Nurse Education Today 79 (2019) 129–134

Contents lists available at ScienceDirect

Nurse Education Today

journal homepage: www.elsevier.com/locate/nedt

Effect of case study versus video simulation on nursing students' satisfaction, self-confidence, and knowledge: A quasi-experimental study

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ARTICLE INFO

Keywords:
Simulation
Classroom
Didactic
Pre-licensure nursing education
Video
Case study

ABSTRACT

Background: Research on simulation in nursing education has demonstrated the positive impact active, experiential learning has on student satisfaction, self-confidence, and knowledge. As a result, simulation laboratories with high-fidelity human patient simulators have become a common adjunct to clinical teaching. It is important to also promote active learning in the classroom setting; however, there is limited evidence on using video simulations in large classrooms.

Objectives: This study sought to determine if using a video simulated unfolding case study as part of the didactic classroom, as compared to a traditional written case study, improved students' satisfaction, self-confidence, and knowledge.

Design: A two-group, quasi-experimental design was used.

Settings: The study occurred at a University in the southeastern United States.

Participants: A total of 165 baccalaureate nursing students participated.

Methods: The control group received a written case study, while the intervention group received video simulation of the same case study and student satisfaction, self-confidence, and knowledge were measured upon completion. Data analysis used descriptive statistics and *t*-tests. Qualitative comments were also provided by students and analyzed for themes.

Results: There were no statistically significant differences, with both groups reporting a high level of satisfaction and self-confidence. The percent of knowledge questions answered correctly was higher for the video simulation group for all seven questions. Four themes were identified from participant words: A better understanding, Able to apply learning to a patient scenario, Engaged in learning, and Visualizing it helps.

Conclusions: Results suggest the use of video simulation in the classroom may deepen students' understanding of classroom content and provide an additional mode for learning to enhance classroom lecture. Use of video simulation to augment classroom teaching is suggested as a strategy for engaging learners.

1. Introduction

Simulation has been shown to improve nursing students' satisfaction, self-confidence, and knowledge (Cant and Cooper, 2017; Crowe et al., 2018; Merriman et al., 2014; Rode et al., 2016; Shin et al., 2015). Experiential learning most often occurs outside the classroom in the simulation laboratory and clinical settings (Berndt et al., 2015; Carson and Harder, 2016). To better assist students to transfer didactic content to these settings, it is imperative that active learning also occur in the classroom (Benner et al., 2010; Carson and Harder, 2016; Kim and Kim, 2015). However, there are challenges to active learning in the classroom, such as large class sizes, shortage of space and resources, and the need for educator training related to active learning facilitation (Berndt et al., 2015; Carson and Harder, 2016). This often results in content delivery without application exercises, promoting a disconnect and challenge in connecting classroom content to actual care of patients (Benner et al., 2010). It is essential to identify strategies for promoting active learning in the classroom so students are better prepared to provide safe and effective patient care (Lisko and O'Dell, 2010; Mahoney et al., 2013). This study sought to determine whether using a video simulated unfolding case study in the classroom, as compared to a traditional written case study, would improve students' satisfaction, self-confidence, and knowledge.

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https://doi.org/10.1016/j.nedt.2019.05.015
Received 13 November 2018; Received in revised form 30 March 2019; Accepted 8 May 2019

2. Background/literature

Kolb's theory of experiential learning supports the acquisition of knowledge through reflection and conceptualization in an active learning environment (Lisko and O'Dell, 2010). Active, experiential learning techniques have been shown to improve nursing students' clinical reasoning and ability to apply knowledge to patient care situations (Kubin et al., 2013; Russell et al., 2013). Pre-licensure nursing education strives to prepare students to provide safe and effective patient care as they transition to practice. However, research demonstrates new graduates are not adequately prepared when they begin their professional career, and this results in patient care errors and intent to leave the profession (Cochran, 2017; Goode et al., 2016; Laschinger et al., 2016; Spector et al., 2015; Spector et al., 2017). It is vital for nurse educators to develop active teaching strategies for promoting and enhancing clinical reasoning in pre-licensure nursing students.

