Educational Videos: An Effective Tool to Improve Training in Interventional Breast Procedures

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Abstract

Purpose: Using the iPad application Explain Everything™, the authors created a "how to" video for stereotactic breast core biopsy to enhance their breast imaging curriculum. The objective was to show that video integration into residency training enhances resident learning.

Methods: A pretest was provided to all 40 radiology residents (postgraduate years 2-5) at the authors' institution. The test included 20 questions on the video content, 15 similarly framed control questions on material that was not included in the video, and four demographic questions. Questions were randomly ordered, and trainees were not informed that both types of questions were included. Residents were given one week to watch the 20-minute video before completing a posttest that included the same 35 content questions presented in a different order. Three logistical questions were also included. Results for the video and the control questions were analyzed separately and compared.

Results: Thirty of 40 residents (75%) participated (6-9 residents each year). The average scores for the video and control pretest were 7.7 of 20 (38.5%) and 7.8 of 15 (52%) and for the posttest were 13.8 of 20 (69%) and 7.8 of 15 (52%), respectively. This corresponds to a 30.7% mean improvement on the video-content questions compared with a 0% improvement for the control test ($P < .001$). Similar improvement was seen across all four postgraduate years and on an individual level.

Conclusions: This instructional video added significantly to resident learning in the short term. Further study on the long-term role of educational videos in radiology residency training seems warranted.

Key Words: Mobile technology, electronic media, radiology education, interventional radiology, stereotactic core biopsy

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INTRODUCTION

Radiology education is evolving to incorporate new technologies and new methods of teaching that target a digital generation of students who prefer to learn new material through interaction and collaboration [1]. Traditional forms of teaching and learning, such as at the PACS workstation and through didactic conferences, are being reevaluated and reimagined to address these changing needs. Mobile technology has been the primary focus of this shift, as an increasing number of trainees are using mobile technology in their learning. A recent survey from 2012 revealed that 74% of radiology residents across the country have smartphones and 37% own tablet devices [2]. Likely, this number has already grown.

Other areas of medicine are including multimedia resources into their educational curricula and are seeing improvements in resident performance [3-6]. To respond to this changing landscape, the Division of Breast Imaging at our institution is also beginning to incorporate multimedia into the resident and fellow curriculum that is accessible through our hospital intranet and can be watched on any mobile device. One project was to create a set of videos describing

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common breast imaging procedures that simulate teaching that currently occurs at the workstation, in the procedure room, and in conference using the iPad application Explain Everything™ (New York, NY). Currently, our breast imaging curriculum is fairly standard and includes 32 didactic sessions per year, each 45 min in length, as well as apprenticeship-style training during the clinical day. Our residents and fellows participate in nearly all cases through supervised interpretation, management planning, reporting of screening and diagnostic cases, planning and performing procedures, communication with patients, and presenting at conferences. Our hypothesis was that these educational videos would help standardize and improve the traditional resident experience and would help ensure that all residents complete residency with the same knowledge base. Although there has been increased discussion regarding incorporating this technology into radiology education, few research studies have assessed these methods to determine whether they actually contribute to the learning process. In our study, we attempted to measure whether these new digital tools have a role in the resident educational curriculum.

The first video created was an instructional video on performing a stereotactic core biopsy. The objective of this study was to show that this video improved resident learning above and beyond the traditional approaches and potentially should be incorporated into the curricula of other sections and other departments as well.

METHODS

The study was deemed exempt by the institutional review board.

The instructional video we evaluated was on how to perform a stereotactic core biopsy. One of the section's fellowship-trained breast imaging radiologists created and narrated the video using Explain Everything. This video walks trainees through the preparation and performance of the procedure as though they are working on the case in real time. It reviews the indications for stereotactic core biopsy, the equipment used, preprocedure planning, and the procedure itself, while reinforcing new terminology, including *stage*, *pass*, *differential*, *stroke*, and *stroke margin*. Images and videos from real cases as well as schematics are used to demonstrate key points.

This study was performed using a pre- and posttest format, administered before and after watching the instructional video. Given the size of our residency program and the desire for all the residents to watch the video, we were unable to designate a control group that would not be shown the video. Therefore, we opted to use a control set of questions instead.

As part of the educational curriculum, a voluntary untimed pretest was provided to all 40 radiology residents (postgraduate years [PGY] 2-5) at our institution using SurveyMonkey® (SurveyMonkey, Palo Alto, California). The residents were asked to complete the test on their own time before the next joint resident session, which took place 1.5 weeks later. After the pretest, residents were granted access to download and watch the stereotactic core biopsy video on their own time. Each resident was permitted to watch the video as often as desired before the joint resident session, at which time the posttest was administered. The residents were not aware that a posttest would be administered. They were asked not to use any outside resources to help answer the questions for either the pre- or the posttest. This was considered a "closed book" test.

The pretest included 35 questions, of which 20 questions were based on the content of the video (Appendix 1), and 15 similarly framed control questions were based on material that was not included in the video (Appendix 2). Questions were written by breast imagers involved in this study (J.P., T.S.M., I.T.) under the direction of a coauthor (P.J.S.) who has 10 years of experience writing test questions for medical student examinations, educational surveys, and continuing medical education and self-assessment module questions as well as for a national certification examination. In addition, we asked four basic demographic questions. Questions were randomly ordered, and trainees were not informed that both content and control types of questions were included. They were also not informed of the results of the pretest after they completed it. The posttest included the same 35 content and control questions presented in a different random order. Three questions on logistics were also included.

Results for the video and the control questions on both the pretest and the posttest were analyzed separately, as though they represented two separate examinations, and were compared to determine the educational value of this intervention. These results were not used as part of the overall resident evaluation for the program.

Descriptive statistics (mean and SD) were calculated for students' scores and for the number of students who answered each question correctly. The Wilcoxon signed rank test was used to evaluate the difference in improvement in the students' scores between video and control questions. The Mann-Whitney *U* test was used to