Clinical Simulation Laboratories: The Disconnect Between Their Application In Academic And Continuing Education Environments

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Abstract

Widely used in the academic preparation of respiratory therapists, the purpose of this study was to determine what factors deter the use of clinical simulation labs for continuing education of respiratory therapists in hospitals in Northeast Tennessee and Southwest Virginia. Using survey methodology, the project evaluated the perceptions of leaders in health care administration regarding the use of clinical simulation labs to determine if their opinions differed from those of respiratory therapists. The findings of this study indicate that respiratory therapists prefer to be engaged in learning activities provided for their continuing education, and that they believe that clinical simulation laboratories are a valuable technique that enhances their learning. While no differences were found between administrators and therapists regarding the awareness of the use of simulation lab training (alpha=.05, p=.589), administrators indicated significantly stronger beliefs regarding the efficacy of simulation lab training than did respiratory therapists (alpha= .05, p=.026). Surprisingly, administrators ranked the efficacy of simulation laboratory training higher than did respiratory therapists. The administrators responding have moved beyond the awareness stage of change and are actively engaged in evaluating the feasibility of providing training using this emerging technology.

INTRODUCTION

Technology has permeated most, if not all, societal institutions. Education is no exception and the use of technology in teaching has proven to be a viable method to enrich learning. Academic medical centers across the nation provide students with opportunities for scenario based learning real-time environments. These experiences often include clinical simulation laboratories with computer-based scenarios that replicate human pathology or the impact of trauma on the body. This interactive learning model has proven successful in academic medical centers and facilitates the integration of theory and practice without any potential harm to human life.

For example, nursing faculty at the University of Maryland-Baltimore use clinical simulations as a method to enhance learning. Researchers reported that these human simulation experiences provided nursing students with opportunities to improve patient management skills as well as improving nursing performance as part of an interdisciplinary healthcare team (Larew, Lessans, Spung and Foster, 2006). Gordon, Oriol, and Cooper (2004) reported that the use of human simulation provided an opportunity for medical students to practice medicine without risk to patients. The authors stated that “high-fidelity patient simulators--full body mannequin-robots that breathe, talk, blink, and respond like a real person--promise to play a revolutionary role in undergraduate medical education (p. 24).”

BACKGROUND

There are several reasons why the use of a clinical simulation laboratory could become an important part of competency and continuing education of clinical staff in healthcare facilities. Currently, if there are no simulation labs available for education the staff must rely on real-life patient clinical scenarios to learn or expand their patient care knowledge. Unfortunately, too often, clinical staff learns from their mistakes. Clinical simulation lab scenarios can mimic situations that are life threatening and then provide healthcare practitioners the opportunity to react and learn without the fear of failure or death. After each scenario debriefings can be used to evaluate the decisions made leading to a collaborative effort to review the correct path for patient treatment. These debriefings should result in better outcomes and increased skill and competency levels of the participating staff.

Society could benefit from healthcare staff using clinical simulation laboratories because it could produce a more confident, competent, and prepared health care worker. Healthcare facilities market image-based products that present the idea that they are the most competent programs in the community. Clinical simulation laboratories can help produce the competent healthcare worker found in marketing promotions.

Purpose of Study

The purpose of this study is to determine what factors impede the development of human simulation based learning in the hospital environment.

Significance of Study

The significance of utilizing clinical simulation labs in healthcare facilities is to educate clinical staff and to continue to elevate their potentials without having to involve realistic life situations. Clinical staff can learn to collaborate in a team fashion to treat patients in acute situations without the fear of death. The clinical simulation experience can identify potential problems and address them in a positive manner rather than these issues being addressed in a risk management environment. Clinical simulation labs will increase the confidence of the healthcare worker and create positive attitudes throughout the clinical staff and the health care facility they represent.

Research Questions

Three research questions guided this study: Why are clinical simulation laboratories not used more in the continuing education of respiratory therapists? Specifically why are hospitals slow to adapt this technology? What are the perceptions of respiratory therapists who use clinical simulation labs?

