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Clinical Simulation Laboratories: Bridging the gap between academia and the private care hospital setting.

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Abstract

Many academic medical programs present students with the chance to experience scenario based learning. This is often achieved through the use of clinical simulation laboratories which utilize computer-based scenarios that realistically imitate the human body and how it responds to various situations. This interactive style of learning has proven to be successful at integrating theories taught in textbooks and practice gained through clinical experience without posing any harm to human patients. Literature has shown documentation of the effectiveness of using clinical simulation laboratories in both the academic and clinical setting; however, some clinical facilities have been slow to adapt the use of this technology. The purpose of this study was to determine what factors are deterring the use of clinical simulation labs for the purpose of continuing education in the hospital setting. The study was limited to the field of respiratory therapy. The study was conducted by sending surveys to respiratory therapists and administrators working in acute care facilities in the Northeast region of Tennessee and the Southwest region of Virginia. The surveys included various questions concerning knowledge and perceptions of clinical simulation labs. The surveys were coded using a modified Likert scale, and the data was input into SPSS Version 18.0. Sample *t*-tests were then run where appropriate. Therapists indicated a preference for learning through the use of clinical simulation labs as opposed to learning through textbooks alone. Administrators

indicated a knowledge of the benefits of clinical simulation labs even though the majority are not currently using the technology in their facilities.

CHAPTER 1

INTRODUCTION

Purpose of the Study

The purpose of this study is to determine the reasoning behind the lack of advancement in the use of human simulation based learning in the hospital environment.

Significance of the Study

Research Questions

Three research questions guide this study:

1. Why are clinical simulation laboratories not utilized more for the continuing education of respiratory therapists?
2. Why are hospital administrators reluctant to start using clinical simulation labs?
3. What are the attitudes of respiratory therapists who have used clinical simulation labs concerning their effectiveness for furthering education and knowledge?

Assumptions

This study assumes that all information provided through the surveys is truthful data. The study also assumes that simulation experience outcomes which have shown to be successful in the academic setting will carry over into the private hospital setting and be successful there as well.

Limitations

This study had several limitations. The study was limited to Wellmont Health System medical group. The study was further limited to the region of Northeast Tennessee and Southwest Virginia where the hospitals included are located. The study was also limited to

practice of clinical simulations in the single allied health field of respiratory therapy. This being said, results obtained from this study cannot be transferred to any other field of practice in medicine or generalized in regard to any other geographical location.

Definitions

- Clinical Staff: a licensed Certified Respiratory Technician or Registered Respiratory Therapist
- Healthcare Administrators: Respiratory Therapy Directors, Education Directors, COOs, CFOs, CEOs, and Directors or Vice Presidents of Patient Care/Clinical Services
- Real-life Scenario Based Modules: synonymous with clinical simulation training
- Respiratory Therapy Director: the single supervisory member of the hospital respiratory therapy department under whose direction capital budgets are developed

CHAPTER 2

REVIEW OF THE LITERATURE

History of Simulation in the Medical Field

The modern use of simulation for clinical training can trace its roots to the field of anesthesia. One of the first known mannequin simulators was created in the early 1960s at the request of anesthesiologist Dr. Bjorn Lind. The mannequin was designed to teach and evaluate the skills required for cardiopulmonary resuscitation (CPR) and was named Resusci-Anne.

The next milestone in the history of clinical simulation occurred just a few years later in the mid-1960s with the invention of the first computer controlled simulator. The mannequin, named Sim One, was created to train anesthesia residents in the art of endotracheal intubation and then evaluate their skills. The mannequin was controlled by a digital/analogue computer that was able to perform chest excursion on breathing, open and close the jaw, dilate and constrict the pupils, and open and close the eyelids. Due to the high cost of production and limited knowledge of potential uses, the prototype of Sim One was the last to be constructed.

The next innovation for clinical simulation came with the invention of a part-task trainer named Harvey who was capable of simulating twenty seven different cardiac conditions. The system was first introduced in 1968 but didn't become popular until several years later. The first research studies conducted to evaluate the effectiveness of clinical simulators were carried out using Harvey. These studies were published in the late 1980s. (Cooper & Taqueti, 2004)

Types of Clinical Simulators

There are many different types of clinical simulators currently being used around the world. They range in fidelity from basic computer programs with no physical mannequin to work on to systems that include a full-scale human body capable of mimicking a vast array of

physiological responses with the help of multiple computer systems. Several different classification systems exist for clinical simulators, but for the purpose of this study there will be four major classification groups that will be discussed in detail in the following section. They are part-task trainers,

Part-task trainers are a category of simulators that focus on one portion of an environment as opposed to the environment as a whole. Most often, part-task trainers are designed to replicate a part of the human body. One advantage of part-task trainers is the ability to focus all attention on one part of the body. This can be very beneficial when trying to teach basic skills to someone who is relatively new in their particular field. Another advantage of part-task trainers is their relatively low cost when compared to other types of simulators. One disadvantage is that many models are not capable of reacting to the actions of users. Another downside to part-task trainers is that they rarely offer performance feedback for users. This could be a unacceptable trait for some administrators considering the purchase of a simulation system for their facility because simulators are often highly valued because of their ability to provide feedback, both positive and negative, to users as a way to help them learn more from the simulation experience.