Educators must address the theory to practice gap to ensure new graduate nurses are prepared for practice (Carson and Harder, 2016; Wagner, 2014) and to ensure positive outcomes both for new nurse transition, as well as patient safety (Mariani and Doolen, 2016; Thomas and Mraz, 2017). Simulation is commonly utilized to assist students and new graduates to bridge theory and practice. Simulation provides active, experiential learning and promotes application of classroom content to patient care situations. Merriman et al. (2014) found that clinical simulation was more effective than classroom lecture when teaching nursing students assessment skills and clinical reasoning to determine if a patient is deteriorating. Further, Thomas and Mraz (2017) explored how simulation affected the transition from student to new graduate nurse and found simulation and debriefing improved new graduates' ability to make clinical decisions, solve problems, and clinically reason through complex patient care situations.

Simulation is a commonly utilized active learning strategy in nursing education. Research on simulation in nursing education has focused on active learning with students rotating from the classroom to simulation laboratory (Berndt et al., 2015), didactic teaching followed by simulation (Crowe et al., 2018), and use of unfolding case studies in the simulation laboratory (Edwards et al., 2018). While active learning outside of the classroom is important, active learning must also occur in the classroom setting. However, classrooms are often used as a way to deliver content and there is a lack of accompanying application exercises (Benner et al., 2010), contributing to the theory-practice gap. Because active learning has been shown to increase student satisfaction, self-confidence, knowledge, and ability to use clinical reasoning (Gibson et al., 2015; Kavanagh and Szweda, 2017; Kim and Kim, 2015), it is important to promote it in the classroom as well. Increased confidence in knowledge acquired in the classroom translates into increased self-confidence in nursing practice (Kavanagh and Szweda, 2017; Thomas and Mackey, 2012). It has also been shown that using simulation in collaboration with classroom lecture improves student knowledge and confidence when caring for complex patient populations (Crowe et al., 2018; Munroe et al., 2016; Reime et al., 2016).

As simulation has been shown to improve student outcomes, integrating it into the classroom would be one method of bringing active learning to this setting. However, there are challenges to bringing simulation to the classroom; such as the need to transport expensive and heavy simulation manikins and equipment, as well as space constraints. Use of realistic video simulations may have the potential to provide an experiential component to classroom learning. Research has shown learning can occur through observation of simulations in the classroom (Rode et al., 2016), supporting this study's aim of investigating the effect of a classroom-based video simulated unfolding case study on students' satisfaction, self-confidence, and knowledge. As few studies have investigated integrating simulation into the lecture portion of a nursing course, this study addresses this knowledge gap in nursing education.

3. Methods

3.1. Purpose and design

The purpose of this two-group, quasi-experimental study was to evaluate the effect of using a video simulated unfolding case study as part of the didactic classroom, as compared to a traditional written case study, on students' satisfaction, self-confidence, and knowledge. An unfolding case study was introduced into the didactic portion of a nursing course in two formats; one written and one simulated via video.

3.2. Sample and setting

Convenience sampling was used to obtain a sample of pre-licensure baccalaureate nursing students from a four-year University in the southeastern United States. Inclusion criteria were: enrolled in Clinical Applications and Reasoning III in the third semester of the nursing program. The study was conducted in two phases. In phase 1 (Fall 2017), 85 students in their second to last semester of nursing school served as the control group. In phase 2 (Spring 2018), 80 different students in their second to last semester of nursing school served as the intervention group. The study intervention and data collection occurred in the assigned classroom of the University and took place over a 4-week period from August to September 2017 and from January to February 2018.

3.3. Intervention

The control group received lectures each class period, with the written unfolding case study integrated into each class. The case study was presented via PowerPoint on the screen in the classroom. The intervention group received the same class lectures each class period with a pre-recorded simulation of the same unfolding case study followed by a structured debriefing integrated into each class. Both groups received a copy of the written case study at the end of the module for review and study purposes.

The written unfolding case study was created to align with content discussed in the classroom each week of the 4-week cardiac module. Information about the patient “Mr. Parker”, his medical history, medications taken, and reason for being admitted to the hospital were all provided in the first scenario of the case study. As the case study unfolded, the patient progressed through a series of cardiac related episodes and experienced several diagnostic tests that culminated in surgery for coronary artery bypass. The case study detailed shift report between nurses, SBAR reporting from nurse to doctor, a cardiologist visit to explain a surgical procedure, and nurse education related to the various procedures he was scheduled to undergo. The case study was written by the primary investigator and reviewed by experts in cardiology nursing. Once the written case study was completed, it was given to the University simulation team to transfer it into a simulation scenario.

