Evaluation of a Computer-Based Educational Module for Improving Anesthesiology Resident Knowledge in Ultrasound-Guided Regional Anesthesia

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Abstract

Background: While the dramatic increase in the total number of outpatient surgeries over the last 20 years, utilization of regional anesthesia as an anesthetic modality has expanded for a variety of reasons, including better preoperative pain control and reduction of postoperative nausea and vomiting. Anesthesiologists have an interest in ultrasound-guided regional anesthesia. The ability to learn ultrasound for anesthesiologists is limited by the lack of widespread accessibility, multidimensional, interactive curriculum capable of teaching regional anesthesia and ultrasound-guided techniques to anesthesiology residents and physicians.

Methods: To avail anesthesiology residents in learning regional anesthesia the opportunity to make it part of their daily practice, an ultrasound-guided regional anesthesia interactive learning program was created. As part of the pathway, a pretest, assessing the individual learner’s current level of knowledge in the area of regional anesthesia begins the learning session. The program itself is broken down into 2 upper extremity regional anesthesia modules, each module about the anatomy, indications, limitations, and clinical pearls involved in each approach by utilizing a variety of modalities including text and multimedia (still photos and cine ultrasound images of actual regional anesthesia techniques). A post-test questionnaire follows to assess each learner’s assimilation of the material, which acts as a form of continuing medical education activity. In addition, a final questionnaire surveys each learner (of methods) of learning, assesses the program’s effectiveness and allows feedback for improvements to future versions of the program.

Results: The program targeted resident anesthesiologists at the University of Florida. Data from this cohort of medical professional learners (n=88) utilizing the program was collected from the pretest, post-test and survey questionnaires. Response rate was 21%. Data from pretests and post-tests showed that resident knowledge of the anatomy of the brachial plexus was only correct about 55% of the time in the pretest but improved to 82% in the post-test. Also, data from the pretests showed the resident knowledge of ultrasound was only correct 58% of the time in the pretest but improved to 85% in the post-test. Of the respondents, 84% agreed that the computer-based format worked well for them as a learning tool and 82% would like to see further learning modules in the program. 85% of the respondents learned best from a textbook on the subject and only 46% agreed that they learned best from lecture format.

Conclusions: The first version of the computer-based learning program was welcomed by the residents. This resident anesthesia education offered at the University of Florida as a learning tool for regional anesthesia training. Many insightful suggestions were received to improve the didactic nature of the program from this same group of residents. Future improvements and adjustments will continue as the hope is to make the program available online to anesthesiology professionals outside the University of Florida where it will receive evaluation from these professionals as they use the program.

Introduction

A computer-based PowerPoint module was developed to introduce the core content items using anatomical drawings, photographic surface anatomy, ultrasound images taken from the real-time practice of regional anesthesia and the literature. The program is self-paced and includes opportunities for knowledge application and learner self-assessment. The learning modules were limited to upper extremity blocks (interscalene and suprascapular) approaches to the brachial plexus (representative images from the PowerPoint module are shown below). The PowerPoint module was tested with resident physicians in the University of Florida Anesthesiology residency program (n=68). A detailed study protocol was developed and received UF IRB approval.

Methods

In brief, participants included all of the UF anesthesiology residents at all levels of training (CA-1 through CA-3). Study participants were provided with a CD containing the computer-based PowerPoint learning module. At the beginning of the module, study participants were asked to complete an ultrasound and regional anesthesia knowledge pretest. Since no validated educational instruments for this particular assessment were available and were beyond the scope of this project to develop and validate, the pre- and post-tests were adapted from examples from the ASA In-Training Exam, the literature, the guidelines for regional anesthesia fellowship training.

Since no previous study like this appears to be available for comparison, only descriptive statistical analysis can be used to report the baseline characteristics of the survey participants. For both the pretest and the post-test, answers to questions posed were recorded as correct or incorrect. The percentage of correct answers were reported as percent correct. Survey questionnaire answers were recorded using a Likert scale.

Results

Of the 68 study packets distributed to UF Anesthesiology residents, only 21% (n=14) of the residents completed the forms to participate in the study.

Pretest questions which specifically addressed knowledge of the brachial plexus anatomy demonstrated that only 55% of respondents answered those questions correctly. For pretest questions which probe resident knowledge in the area of ultrasound physics and application to regional anesthesia, 53% of the respondents answered the questions correctly.

Post test questions, addressing essentially similar brachial plexus anatomy questions as the pretest, showed that residents answered the questions correctly 82% after viewing the PowerPoint CD module. Post-test questions probed resident knowledge of ultrasound and regional anesthesia and showed that residents answered the questions correctly 85% after viewing the PowerPoint CD.

Survey results showed that 84% of respondents agreed that the computer-based learning format worked well for them and 82% would like to see further teaching in that format. It is clear that the residents are very technology-oriented since 100% of respondents liked having the CD for their own use and 92% would like to see the format on an internet website. Not surprisingly, only 31% of these same respondents felt they learned best from textbooks and only 48% agreed that they learned best from a lecture format. 85% of responding anesthesiology residents agreed that they learn best from a one-on-one teaching format.

Conclusions

Evidence suggests that while the long established apprenticeship model for teaching anesthesiology residents regional anesthesia is the traditional method from which residents continue to learn, it is no longer sufficient to ensure competency in regional anesthesia. The emergence of ultrasound-guided regional anesthesia has introduced new challenges for regional anesthesia educators. New educational systems need to be developed to ensure competency in all the traditional methods as well as these newer technologies utilized in the performance of regional anesthesia. The present study would suggest that current anesthesiology residents at the University of Florida favor an asynchronous computer-based learning methodology for ultrasound-guided regional anesthesia over textbook or lecture format in addition to the ongoing one-on-one teaching at the patient’s bedside.

References