The second major type of clinical simulators is computer based systems. These simulators utilize a computer interface to display different types of the environment being simulated. Computer based programs are relatively inexpensive and offer performance feedback for the user.

Virtual Reality simulators are a more advanced version of computer based systems. This type of simulator has the ability to offer haptic feedback which allows users to experience what it would feel like to use various instruments on a patient. Virtual reality simulators vary in fidelity and cost depending on the system.

The most advanced type of clinical simulators is known as integrated simulators. These simulators combine computer based programs with either part or whole body mannequins to provide the most realistic experience for the user. Integrated simulators can either be instructor-driven or computer-controlled. (Schatz 2007)

Simulation Use in Medical Emergency Team (MET) Training

DeVita et al. (2005) conducted a study at The University of Pittsburg Medical Center Winter Institute for Simulation Education and Research to investigate the impact a simulation training course would have on medical emergency team (MET) performance. The study participants consisted of sixty-nine critical care nurses, twenty-one respiratory therapists, and forty-eight physicians who were all Advanced Care Life Support (ACLS) trained. The participants went through a training process which consisted of a PowerPoint presentation, a didactic lecture session, three of five pre-programmed simulation scenarios, and a debriefing session. The participants were videotaped during their simulations to aid in the debriefing sessions. The MET team members were divided into groups of 10-20 participants for each of the simulation sessions. The simulation scenarios were designed with two key components for assessment. The first was the ability to manage all airway, breathing, circulation, and neurological problems (ABCD) effectively within the first minute of the scenario. The second assessment tool was the ability to recognize and deliver the definitive therapy (DT) required by the patient within the first three minutes of the scenario. In order for the patient to survive, ABCD had to be performed effectively in the specified time limit. The overall simulator survival rate from the first session was 0%. By the third session, the survival rate had increased to 90%. (DeVita, Schaefer, Lutz, Wang & Dongilli, 2005)

Chapter III

REASEARCH METHOD

Research Design

This study sought to conclude whether or not clinical simulation laboratories should be utilized to provide further education for respiratory therapists in the acute care hospital setting. Through the use of surveys, the study will determine the knowledge and attitudes of respiratory therapists regarding the effectiveness of clinical simulation labs for continuing education and determine how those beliefs differ from those of health care administrators. The study will also evaluate the knowledge of health care administrators regarding the costs of utilizing clinical simulation labs and the space availability at their respective hospitals.

Methods

Population

The population for this study was comprised of twenty healthcare administrators and seventy-six respiratory therapists employed by acute care hospitals in the Northeast Tennessee and Southwest Virginia region during the fall of 2011. Employees of rehabilitative and psychiatric facilities were excluded from the study.

Data Collection

After receiving IRB approval from East Tennessee State University and the hospitals taking part in the survey, two surveys were used to gather data. One survey was designed to ascertain the knowledge and opinions of healthcare administrators and managers at each of the facilities included in the study. (See Appendix II for this survey). The second survey was sent to respiratory therapists to determine their knowledge and perceptions. (See Appendix III for this

survey.) Using the method of Dillman as described by Byington (2003), cover letters explaining the study, surveys, and stamped return envelopes were sent to acute care facilities in the target population. (See Appendix I for the cover letter sent with each survey.) Follow-up for administrators will be conducted using the protocols outlined by Dillman. All returned questionnaires were coded using a Liger scale (4=Strongly Agree, 3=Agree, 2=Disagree, and 1=Strongly Disagree) and input into SPSS Version 18.0.

Research Questions

The study is driven by the following research questions:

1. Why are clinical simulation labs not utilized more for the continuing education of respiratory therapists?
2. Why are hospital administrators reluctant to start using clinical simulation labs?
3. What are the attitudes of respiratory therapists who have used clinical simulation labs concerning their effectiveness for furthering education and knowledge?