The pre-recorded simulated case study was developed in collaboration with Certified Healthcare Simulation Educators with application of Standards of Best Practice: Simulation℠ from the International Nursing Association for Clinical Learning and Simulation (INACSL Standards Committee, 2016). The written case study was converted into a 4-stage unfolding simulated case study. Each stage contained targeted learning objectives that guided the recorded segments of the simulated case study. When deciding on simulation modality, it was determined that use of a standardized patient would best depict the selected didactic cardiac content in a simulated format.

Prior to recording the simulated case study, the written case study was converted into a production format given the theatrical nature of the intervention. The production format contained the case study chronology, standardized patient scripts, video start/stop cues, moulage, and equipment settings. The standardized patient was moulaged

for each phase of the simulation to include makeup to depict a dusky skin color, a central line affixed on the neck, and a pleur-e-vac connected to a chest tube taped to the chest. The simulated case study was recorded in a high-fidelity acute care simulation laboratory which was equipped with a hospital bed, headwalls with simulated oxygen and suction, patient monitor, telephone, sink, storage, workstation on wheels, and customary disposable supplies at the bedside (oxygen delivery devices, suction tubing, and IV therapy devices). Three additional actors were included in the simulation as embedded participants (two nurses and a cardiologist). The patient monitor displayed vital signs, telemetry waveforms, and oxygen saturation. A high-fidelity manikin-based computer program connected to a virtual patient was used to replicate written case study patient vital signs, heart rhythm, and oxygen saturation. A University video service recorded the scenarios and provided editing services to ensure consistency with the written case study. The standardized patient and embedded participants were compensated for their time using grant funds. Upon completion, the simulated case study was presented to the intervention group according to the same didactic schedule that the written case study was presented to the control group in the prior semester. Both the written case study and the simulated case study were presented by the primary investigator. The content and unfolding scenarios embedded in both formats were identical; the only difference was the control group received the information in written format without accompanying visuals to portray the patient and associated nursing care, while the intervention group was able to visualize the patient and associated nursing care on the screen in the front of the classroom.

3.4. Dependent variables and instruments

To measure the dependent variables, satisfaction and self-confidence in learning, the National League for Nursing (NLN) Student Satisfaction and Self-confidence in Learning Scale (SSSLS) was used. Measurement of these variables is supported by Bandura's Social Cognitive Theory which states an individual's belief in their own efficacy can significantly affect both motivation and performance (Bandura and Locke, 2003). Permission was obtained from the NLN to use the scale, which consists of 5 items to measure satisfaction and 8 items to measure self-confidence. Cronbach's alpha is reported at 0.94 for satisfaction items and 0.87 for self-confidence items (NLN, 2017). It was originally planned to administer the SSSLS to each group at 3 time points (pre-test, mid-test, and post-test) to assess for changes. However, participants reported the scale items were confusing for use during the pre-test and mid-test, and this data was incomplete and could not be evaluated. The research team re-evaluated the SSSLS and determined it was worded more appropriately for post-test data collection; thus, only post-test satisfaction and self-confidence scores were compared for the 2 groups.

To measure the dependent variable knowledge, the post-test also consisted of 7 scenario-based application level questions which were developed by the primary investigator. The 7 multiple choice items were developed based on the content provided in the case study. Finally, participants were also asked to respond to 2 open-ended questions on the post-test: “Please describe how integration of the case study in the cardiac module has affected your learning” and “Do you have anything else you would like to add related to the case study?”

3.5. Data collection procedures

The study commenced following institutional review board approval at the University. Participant recruitment and obtainment of informed consent occurred during the first course meeting of the semester in August 2017 (control group) and in January 2018 (intervention group), and was performed by a member of the research team who did not have a teaching role with participants. Students were informed their participation in data collection was voluntary and were required to provide their consent if they wished to participate. Data collection occurred using Qualtrics©, and participants were asked to use their laptop or iPad to access either the control group or intervention group study site in Qualtrics© as assigned by semester enrollment. Both Qualtrics© sites were identical but group data was collected and stored separately to ensure accuracy. Upon entering the Qualtrics© pre-test study site, participants in each of the groups provided informed consent and completed the pre-test SSSLS (not used in analysis). No demographic information was collected to protect participant confidentiality.