Assumptions

This study assumed that successful outcomes in academic settings will transfer to success in a private hospital based setting. The study further assumes that those who provide data that inform the study provide truthful data.

Limitations

This study was limited to hospitals affiliated with Wellmont Health System with corporate headquarters in Kingsport, Tennessee and facilities in Northeastern Tennessee and Southwestern Virginia This study was further limited to the use of clinical simulation in a single allied health profession-respiratory therapy. Results may not be transferrable, nor generalized to other geographic locations.

Definitions

Respiratory Therapy Director: for the purposes of this study a director is the single supervisory member of the hospital respiratory therapy department under whose direction capital budgets are developed.

Respiratory Therapist: a licensed Certified Respiratory Technician or Registered Respiratory Therapist.

Real-life Scenario Based Modules: synonymous with clinical simulation training.

Healthcare Administrators: for the purposes of this study includes Respiratory Therapy Directors, Education Directors, COOs, CFOs, CEOs and Directors or Vice Presidents of Patient Care/Clinical Services.

REVIEW OF THE LITERATURE

Gordon, Oriol, and Cooper (2003) stated that the use of human simulation to provide clinical experiences expanded during the decade of the 1990s. The authors reported that Harvard Medical School had successfully integrated simulation scenarios into their medical education. Their initial evaluations indicated that not only did the technique result in positive learning outcomes, but that it was “highly accepted and increasingly demanded (p. 23)”. They stated that, for some students, the simulations allowed “complex information to be understood and retained more efficiently than would be the case with traditional methods, favoring the development of expertise in the formative years (p. 24).”

As the technique becomes more widely used in healthcare settings, its use should be developed with realistic expectations. Hendriksen and Patterson (2007) wrote that it is reasonable to expect that the factors or advantages that made simulation a successful training mode for other high risk industrial settings should also make simulation similarly successful when found in the clinical setting. While it is logical to make this assumption, the authors stated that enthusiasm for this training technique should be tempered with realistic expectations for such training. The authors pointed out that the scenarios should be developed based upon relevant research questions, objectives matched to training objectives, and integration of the scenarios into the training curricula. The authors also stated that it might be of use to develop interprofessional training opportunities.

Simulation Labs in Nursing

Nursing educators have recognized the merits and advocate the use of hospital based simulation laboratories. Winslow, Dunn, and Rowlands (2005) indicated that nurses must be prepared to provide care for an increasingly complex set of clinical realities. Simulations laboratories are considered an adjunct method to validate continued clinical competencies and provide continuing education opportunities. The authors advocate the scarce resources available for continuing education drive the development of a shared simulation laboratory for use in the hospital setting.

Some institutions have integrated simulation learning and online technology to create innovative models for critical care orientation. Brady, Molzen, Graham, and Oneil (2006) reported that this integration provided the cost effectiveness of online learning and provided a hands on experience that students found to be engaging. The authors suggested that because of the high cost of human simulation laboratories, hospitals should collaborate to make this a more cost effective tool for the orientation of critical care nurses.

Similarly, Rauen (2004) described the use of simulation as a method for providing nursing orientation for cardiac surgery. In addition to simulation laboratories, the author pointed out that emerging technologies, especially CD-ROM applications, could be used to augment or enhance the simulation experience. Rauen explained how Georgetown University developed cardiac physiology based scenarios using a human simulator. She listed the cost of a high fidelity human simulator to be $200,000, with less than fully functional simulators available for $30,000-$40,000. The author explained that human simulation was an essential component of clinical education as well as education specific to critical care environments such as cardiac surgery units.

Larew, Lessans, Spunt and Foster (2006) described the benefits that the use of human simulation learning provided for nursing students at the University of Maryland-Baltimore. They reported that the use of a high fidelity human simulator allowed nursing students to “refine their patient management skills and collaborate with multidisciplinary teams as they solved problems (p. 22).”

