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A Peer-Reviewed Instructional Video is as Effective as a Standard Recorded Didactic Lecture in Medical Trainees Performing Chest Tube Insertion: A Randomized Control Trial

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OBJECTIVE: Online medical education resources are becoming an increasingly used modality and many studies have demonstrated their efficacy in procedural instruction. This study sought to determine whether a standardized online procedural video is as effective as a standard recorded didactic teaching session for chest tube insertion.

DESIGN: A randomized control trial was conducted. Participants were taught how to insert a chest tube with either a recorded didactic teaching session, or a New England Journal of Medicine (NEJM) video. Participants filled out a questionnaire before and after performing the procedure on a cadaver, which was filmed and assessed by 2 blinded evaluators using a standardized tool.

SETTING: Western University, London, Ontario. Level of clinical care: institutional.

PARTICIPANTS: A total of 30 fourth-year medical students from 2 graduating classes at the Schulich School of Medicine & Dentistry were screened for eligibility. Two students did not complete the study and were excluded. There were 13 students in the NEJM group, and 15 students in the didactic group.

RESULTS: The NEJM group's average score was 45.2% (±9.56) on the prequestionnaire, 67.7% (±12.9) for the procedure, and 60.1% (±7.65) on the postquestionnaire. The didactic group's average score was 42.8% (±10.9) on the prequestionnaire, 73.7% (±9.90) for the procedure, and 46.5% (±7.46) on the postquestionnaire. There was no difference between the groups on the prequestionnaire (Δ + 2.4%; 95% CI: −5.16 to 9.99), or the procedure (Δ −6.0%; 95% CI: −14.6 to 2.65). The NEJM group had better scores on the postquestionnaire (Δ + 11.15%; 95% CI: 3.74-18.6).

CONCLUSIONS: The NEJM video was as effective as video-recorded didactic training for teaching the knowledge and technical skills essential for chest tube insertion. Participants expressed high satisfaction with this modality. It may prove to be a helpful adjunct to standard instruction on the topic. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: chest tube, trauma, medical education, simulation, clinical medicine videos

COMPETENCY: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement

INTRODUCTION

In the last decade, there has been a paradigm shift in the delivery of medical education from a didactic, lecture-based approach, to active and self-directed learning models.[1] This change has been well-supported by the continued innovation and development of multimedia and web-based teaching resources. These allow for any-time, any-place, nonlinear access to an ever-growing body of medical knowledge.[2]

Several studies have shown that online medical education resources were as effective as traditional teaching methods and were generally preferred by the users.[3-6] Multimedia

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educational tools may offer several advantages over traditional teaching methods as they may be used as self-directed learning resources for acquiring technical skills. The online format promotes active learning as it allows users of any training level to learn at their own pace and interact with the material.[7] Furthermore, developing these resources typically require a one-time cost and can be disseminated across multiple institutions.[8] As such, online medical resources are now commonly used for both undergraduate and postgraduate medical education, as well as for continuing medical education.[9]

Over the past 8 years, the New England Journal of Medicine (NEJM) has been publishing a series of educational videos titled, "Videos in Clinical Medicine" that allow subscribers to watch common clinical procedures on a computer or mobile device.[10] These videos undergo vigorous peer-review for accuracy, are chaptered for easy reference, and provide a concise review of the procedure including indications, preparation, equipment, and potential complications. One of the publications in this series was on chest tube insertion.[11]

Chest tube insertion is an important procedural skill that is often introduced in Advanced Trauma and Life Support courses, but usually taught informally at the bedside or in a simulated environment.[12] All of these scenarios typically consist of a small group of learners led by an instructor who demonstrates the procedure on a real patient or an artificial simulation model. The effectiveness this method of information delivery relative to a peer-reviewed, standardized educational video has yet to be explored. As such, the purpose of this study was to determine whether a peer-reviewed, online procedural video on chest tube insertion[11] is as effective as a recorded didactic teaching session.

MATERIALS AND METHODS

Study Design

A randomized control noninferiority trial was used to evaluate the effectiveness of an online procedural video on chest tube insertion by comparing it to a video-recorded didactic teaching session. In consultation with several experts and the literature, a list of important indications, contraindications, materials required, and complications was generated. Additionally, a checklist of the important steps in chest tube insertion was derived. The Health Sciences Research Ethics Boards at The University of Western Ontario and at The University of Toronto and Sunnybrook Health Sciences Centre approved this study.

Study Setting and Population

This study was conducted at the Schulich School of Medicine & Dentistry, Western University, London, Ontario, Canada. An e-mail was sent inviting the graduating class of fourth-year medical students to participate. There are between 165 and 171 graduating students each year. To be eligible, participants only needed to be in their final year of medical school. A volunteer sample of 30 students was recruited.

There were 2 cohorts of students who completed this study. One cohort was collected in April 2013 and a second cohort collected in April 2014. Participants were recruited from 2 subsequent graduating classes to generate an adequate sample size and also to improve external validity. Participants were randomized into one of the 2 study arms, in a block randomization format. Those wishing to participate were asked to sign up for an available appointment that spanned a 2-week range. Participants were excluded if they were unwilling or unable to provide informed consent, or if they were previously enrolled in the study.

Description of Videos

The NEJM video was approximately 16 minutes in length. It provides an overview of the steps, indications and contraindications of the procedure, equipment required, key procedural steps, and potential complications. The information is delivered in a structured format with graphical animations and overlays. The procedure is also performed using a cadaveric model and on a real patient.

The didactic lecture was delivered by a certified Advanced Trauma and Life Support instructor for 17 minutes. It shows a small group of students with an instructor, an artificial model, and there is a 2-way dialog between then students and instructor. The lecture was filmed from the perspective of a trainee to ensure that every participant in the control group was exposed to the same demonstration. The format used is similar to online podcasts or recorded lectures that students are typically provided in their regular medical school curriculum.

Study Protocol

Two research assistants, both of whom were medical students, ran all participants through the study protocol. Consent was obtained and participants were asked to document previous exposure to both actual and simulated chest tube insertion on a standardized preintervention form. An online random sequence generator randomized participants to either the didactic video group (control) or the NEJM video group (intervention). A unique quick response code identifier was also generated and attached to the participant's file. One group watched the video of didactic teaching for chest tube insertion and the second group watched the NEJM video on chest tube insertion. The unique quick response code provided participants access to their assigned video when scanned on a dedicated tablet device. Both research assistants were blinded to assignment and were responsible for filming and retrieving materials for participants.