Pilot Study: a Novel Approach to Case-based Instruction of Medical Students Using Simulation Education

Tanner Jugler, University of Arizona College of Medicine-Phoenix; Jennifer Hartmark-Hill, MD, University of Arizona College of Medicine-Phoenix

Abstract

This project was designed to determine preference of medical students regarding simulation education in case based instruction (CBI) compared with the traditional Power Point lecture CBI. Analysis (via T-test) of preference of simulation vs. traditional CBI between intervention and control groups was performed through pre- and post-surveys. Enjoyment of the simulation activity was determined to be higher post-simulation activity in the intervention group compared to the control group. This study suggests that students who have experienced a simulation CBI enjoy them more compared to the traditional CBI and are more agreeable to changing the current model of case-based instruction. Potentially, this project sets up further studies to determine effective ways to implement simulation into medical school curriculum.

Introduction

Despite well-validated studies elucidating the value of simulation education in the clinical 3rd and 4th years of medical school as well as in Resident education, the first and second year basic science curriculum remains an underdeveloped opportunity for pre-clerkship education and preparation. Simulation education has shown to have a positive impact on resident education, and assessments of simulation education for medical residents via core competencies have been developed to further improve the experience. Implementing medical simulation into pre-clinical basic science medical education is important in order to establish an active learning environment which has been documented to have positive results on learning.

Offering first and second year medical students the opportunity to participate in simulation activities allows them the chance to learn through many different modalities in a safe environment leading to a more effective learning activity. The hypothesis of this study is that students will prefer to participate in a simulation activity compared to a traditional small group lecture activity with preference determined by enjoyment and possibility of performing better on exams.

Image 1. Example of Syndaver™ knee used in the simulation event.

Methods

Event: Subjects in this study were 1st, 2nd, 3rd, and 4th year medical student volunteers who were recruited with IRB flyers through emails. The subject attended one 3 hour simulation event at the Health Science Education Building on the University of Arizona – Phoenix campus. There were a total of 18 participants. 1st, 2nd, 3rd, and 4th year students were represented in each group. They were divided into equal number control and intervention groups via blind randomization. Each participant filled out a paper pre-survey. The control group was subjected to a traditional power point case based instruction activity. They were presented a fictional patient with musculoskeletal complaints on the power point and had a faculty facilitator leading the discussion. They were instructed to form learning objectives as well as present them.

The intervention group participated in the simulated version of the same case based instruction. The group obtained a history and physical from simulated patients. The simulated patients were manikins voiced by simulation center employees. After obtaining the history and physical, the subjects discussed the case with their facilitators and what steps should be taken next. They were given the same lab values and imaging as the control. The team then discussed the findings, developed learning objectives, and discussed treatment plans for the patient. Upon completing the treatment plan they were then instructed to perform an arthrocentesis on a Syndaver™ knee in the simulation center. They were able to practice the procedure as many times as needed and they received guidance from the facilitator.

After both groups had finished their activity, both groups were given a post-survey.

Surveys: Both the pre- and post-surveys were focused on learning styles and enjoyment of simulation events. The questions were asked on a 5 point scale, 1 being 'not at all agree' and 5 being 'completely agree'

Analysis: Scaled scores from the surveys were compiled for each group and post-test results from the control and intervention groups were compared. T-tests were used to determine statistical significance.

Table 1
Significant Group Statistics

	N	Mean	Std. Deviation	Std. Error Mean
I enjoy the traditional small group, power point version of CBIs				
Control Group	9	4.11	.928	.309
Intervention Group	9	3.11	.601	.200
I would prefer to do more CBIs as simulations because I would enjoy the learning method more than traditional CBIs				
Control Group	9	3.67	1.323	.441
Intervention Group	9	5.00	0.000	0.000
I would prefer that CBIs stay exactly as they are currently				
Control Group	9	2.78	.667	.222
Intervention Group	9	1.67	.500	.167

Table 1. Significant group statistics. This table shows the questions from the survey that were statistically significant from the t-tables analysis used. The questions that were significant were 'I enjoy the traditional small group, power point version of CBIs', 'I would prefer to do more CBIs as simulations because I would enjoy the learning method more', and 'I would prefer that CBIs stay exactly as they are'.

Table 2
Statistically Insignificant Group Statistics

	N	Mean	Std. Deviation	Std. Error Mean
I learn more from the traditional small group, power point version of CBIs than from classroom lectures				
Control Group	9	3.67	1.118	.373
Intervention Group	9	3.44	.882	.294
I would prefer to do more CBIs as simulations because I believe I would do better on tests compared to traditional CBIs				
Control Group	9	3.22	1.302	.434
Intervention Group	9	3.89	.928	.309
I would prefer to include Standardized patients into CBIs because I would enjoy the learning method more than traditional CBIs				
Control Group	9	2.89	1.691	.564
Intervention Group	9	3.56	1.130	.377
I would prefer to include Standardized patients into CBIs because I believe I would do better on tests compared to traditional CBIs				
Control Group	9	2.89	1.691	.564
Intervention Group	9	3.11	1.167	.389

Table 2. Statistically Insignificant Group Statistics. This table shows the survey questions that were not statistically significant when comparing post survey results of the control and intervention groups.

Results

The scaled scores were compiled for each question on the survey and post test results from the control and intervention groups were compared. Statistical analysis was performed using t-tests to determine statistical significance. Statistically significant results are included in Table 1 and Table 2. Subjects in the intervention group differed significantly from the control group on 3 questions from the survey.
The first was 'I enjoy the traditional small group, power point version of CBIs'. Subjects in the control group (mean = 4.11) indicated statistically significant more enjoyment, with a p-value of .015, than the intervention group (mean = 3.11) in the post-survey.

The next significant question from the survey was 'I would prefer to do more CBIs as simulations because I would enjoy the learning method more than the traditional CBIs'. The intervention group (mean = 5.00) differed significantly with a p-value of .008 from the control group (mean = 3.67). They indicated a preference toward more CBIs as simulations because of enjoyment of the learning method over traditional CBIs.

The last significant question from the post-survey was 'I would prefer that CBIs stay exactly as they are currently'. The intervention (mean = 1.67) and control groups (mean = 2.78) differed significantly with a p-value of .001. The control group indicated a stronger preference to keep CBIs exactly as they are when compared with the intervention group. Suggesting that after having experienced a simulated CBI the intervention group is more open to changing the format of CBIs.

Discussion and Conclusions

The Purpose of this study was to determine if medical students would prefer to simulated CBI activity over a traditional PowerPoint, facilitator lead CBI. Preference was to be determined by the enjoyment the students experienced during the simulation portion and whether they believed the simulation activity would be beneficial for future test taking.

The data from the study show that the students in the intervention group, after having the experience of the simulation activity, found the simulation CBI more enjoyable compared to a traditional CBI and felt more strongly that the current traditional CBI could be changed. This suggests that because the students were able to experience a more enjoyable model of case based instruction, they were more open to the idea of changing the current CBI model to possibly a model with more integration of simulation. Future opportunities for study include integration of the simulated version of the case-based instruction into the curriculum in order to quantifiably determine the effect on memory, recall and exam scores, compared with the traditional model.

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