Simulation Labs in Medical School Education

Kharasch, et al. (2007) described factors that were necessary to increase successful use of high fidelity human simulation in medical education. The authors listed the following as factors for consideration: “the physical plan, the simulation equipment, the curriculum, and the teaching methodology (p. 2).” The authors described their experiences as they developed high fidelity simulation in a community based academic medical center. Curiously, while initial grant funding for development of the laboratory was secured, no physical location for the laboratory was initially provided and an existing conference room was converted to dual use space. The laboratory was initially staffed by a director who received release time from their clinical schedule and because of the rapid increase in simulations, the staff expanded to include support staff including an emergency department nurse and computer technician. The authors found that effective learning outcomes resulted from refining simulations and identifying critical teaching points for each simulation. They recognized the necessity of post-simulation debriefing and its role in learning outcomes. They concluded that while the software and hardware were an important component of the simulation assisted learning experience; teaching was really the driving factor in successful learning outcomes.

The national initiatives for increased patient safety have provided an impetus for the use of high fidelity simulations in medical education. Hamman, et al. (2007) described the use of such simulations to identify and correct behaviors that impacted patient outcomes. The authors detailed four categories of functional outputs from the simulation that focused on error detection and management. These categories are: Error Detection that lead to a Yellow Flag, Error Detection that lead to a Red Flag, Situational Awareness, and External Systems Interface. For example, a single simulation could result in nearly 50 systems issues alone that could lead to poor patient outcomes. Improvements/changes resulted as a result of training, assessment of performance, debriefing, and follow-up on area for improvement.

Bond, et al. (2004) reported the results of their qualitative study of simulation based educational interventions at Lehigh Valley Hospital. The authors reviewed the results of emergency medicine simulations and the experiences of those participating in the simulations. They found that medical residents ranked simulation second only to direct patient care for learning effectiveness. The results of this small study suggested that “metacognitive strategies can be taught to residents, though they may be better understood by upper-level residents (p. 483).”

Weinstock, et al. (2009) proposed point of care simulation as a method to reduce the cost of in-situ training. The authors pointed out that while expensive, even low fidelity simulation could result in better patient outcomes via deliberate practice of high-risk yet low-volume events in a safe structured simulated environment. The authors advocated the use of a low cost point of care mobile simulation cart coupled with teaching techniques commonly used in high fidelity simulation (didactics, debriefing, and video tape) could provide practitioners with effective learning opportunities. This mobile approach reduced both set-up costs and the need for a dedicated high fidelity simulation laboratory.

Future

Gaba, (2004) attempted to predict the future of simulation in health care. He pointed out that while new to health care, high fidelity simulation was not new to the training field and was a commonly used technique that had application in aviation, nuclear power production, and in the military. To its fullest evolution, the author compared simulation to a full immersion experience similar to that of the fictional holodeck as conceptualized in Star Trek.

Conclusion

While little literature exists regarding the use of simulation laboratories in allied health education and even less exists regarding their use in respiratory therapy, the literature review provides documentation that high fidelity and in some cases low fidelity patient simulation is effective as a teaching tool in both academia and within the clinical setting. While once the purview of universities and academic medical centers, high fidelity simulation labs are seeing use in hospital-based settings. National initiatives for improved patient safety are driving forces for the use of simulators to replicate high-risk, low volume procedures.

METHODS

This study utilized surveys targeting hospital administrators (Appendix A) and respiratory therapists (Appendix B).

Population

The population for this study included administrators and respiratory therapists employed in acute care and critical access hospitals of Wellmont Health System with facilities in Northeast Tennessee and Southwest Virginia during the data collection period of February/March 2012. These hospitals are within a 50 mile radius of the Wellmont corporate headquarters in Kingsport, Tennessee. Therapists and administrators of psychiatric and rehabilitative hospitals were not included in this study. Personnel from the following hospitals were included: Holston Valley Medical Center, Bristol Regional Medical Center, Takoma Regional Hospital, Hawkins County Memorial Hospital, Hancock County Hospital, Mountain View Regional Medical Center, Lonesome Pine Hospital, and Lee Regional Medical Center.