The study intervention was then implemented over a 4-week period (from August to September 2017 for the control group and from January to February 2018 for the intervention group) during classes focused on the care of cardiac patients. The intervention consisted of lecture supplemented with a written unfolding case study (control group) in Fall 2017 versus a pre-recorded unfolding case study simulation using standardized actors (intervention group) in Spring 2018. All students received the same course content and case study (either written or simulated). Half-way at 2-weeks, data collection occurred again via Qualtrics© for the mid-test SSSLS (not used in analysis). Then when the intervention was complete at 4 weeks, the post-test was administered to each group (in September 2017 for the control group and in February 2018 for the intervention group) and consisted of the SSSLS, 7 knowledge questions, and 2 open-ended questions.

3.6. Data analysis

All quantitative data analysis was conducted utilizing SPSS. Data was directly transferred from Qualtrics© to SPSS. Descriptive statistics were used to evaluate individual items on the post-test SSSLS and *t*-tests were used to identify statistically significant differences between the two groups. Next, the 5 SSSLS items measuring satisfaction were summed to provide overall satisfaction scores (maximum score possible was 25), and the 8 SSSLS items measuring self-confidence were summed to provide overall self-confidence scores (maximum score possible was 40). Descriptive statistics were used to present overall post-test scores on each of these sub-scales for the two groups and to determine if there were statistically significant group differences on the post-test, *t*-tests were used. Significance level was set at $p < 0.05$. Group results for the 7 knowledge questions were assessed using descriptive statistics. Specifically, the percent of participants in each group who answered each multiple-choice question correctly was compared. Finally, the open-ended items were analyzed for themes by two researchers. Each researcher independently identified themes and then the researchers met to discuss and finalize the themes gleaned from the open-ended questions.

4. Data/results

A total of 165 participants consented to participate. Of the 89 students invited to participate in the control group (Case Study Group), 85 consented to participate for a participation rate of 96%. Of the 86 students invited to participate in the intervention group (Video Simulation Group), 80 consented to participate for a participation rate of 93%.

4.1. Satisfaction results

Results for each of the 5 satisfaction items revealed a high level of satisfaction (range 4.15–4.51). There were no statistically significant group differences for any of the individual satisfaction items; however, scores were noted to be higher on all 5 items for the Video Simulation Group. Overall satisfaction score for the Case Study Group was 21.47 and for the Video Simulation Group was 22.03. Although overall satisfaction was higher for the intervention group, this was not a statistically significant difference ($p = 0.32$). See Table 1.

Table 1
Satisfaction scores.

	Group1: case study (n = 85) Mean (SD)	Group2: video simulation (n = 80) Mean (SD)	Mean difference G2–G1	*p* value
Item 1	4.47 (0.796)	4.51 (0.551)	+0.04	0.69
Item 2	4.31 (0.802)	4.33 (0.708)	+0.02	0.87
Item 3	4.32 (0.889)	4.49 (0.696)	+0.17	0.16
Item 4	4.22 (0.956)	4.33 (0.759)	+0.11	0.45
Item 5	4.15 (1.018)	4.35 (0.843)	+0.20	0.18
Total[a]	21.47 (4.064)	22.03 (2.966)	+0.56	0.32

[a] Maximum total score = 25.

4.2. Self-confidence results

For 7 out of the 8 self-confidence items, results revealed a high level of self-confidence (range 4.00–4.38). Scores for item #8 were 3.76 and 3.95. There were no statistically significant group differences noted for any of the individual self-confidence items, and higher scores were observed in the Video Simulation Group for 4 of the 8 items. Overall self-confidence score for the Case Study Group was 33.70 and for the Video Simulation Group was 33.75. Although overall self-confidence was slightly higher for the intervention group, this was not a statistically significant difference ($p = 0.95$). See Table 2.

4.3. Knowledge results

The percentage of participants who answered the multiple-choice questions correctly on the post-test was higher for the Video Simulation Group for all 7 questions. For all 7 questions, the Video Simulation Group scored 0.19% to 5.09% higher than the Case Study Group. Further, on 3 of the questions, the percent who scored correctly was 5% higher for the Video Simulation Group than for the Case Study Group. See Table 3.