Data Analysis

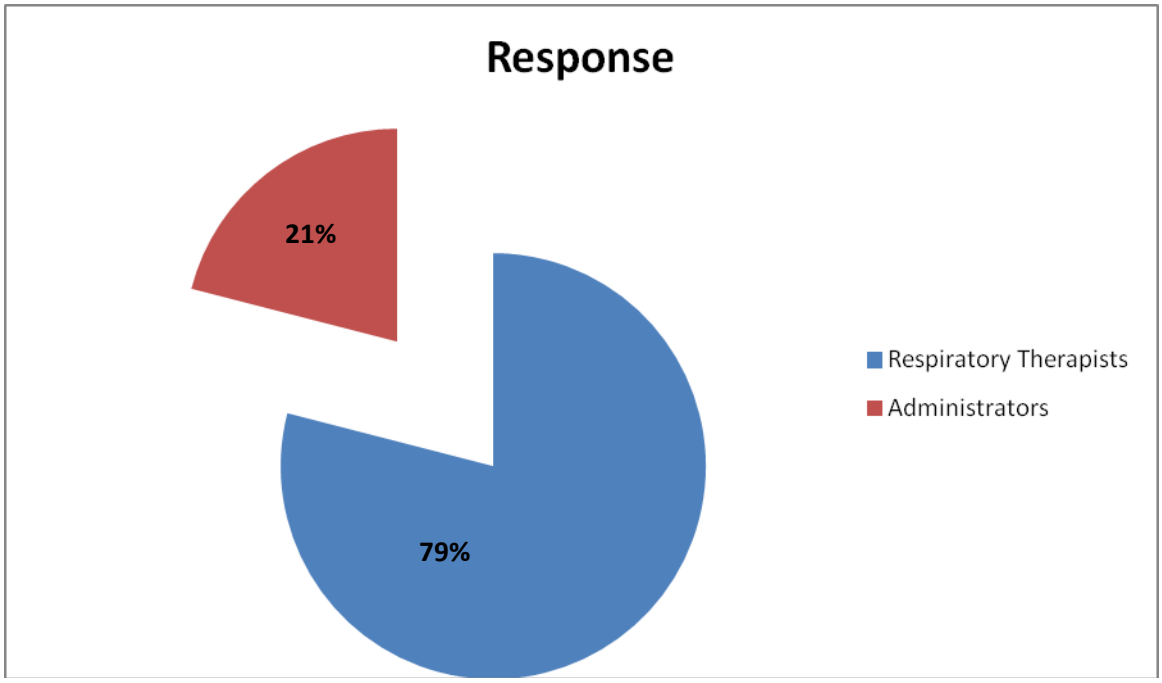
The use of descriptive statistics will make it possible to determine the perceptions of administrators and clinical staff concerning the use of clinical simulation laboratories as continuing education tools. The statistics being used will include mean value and frequency distributions of each of the questions from the administrative and clinical staff surveys.

Chapter IV

Findings

The data was collected during February of 2011. Two hundred and fifty clinical staff surveys were sent out along with fifty administrator surveys. Ninety-seven clinical staff surveys were returned, and twenty administrator surveys were returned.

Table 1. Breakdown of Survey Responses



The following research questions guided this study: Why are clinical simulation laboratories not utilized more for the continuing education of respiratory therapists? Why are hospital administrators reluctant to start using clinical simulation labs? What are the attitudes of respiratory therapists who have used clinical simulation labs concerning their effectiveness for furthering education and knowledge?

Why are clinical simulation laboratories not utilized more for the continuing education of respiratory therapists?

Several questions from the surveys were used to evaluate this question. To evaluate the awareness of use of clinical simulation labs for continuing education, question 3 from the administrator survey and question 1 from the clinical staff survey were examined. There was a mean response rate of 3.34 which falls between the agree and strongly agree categories. A sample *t*-test was run and indicated that there was no significant difference between the responses of administrators and respiratory therapists (p=.589)

To determine whether or not therapists and administrators perceive clinical simulation laboratories as an effective tool for creating better patient outcomes, question 4 from the administrator survey and question 3 from the clinical staff survey were evaluated. The mean response rate was 3.51 which again fell between the agree and strongly agree categories. This time the sample *t*-test revealed a significant difference between the response of therapists and administrators (.026). The mean response rate of administrators was 3.75, and the mean response rate of clinical staff members was 3.45.

Why are hospital administrators reluctant to start using clinical simulation labs?

Sixty percent of the administrators who responded to the survey signified that they are not currently offering the use of clinical simulation laboratories to their therapists. Several questions on the administrative survey were evaluated in an attempt to answer the above research question.