Data Collection

The surveys were reviewed by select hospital administrators and by respiratory therapy students at East Tennessee State University. No suggested changes resulted from the pilot and after IRB approval was obtained from East Tennessee State University and the hospitals involved in the study, data were gathered using the two surveys. The administrative surveys were given to health care leaders and managers within all health care facilities participating in the study. Data were collected during February/March of 2012. Using the method of Dillman as described by Byington (2003) cover letters, surveys and stamped return envelopes were mailed to the target population. Follow-up for administrators was conducted using the protocols outlined by Dillman. In addition to the methods of Dillman, the researchers followed up via phone and e-mail with select personnel at each hospital. Returned questionnaires were coded (4=Strongly Agree, 3=Agree, 2=Disagree and 1=Strongly Disagree), the grouping variable (administrator versus respiratory therapist was also coded (1=Administrator and 2=Respiratory Therapist) and data were input into SPSS Version 18.0. Descriptive statistics were calculated and independent sample t-tests where used where appropriate.

Data Analysis

Descriptive statistics including mean value and frequency distributions for the responses to each question, administrative surveys, made it possible to determine the perceptions regarding the use of simulation laboratories for the continuing education of respiratory therapists. Frequency distributions are a common method for displaying numerical data of this type and descriptive statistics allowed the researchers to measure the collective perceptions of each of the two groups on these survey questions (Gall, Borg, & Gall, 1996).

FINDINGS

Ninety-seven participants responded to the study’s survey instruments, 20 administrators (100% of the administrators targeted and 21% of the total respondents) and 77 respiratory therapists (100% of the respiratory therapists targeted and 79% of the total respondents). While small in number, the respondents represented employees from a purposeful sample of hospitals that included primary and tertiary care hospitals as well as a single critical access hospital.

Why are clinical simulation laboratories not used more in the continuing education of respiratory therapists?

Questions regarding awareness and efficacy provided data for findings regarding this research question. Awareness of the use of simulation laboratories for training was indicated by a mean response rate of 3.34 (falling between agree and strongly agree) to survey question 1 on the administrative survey and question 3 on the clinical staff survey assessing the general knowledge of the use of simulation laboratory testing for continuing education of respiratory therapists.

The results of an independent samples t-test indicated no significant difference at the 95% confidence level between the responses of therapists and administrators (p=.589). Questions 4 on the administrative survey and 3 on the clinical staff survey were designed to determine if perceptions of efficacy of the use of simulation based continuing education were a barrier to its use. The collective responses to those questions resulted in a mean response of 3.51, again falling between agree and strongly agree on the Likert scale. The results of an independent samples t-test indicated a significant difference at the 95% confidence level between the responses of therapists and administrators (p=.026) with the mean response of administrators higher than that of therapists (3.75 versus 3.45). However, despite this finding, the mean response for both groups still fell between the agree and strongly agree categories on the Likert scale, with administrators demonstrating a stronger valence regarding their perception of the use of simulation laboratory training leading to better patient outcomes.

Specifically why are hospitals slow to adapt this technology?

Sixty percent of the administrators responding indicated they were not currently using simulation laboratories to provide continuing education for respiratory therapists. Responses to a number of questions on the study's surveys provide data regarding this question. From an administrative standpoint, factors assessing patient safety, regulatory compliance, availability of existing simulation laboratories, readiness for change, and start-up costs for new simulation laboratories were evaluated.

Patient Safety

Questions 8 and 9 on the administrative survey provide data regarding administrators perception of association between simulation laboratory training and patient safety. Administrative question 8 was an outcomes measure regarding the effectiveness of simulation training (the goal for any continuing education method is to increase the skills of therapists, and specifically their ability to detect changes in patient condition before evaluating alternative treatment/corrective actions). The mean response for this question was 3.8 (between agree and strongly agree) indicating that administrators recognize that simulation laboratory training is an effective method to increase therapist's skills. Administrative question 9 addressed the impact of this training modality on reduction of errors impacting patient care. Again, the mean response rate (3.55) indicates a belief that simulation laboratory training is an effective method to address errors impacting patient care.

