Telemedicine as a Potential Medium for Teaching the Advanced Trauma Life Support (ATLS) Course

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OBJECTIVES: The advanced trauma life support (ATLS) course has become the international standard for teaching trauma resuscitation skills. The 2 to 2.5 days course is usually offered as an on-site teaching experience. The present project assesses the potential for applying telemedicine technology to teaching ATLS by distance learning.

DESIGN: Two groups of equally trained first-year family practice residents were randomly assigned to a standard on-site ATLS course or one delivered by telemedicine. The 2 courses were compared by evaluating post-ATLS multiple-choice question test performance, instructor evaluation of student skill station performance, overall pass rate, participant rating of each component of the course, and overall feedback on the educational quality of the course (rating scale 1-4).

RESULTS: The mean scores for the 2 groups (with the standard ATLS and with the telemedicine, respectively) were not statistically significantly different: post-ATLS multiple-choice question—89.69% vs 85.89%; pass rate for the course was the same for both models; instructor overall evaluation of student skill station performance—3.12 vs 3.00; and participant overall feedback on all components of the course—3.67 vs 3.91.

CONCLUSIONS: Our results suggest that telemedicine technology could be successfully applied to teaching ATLS courses. (J Surg 70:258-264. ©2013 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: trauma education, ATLS, telemedicine, skills teaching

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

INTRODUCTION

Since its inception in the 1970s as a Nebraska state program,[1] the Advanced Trauma Life Support (ATLS) course has grown and expanded to become the international standard for teaching trauma resuscitation skills, with over 60 countries involved and over 1.5 million physicians trained worldwide.[1-3] Its educational, cognitive, attitudinal, and trauma outcome effects have been well documented.[4,5] With each roughly 4-year revision of the course, its content[6] and mode of delivery have been modified, including increasing emphasis on interactivity[7] and the use of simulators.[8,9]

Although the ninth edition of the ATLS course contains an online e-learning option for the delivery of the lecture content, the entire course has generally been conducted with all faculty and students congregating at one specific site. For most of the course participants and some faculty, this requires travel cost and time commitment away from their location of practice which could negatively affect enrollment, especially for rural communities with limited physician staff coverage which was the initial target of the ATLS course.

Telemedicine is gaining wide acceptance as a medium for distance learning and teaching.[10,11] This technology not only provides opportunity for training but also allows delivery of emergency care through the conduct of life-saving procedures under the guidance and supervision of experts from distant sites.[12]

The ATLS subcommittee of the American college of surgeons was approached by the Arizona ATLS faculty who expressed interest in the telemedicine model for delivering ATLS teaching to rural physicians. The ATLS subcommittee authorized a pilot project conducted by us to test the feasibility and effectiveness of telemedicine as a

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medium for teaching ATLS. This paper describes our experience with exploring the role of telemedicine in ATLS teaching.

MATERIALS AND METHODS

Protocol and the Groups

After approval of the Ethics committee of our institution, members of the first year family practice medicine resident class at the University of Toronto who had all completed the same standard undergraduate medical curriculum were invited to participate in the project. From the list of potential participants, 32 students were randomly chosen and further randomly assigned to either a standard 2-day ATLS course (control group) or a course involving telemedicine teaching (telemedicine group). Initially there were 16 students in each group but at the last moment 2 students in the telemedicine group did not participate and we felt it was too late to replace them. These 2 students exercised the option in the signed consent form of withdrawing voluntarily from the project.

Both the telemedicine and standard ATLS courses were of 2 days duration using the 2-day schedule from the ATLS manual and using the rotation alternative no. 3 schedule for the skill stations on day 1.[2] To keep both the courses of similar duration and to avoid time as a confounding variable affecting outcome, we followed the same time frames for all the lectures and skill stations as outlined in the ATLS manual.

For the telemedicine course, 2 ATLS instructors and a coordinator, with all skill station equipment including the TraumaMan surgical skills manikin and 2 cameras, were located at the designated telemedicine group site and 2 instructors were located at the telemedicine transmission port.

For the standard ATLS course, the usual 7 faculty and course coordinators participated with lectures and skills stations on site. The lecture schedules for both courses were as listed in the ATLS manual, and all lectures for the telemedicine group were delivered by the 2 instructors at the telemedicine transmission port.

For the telemedicine group, half of the skill stations were conducted by the local instructors at the designated student site and the other half were conducted by faculty at the telemedicine transmission port. The rotations which we planned for these skill stations in the telemedicine group are detailed in Table 1 (day 1), Table 2 (early day 2), and Table 3 (end of day 2). Because of the 2 participants who did not attend, students no. 15 and no. 16 slots were left vacant. We chose this schedule and staffing option so as to maintain similar time schedules for both courses. Other schedule options and possible rationales are outlined in the discussion section of the manuscript.

Data Analysis

All participants completed the same ATLS multiple-choice question (MCQ) pretest. Another 40-item ATLS MCQ posttest was used in both courses and the scores were expressed as percentage. The means were compared for the 2 groups by unpaired t-test with a p value of ≤ 0.05 being considered statistically significant.

Each of the evaluations completed by the faculty and students was graded on a 4-point scale. In the faculty evaluation of student skill station performance, the scale was (1) incomplete/repeat; (2) incomplete/remedial; (3) successful; and (4) instructor potential. In the participant evaluation of the different components of the course as well as the educational quality of the course, the scale was (1) poor; (2) fair; (3) good; and (4) very good. The mean scores were computed and compared by unpaired t-test for the groups with a p value of < 0.05 being considered statistically significant.

RESULTS

MCQ Performance

Table 4 shows the means and standard deviation (SD) of the percentage scores in the post ATLS test for both groups, with the 95% confidence intervals. In each group there was 1 student that did not reach the 80% pass mark and they both passed on a remedial written test. Unpaired t-test comparison of the means yielded a p value of 0.091.

Participant Feedback on the Different Components of the Course

Table 5 summarizes the results of the Likert Scale mean scores for each component of the course as rated by the participants from each group, as well as the p values obtained by unpaired t-test analysis. There was no statistically significant difference in the student mean rating of the different components for the 2 versions of the course with an overall mean score of 3.76 (SD = 0.16) for the standard course and 3.74 (SD = 0.24) for the telemedicine course (p value = 0.062).

Participant Assessment of the Educational Value of the Course

Table 6 summarizes the results of the comparison of the 2 courses by the students with no statistically significant difference in the ratings. An overall mean rating for the standard course was 3.67 (SD = 0.50) and 3.91 (SD = 0.30) for the telemedicine course (p = 0.20).

Evaluation of Skill Station Performance by Instructors

These results are summarized in Table 7. The initial assessment test station, mean scores of 3.38 (SD = 0.50)