Patient Safety

Two questions from the administrative survey targeted the administrator's perceptions of the ability of clinical simulation lab use to increase patient safety. Question 8 assessed the administrator's perception of increased awareness of changes in patient conditions as a result of participating in clinical simulation laboratories. The mean response was 3.8 which falls between the agree and strongly agree category. Question 9 asked whether or not administrators thought there would be a reduction of errors in patient care as a result of clinical simulation lab use. The mean response was 3.55 which again falls between agree and strongly agree. These two questions indicate that administrators believe using clinical simulation laboratories as continuing education tools for their respiratory therapists would result in increased patient safety.

Regulatory Compliance

Question 5 on the administrative survey was developed to determine whether or not administrators knew that the use of clinical simulation laboratories addresses standards that have been set in place by JCAHO. The mean response was 3.33 which indicated that administrators were aware of the continuing education requirements that are in place and that using clinical simulation labs would satisfy those requirements.

Availability of Existing Simulation Laboratories

It is possible that administrators were not offering the use of clinical simulation laboratories because they were unaware of the availability in the area. Question 2 on the administrator survey assessed the knowledge of availability of clinical simulation laboratories in the Tri-Cities Metro Area. The mean response was 3.33 which indicated that administrators are aware of the availability.

Startup Costs and Readiness for Change

Question 6 on the administrator survey was intended to determine whether or not administrators had performed a cost analysis of starting a clinical simulation laboratory in their facility. The mean response was 3.5 which indicates that administrators have considered the costs associated with initiating clinical simulation labs in their facilities.

Question 7 on the administrator survey assessed the perceptions of administrators concerning space availability for a clinical simulation lab in their facility. The mean response was 2.2, but it is important to note that the question was phrased in a negative way ("space is not available"). This indicated that administrators believe space is available in their facilities.

To assess readiness for change, question 10 on the administrator survey asked if they believed the benefits of having a clinical simulation lab would outweigh the costs associated with it. The mean response was 3.25 which fell between agree and strongly agree. Question 14 on the administrator survey asked if the decision not to have a clinical simulation laboratory was based on the capital investment involved. The mean response was 1.90 which fell between strongly disagree and disagree. This indicated that cost was not the reason administrators have not utilized clinical simulation laboratories.

What are the attitudes of respiratory therapists who have used clinical simulation labs concerning their effectiveness for furthering education and knowledge?

Sixty-nine percent (*n=53*) of respiratory therapists who responded to the clinical staff survey indicated that they have participated in clinical simulation laboratories. Questions 5-9 on the clinical staff survey assessed their opinions concerning their experiences with clinical simulation laboratories. Table 2 shows their responses.

Table 2. Clinical Staff Preference

Clinical Survey Question	Mean Response
The use of clinical simulation lab training is a good way for respiratory therapists to maintain competency in their practice.	3.26
I believe that clinical simulation training should be one method used by my hospital to help me maintain competency in their practice.	3.32
Clinical simulation training is more effective than a lecture and review training mode for clinical education and competency review.	3.17
My most recent clinical simulation experience did not enhance my learning.	1.72

Chapter V

Conclusions

In Conclusion, the findings of the study indicate that respiratory therapists prefer simulation laboratories over lecture and review styles. The study also showed that administrators are moving past an awareness stage but are still choosing not to adopt this technology. They indicated a belief that the benefits would outweigh the costs and the use of clinical simulation laboratories would increase the safety of their patients. Given all of this information, the study concluded that the gap between use of clinical simulation labs in the academic setting and the private care hospital setting will continue to exist for the near future.

APPENDIX I

Cover Letter

CEO or Therapist

Hospital Name

Hospital Address

City, State, Postal Code

Methods for effective continuing education are evolving rapidly and the use of clinical simulation laboratories to provide training is increasing. While slow to be adapted, the use of clinical simulation as a training method is well documented in the literature and your voluntary participation in this research will give valuable insight into why adaptation of this technology is occurring slowly.

As an administrator or respiratory therapist at a Northeast Tennessee or Southwest Virginia hospital, you are asked to give your opinions regarding using this technology for continuing education in the hospital setting by completing and returning the attached survey. Your participation is completely voluntary, however in order for the researchers to understand issues facilitating and those inhibiting the use of clinical simulation laboratories in this region it is important that each of the surveys be completed and returned.

We would be happy to answer any questions you might have about this study and we may be contacted via e-mail at Keene@etsu.edu or ByingtoR@etsu.edu.

Thank you for your participation in this important study.