Regulatory Compliance

A single question from the administrative survey was designed to assess the level of understanding regarding the use of simulation laboratory based training and compliance to regulatory agency standards, specifically the standards concerning National Patient Safety Goals issued by JCAHO. The mean response rate of 3.60 (between agree and strongly agree) indicated that administrators were well aware of the continuing education requirements and that this particular training modality would satisfy those standards.

Availability of Existing Simulation Laboratories

Lack of knowledge of regional access to simulation laboratories could serve as a barrier to their use for continuing education of respiratory therapists. Question 2 on the administrative survey was designed to determine the level of awareness of existing simulation laboratories. A mean response rate of 3.33 to this question indicated that awareness existed, and data mining found that no single administrator's response indicated that there was a lack of knowledge of regional availability of simulation laboratories.

Start up Costs and Readiness for Change

To determine if administrators were in either an awareness stage of change, or a contemplative stage of change, three questions were included in their survey. Question 7 was developed to assess the level or more specifically, the depth of awareness of the use of simulation laboratories for continuing education by asking if administrators were reviewing literature on the subject. The mean response of 3.45 for this question confirmed an active review of literature on the topic. To determine if administrators were in a contemplative stage of change questions regarding cost and spaced analysis were asked. A mean response rate of 3.5 (administrative question 6) confirmed that administrators had considered the costs associated with both the set-up costs and operating costs of simulation based continuing education. A mean response rate of 2.2 on question 12, space is not available in my facility for the development of a clinical simulation laboratory (between disagree and strongly disagree) indicated that they had considered not only the financial costs associated with the use of simulation laboratories, but also the availability of space for their use. To evaluate administrative attitudes regarding cost benefit analysis of clinical simulation training, questions 10 and 14 were developed. Respondents indicated that they believed that the benefits outweighed the costs (mean response 3.25) and indicated that they had not made a decision regarding the capital outlay associated with developing a clinical simulation laboratory (administrative question 14, mean response 1.90). The findings indicate that administrators are in a contemplative stage of change.

Finally, administrative perception of active support among those responsible for clinical simulation training in respiratory therapy departments was assessed. Findings indicate that education coordinators are active in their pursuit of this training modality (administrative question 13, mean response 3.2).

What are the Perceptions of Respiratory Therapists who use Clinical Simulation Labs?

Respiratory therapists responding to the survey indicated they preferred real-life scenarios over other methods including textbooks, lectures, and reviews (clinical staff question 2, mean response=1.76). Sixty-nine percent (n=53) of those responding indicated they had participated in clinical simulation lab training.

For clinical staff members who had participated in clinical simulation laboratory training, questions 5 through 9 on the clinical staff survey were developed to determine their opinions of that training. Without exception, the respondents indicated that they preferred continuing education delivered via a simulation laboratory model and believed that training to be effective (Table 1).

Table 1

Clinical Staff Preference

CONCLUSIONS

The findings of this study indicate that respiratory therapists prefer to be engaged in learning activities that are provided for their continuing education, and that they believe that the use of clinical simulation laboratories is a valuable technique available to assist with their learning. The administrators responding have moved beyond the awareness stage of change and are actively engaged in evaluating the feasibility of providing training using this emerging technology.

Additionally, administrators indicated that they believed the benefits of providing clinical simulation training to outweigh the costs, yet they indicated that they have not made a decision regarding the capital outlay associated with such training.

Given the paradox that there is agreement among administrators that benefits outweigh costs, it is a preferred method among respiratory therapists, and yet no commitment to capital outlay has been made, it appears that the disconnect between the use of clinical simulation in academic settings and its for providing continuing education will persist, at least for the near future.

APPENDIX A 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

APENDIX B 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

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

Strongly Disagree, Disagree, Agree, Strongly Agree

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