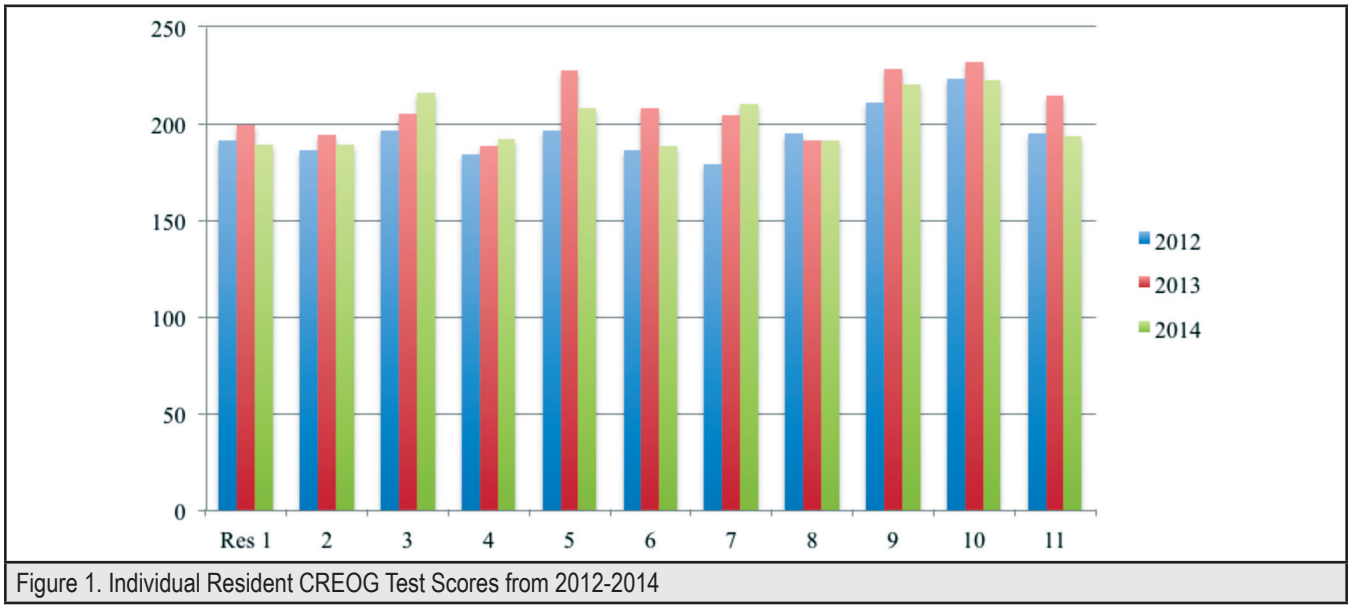

Figure 1. Individual Resident CREOG Test Scores from 2012-2014

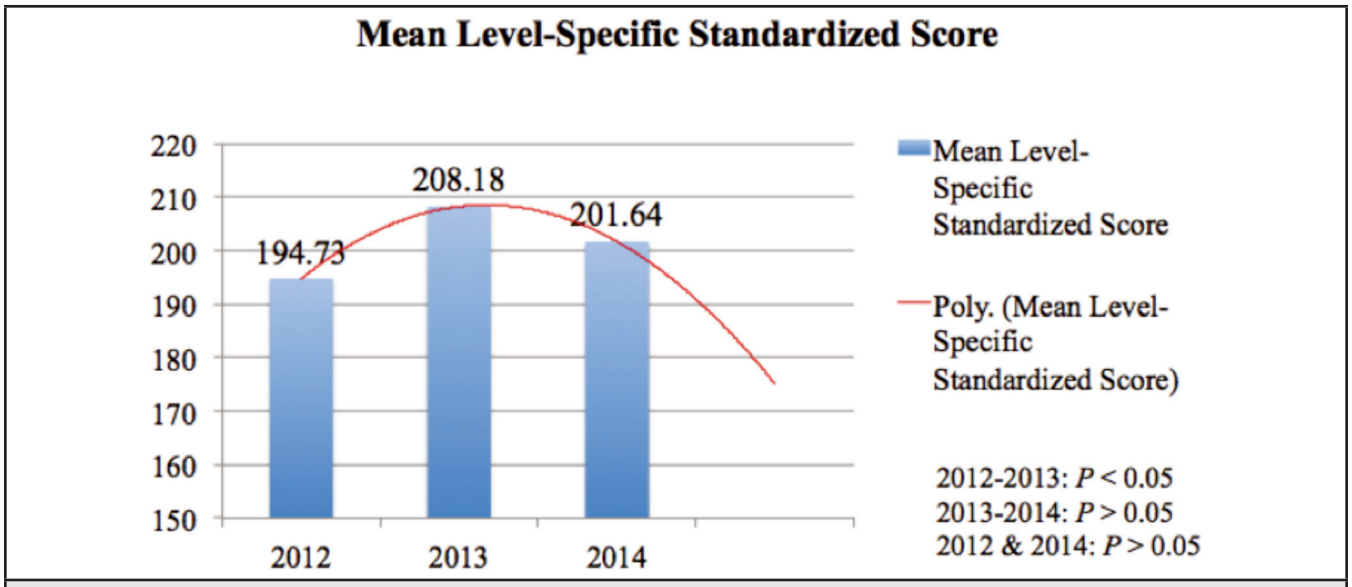

Figure 2. Mean Level-Specific Standardized Score for 2012-2014

Discussion

There have been previous studies documenting the utilization of various educational interventions to improve standardized in-training testing scores in internal medicine and surgery. These interventions include a multiple choice testing program coupled with a year-long elective experience,[16] a directed postgraduate study,[17]self-directed study; resident-directed study with weekly systematic textbook reviews; and faculty-directed study with additional formal basic science and clinical lectures. RESULTS Aggregate higher scores were observed when ABSITE results for the directed study period were compared with those observed during the independent study period in mid-level resident years (postgraduate year [PGY] 2 to 4 a problem-based learning conference,[18] a multidisciplinary surgeon-directed integrated learning platform,[19] review textbooks, weekly reading assignments, and slide and audio reviews integrated within an online LMS was made available to postgraduate year (PGY a mandatory focused academic support program (with individual mentoring, personal learning plan, review session, self assessment, and feedback),[20] and individualized study plans.[21]a program was initiated to improve American Board of Surgery In-Training Exam (ABSITE All noted significant improvement in examination scores.

Use of the CREOG Test Item Summary booklet as an educational resource has been previously shown to improve CREOG ITE scores. After a resident-created study guide based on the test Item Summary booklet was introduced, improvement in CREOG ITE scores across residency levels 2-4 and across all topic areas was noted.[13] Our study utilized wiki as an interactive medium for effective and collaborative review of the CREOG Test Item Summary booklet. With significant improvement in CREOG ITE scores, our results further validate the value of the booklet while also demonstrating the potential of utilizing wiki as an educational tool.

The importance of the CREOG ITE also stems from its predictive value for board certification. Previous studies have shown a statistically significant correlation between CREOG ITE scores and both outcomes and scores on the American Board of Obstetrics and Gynecology (ABOG) written examination. Lingenfelter et al[15] noted that residents with a CREOG ITE score of at least 200 predicted successful performance on the ABOG written examination while Spellacy et al[22] found that scores less than 190 were associated with an increased risk of failing. Similar correlations have also been documented between the In-Training Examination (ITE) performance in Internal Medicine and predicting American Board of Internal Medicine Certifying Examination (ABIMCE) scores[23]and who had also taken at least one ITE.