4.4. Open-ended question results

There were 4 themes identified from participant words: *A better understanding*, *Able to apply learning to a patient scenario*, *Engaged in learning, and Visualizing it helps*. Participants in both groups commented that the case study (either written or via video) improved their understanding of content addressed in class. The case studies "helped to pull together concepts and interventions" [Control Group] and "help me remember certain concepts by thinking back" [Intervention Group].

More often, participants commented on how the case study (either written or via video) helped them "think more critically" [Control Group and Intervention Group]. Participant comments revealed they were satisfied with the case study technique they received because it

Table 2
Self-confidence scores.

	Group1: case study (n = 85) Mean (SD)	Group2: video simulation (n = 80) Mean (SD)	Mean difference G2–G1	*p* value
Item 1	4.00 (0.939)	4.04 (0.665)	+0.04	0.77
Item 2	4.38 (0.723)	4.33 (0.632)	−0.05	0.63
Item 3	4.21 (0.822)	4.33 (0.591)	+0.12	0.33
Item 4	4.34 (0.733)	4.36 (0.601)	+0.02	0.84
Item 5	4.32 (0.727)	4.24 (0.680)	−0.08	0.47
Item 6	4.38 (0.740)	4.29 (0.766)	−0.09	0.45
Item 7	4.29 (0.721)	4.23 (0.711)	−0.06	0.54
Item 8	3.76 (1.031)	3.95 (0.840)	+0.19	0.21
Total[a]	33.70 (5.243)	33.75 (3.658)	+0.05	0.95

[a] Maximum total score = 40.

Table 3
Knowledge questions.

	Group1: case study (n = 85) Percent correct	Group2: video simulation (n = 80) Percent correct	Percent difference G2–G1
Question 1	68.75%	70.37%	+1.62%
Question 2	85.00%	85.19%	+0.19%
Question 3	40.00%	41.98%	+1.98%
Question 4	91.25%	96.30%	+5.05%
Question 5	87.50%	92.59%	+5.09%
Question 6	85.00%	86.42%	+1.42%
Question 7	92.50%	97.53%	+5.03%

"helped me practice putting what I learned to a real situation" [Control Group] and "allowed us to integrate the material we were learning in class to a live situation" [Intervention Group]. This also improved self-confidence in their nursing abilities: "I like being able to think about it as a real clinical situation instead of just memorizing information- it makes it more like real life and what we would encounter as a nurse and makes me feel more confident in my ability as a nurse" [Control Group] and "It gave me an idea of what could happen in a clinical setting as well as how to effectively deal with the scenario" [Intervention Group].

Use of a case study (either written or via video) was viewed as a helpful way to engage students in learning. In the Control Group, the case study was described as "a fun learning activity in class to break up a long lecture." Participants in the Intervention Group felt the video simulation "enhanced my learning experience" and "appreciated that a new method of learning was introduced!"

The fourth theme, *Visualizing it helps*, was gleaned from comments provided by participants in the Intervention Group (Video Simulation Group). The words "see" and "visualize" were repeatedly included in participant comments in this group. Participants expressed how being able to visualize the patient and associated nursing care improved their learning: "it added another element of learning and was interesting" and "it has enhanced my learning experience." One participant stated: "seeing an actual situation helped me to connect all the little details from each PowerPoint and make more sense of how to visualize it in the clinical setting." Finally, some participants revealed "I am a visual learner" and thus, they valued this teaching strategy.

5. Discussion

Findings revealed student participants were highly satisfied and self-confident following both the written case study and video simulation interventions. Both offered the same content and were designed to encourage clinical reasoning. This indicates that use of both a written and video simulated case study in the classroom enhanced satisfaction and self-confidence in learning for the participants. Although there was no statistically significant difference between the groups for satisfaction or self-confidence, knowledge scores for the video simulation group indicated there may have been a deeper understanding of the content. However, because the knowledge questions created for this study were not pilot tested, item reliability was not determined and tests to detect statistically significant differences were not conducted indicating the need for further investigation. A noted difference between the two groups was found in the participant comments. The intervention group's written comments showed increased engagement in learning through visualizing the patient and associated care. Addressing the different learning styles of nursing students can improve engagement in the classroom, understanding of complex content, and visualization of applying content to clinical practice (Carson and Harder, 2016). In our study, student participants in the video simulation group specifically commented on how being able to visualize the scenario was helpful and engaging, with it being particularly helpful to visual learners.