Dr. Shane Keene
Associate Professor Allied Health Sciences
Cardiopulmonary Science Program Director

Dr. Randy Byington
Associate Professor of Allied Health Sciences

APPENDIX II

Administrative Survey

1. The use of clinical simulation labs complements other methods for maintaining competency among respiratory therapists.

Strongly Disagree, Disagree, Agree, Strongly Agree

2. The benefits of a clinical simulation lab exceed the start-up cost of a clinical simulation lab for your facility.

Strongly Disagree, Disagree, Agree, Strongly Agree

3. There are clinical simulation labs available in the Tri-cities Metro Area available for use to provide continuing education.

Strongly Disagree, Disagree, Agree, Strongly Agree

4. I believe that the use of clinical simulation training can improve patient outcomes.

Strongly Disagree, Disagree, Agree, Strongly Agree

5. The use of clinical simulation training for demonstrating competencies addresses standards concerning National Patient Safety Goals issued by JCAHO.

Strongly Disagree, Disagree, Agree, Strongly Agree

6. I have considered the set-up and operation of a clinical simulation lab to provide continuing education opportunities for my facility's respiratory therapists.

Strongly Disagree, Disagree, Agree, Strongly Agree

7. I have read literature concerning clinical simulation labs used in the hospital environment.

Strongly Disagree, Disagree, Agree, Strongly Agree

8. The use of clinical simulation education will increased awareness of changes in patient clinical condition.

Strongly Disagree, Disagree, Agree, Strongly Agree

9. The use of clinical simulation will decrease the likelihood of human error in patient care.

Strongly Disagree, Disagree, Agree, Strongly Agree

10. The benefits of using a clinical simulation lab to provide continuing education for my staff respiratory therapists outweigh the costs associated with this method of training.

Strongly Disagree, Disagree, Agree, Strongly Agree

11. My facility currently uses clinical simulation laboratories to provide continuing education for respiratory therapists.

Yes_____No_____

12. Space is not available in my facility for the development of a clinical simulation laboratory.

Strongly Disagree, Disagree, Agree, Strongly Agree

13. Educators within the organization have approached our administration about starting a clinical simulation laboratory for our employees.

Strongly Disagree, Disagree, Agree, Strongly Agree

14. Our administration has considered the costs associated with human simulation laboratory training program and has decided not to make the capital investment.

Strongly Disagree, Disagree, Agree, Strongly Agree

APPENDIX III

Clinical Staff Survey

1. I am aware that some hospitals use clinical simulation lab training to provide continuing education.

   Strongly Disagree, Disagree, Agree, Strongly Agree

2. I prefer to learn from textbooks, lectures, and reviews rather than from real-life scenarios

   Strongly Disagree, Disagree, Agree, Strongly Agree

3. I believe that if I train using real-life scenario based modules it will lead to better patient outcomes

   Strongly Disagree, Disagree, Agree, Strongly Agree

4. Have you ever participated in clinical simulation lab training?

   Yes_____No_____

   *If your answer to question number 4 was **YES***, please answer the following:

5. The use of clinical simulation lab training is a good way for respiratory therapists to maintain competency in their practice.

   Strongly Disagree, Disagree, Agree, Strongly Agree

6. I believe that clinical simulation training should be one method used by my hospital to help me maintain my clinical competence.

   Strongly Disagree, Disagree, Agree, Strongly Agree

7. Clinical simulation training is more effective than a lecture and review training mode for clinical education and competency review.

   Strongly Disagree, Disagree, Agree, Strongly Agree

8. My most recent clinical simulation experience did not enhance my learning.

   Strongly Disagree, Disagree, Agree, Strongly Agree

References

Byington, R. (2003). Healthcare strategic management: The impact of state and federal funding levels on the implementation of strategic plans at Tennessee hospitals (Doctoral Dissertation) available at http://etd-submit.etsu.edu/etd/theses/available/etd-0819103-152940/unrestricted/ByingtonR090203f.pdf

Cooper, J. B., & Taqueti, V. R. (2004). A brief history of the development of mannequin simulators for clinical education and training. *Qual Saf Health Care*, *13*, i11-i18. doi: 10.1136/qshc.2004.009886

DeVita, M. A., Schaefer, J., Lutz, J., Wang, H., & Dongilli, T. (2005). Improving medical emergency team (met) performance using a novel curriculum and a computerized human patient simulator. *Qual Saf Health Care*, *14*, 326-331. doi: 10.1136/qshc.2004.011148

Schatz, S. (2007). *A survey of commercial medical simulators*. Informally published manuscript, University of Central Florida, Orlando, Florida. Retrieved from http://pegasus.cc.ucf.edu/~wangyan/esi6532/papers/ESI6532_SaeSchatz_paper.pdf