\\n\\nMEASUREMENTS: Scores for the composite and subspecialty sections of the ITE were compared with those for the ABIMCE. An R2 was obtained to relate the scores on the two examinations. A cutoff score was derived to maximize the ability of the ITE to discriminate between residents who were likely to pass and those who were likely to fail the ABIMCE.\\n\\nMAIN RESULTS: ABIMCE scores were available for 109 residents who had also taken the ITE during PGY-2 (19[24] as well as for the American Board of Surgery In-Training Exam (ABSITE) and the qualifying examination of the American Board of Surgery.[25–27]the American Board of Surgery In-Training Examination (ABSITE

The strength of our study is that data was collected among the same pool of residents who took the CREOG ITE through all three years (2012-2014). Paired t-test showed statistical significant improvement between scores from 2012 and 2013 among individual resident scores. This analysis demonstrates that resident scores improved significantly without the mean of the group in 2013 being excessively skewed by a few outliers.

There are also limitations to this study. It is a prospective cohort study performed at a single institution with a small sample size

and short duration so the resulting significant improvement in CREOG ITE scores may not be applicable to other residency programs. The Wiki software also had a relatively steep learning curve and uploading tables and images was difficult. In addition, the wiki required a large amount of oversight and administration by the resident champions. These resident champions were tasked with running the Wiki, monitoring entries, editing entries, and leading the review sessions. This likely contributed to decreased champion effort and ultimate loss of resident interest. However, it is important to note that newer Wiki platforms make posting and editing entries much easier. While our study utilized wiki as our main interactive medium, we also implemented student-led lectures and a Jeopardy-styled quiz game. This design does not allow us to distinguish among the impacts of this multi-faceted approach.

Conclusion

Based on the analysis of level-specific CREOG in-training exam scores, we were able to demonstrate a positive and significant correlation between targeted education activity and improved CREOG ITE scores. Therefore, the use of the CREOG Test Item Summary booklet to identify high yield questions can help improve performance on the CREOG in-training exam when used in a structured manner.

Now that we have demonstrated the value of the wiki project, we hope our residents will show renewed interest and that we can revive the CREOG wiki-project. Currently, we have a similar project using Dropbox but it does not allow for the same level of collaboration as the wiki project. We hope that the use of a more user-friendly wiki platform will remove one of the major barriers to resident participation.

Conflict of Interest

None of the authors identify any conflict of interest.

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