This study compared two strategies for active learning in the

classroom; using a video simulated unfolding case study versus a traditional written case study. Participant comments indicate video simulation may promote increased student engagement and particularly benefit visual learners. Interestingly, during study implementation, other potential benefits of video simulation were realized. In the study, video simulation in the classroom allowed for participation in simulated cardiac patient care during the regularly scheduled class meeting time. Literature suggests simulation in the classroom has potential benefits over simulation in the laboratory; such as eliminating the need for organizing student groups to attend the simulation laboratory and for separating active student participants in the simulation from student observers, as well as increasing availability of valuable laboratory space (Carson and Harder, 2016; Edwards et al., 2018; Kim and Kim, 2015; Mahoney et al., 2013). Based on current simulation practices at our institution and simulation best standards (INACSL, 2016), to rotate the entire class through the laboratory for cardiac simulations to complement classroom content would have required approximately 17 groups of 5 students to be organized to attend the simulation laboratory for a minimum of 1 h with a debriefing of up to 30 min for each group. This would have prevented use of laboratory space by other students for approximately 25 h of time, and also would have required 25 h of faculty time. Although preparation of the unfolding case study, development of the simulation by certified simulation educators, and recording of the video simulation required time at the onset, it is now saved electronically and can be implemented into the course each semester without requiring additional preparation time. There is convenience that results from a teaching and learning tool that is video recorded because it can be utilized repeatedly for different student cohorts without incurring additional expenses. Bringing simulation to the classroom via a video recorded unfolding case study is another option that requires less equipment, fewer faculty resources, and can accommodate an entire class of students at one point in time. Although cost and faculty time considerations support use of video simulations in the classroom, it is important for future studies to compare them to simulations in the laboratory setting in terms of student outcomes.

5.1. Limitations

A limitation was our planned use of the SSSLS at 3 time points to also evaluate for changes within the participants over the length of the 4-week intervention. After the first group of participants completed the pre-test, they reported the scale items were unclear for a pre-test when an intervention had not yet occurred. Participant confusion prompted many incomplete survey responses on the pre-test and mid-test. Therefore, these 2 time points were excluded from data analysis for both groups and changes could not be assessed over time as planned. Scale reliability was assessed during analysis of SSSLS post-test data and Cronbach's alpha was found to be 0.92 for satisfaction items and 0.89 for self-confidence items, demonstrating a high level of internal reliability for using this scale as a post-test measure. Therefore, the findings of overall high satisfaction and self-confidence levels following both the written case study and video simulation are reported, as the primary aim of this study was to compare two groups of students who received different interventions in the classroom.

Additional limitations included no demographic data collection, use of knowledge questions created by the primary investigator and not pilot tested, and recruitment of participants who were students of the primary investigator. Demographic data was not collected in order to protect participant confidentiality, but this prevents group comparisons related to participant characteristics to assess for group differences. Next, the knowledge questions were created for use in this study and were not pilot tested; thus, reliability was not determined and statistical analyses to detect group differences were not conducted. Finally, the students may have opted to participate or may have altered their responses in an attempt to please the primary investigator, who taught the course and implemented both the written case study and video simulated case study. Effort was made by the primary investigator to follow a detailed outline when teaching the course to ensure content delivered to both groups was comparable with as little deviation as possible.

6. Recommendations

Based on the findings of this study, we recommend both written case studies and video simulations for use in classrooms as a way to engage students and encourage active learning. Further research should be conducted on video simulations in the classroom and should seek to detect changes over time. Also, because the percent of participants who answered the knowledge questions correctly was greater in the video simulation group for all 7 questions, effect on knowledge acquisition should be further investigated because application of knowledge learned in the classroom is essential to safe and effective patient care.

7. Conclusions

In conclusion, the use of unfolding written case studies, video simulated case studies, and other forms of active learning in the classroom is recommended to enhance nursing students' satisfaction, self-confidence, and knowledge. In particular, use of video simulation in the classroom may deepen students' understanding of class content, helps to engage learners, and can alleviate some of the challenges to scheduling large student cohorts in the simulation laboratory.

Acknowledgements

The authors would like to thank James Madison University's Media Production Services for their assistance in the videography for this project.

Funding

This work was supported by Sigma Theta Tau International through the Joan K. Stout, RN Research Grant.

Ethical approval

This study was approved by the IRB at James Madison University.

Declaration of Competing Interest

None.

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