

Background

Each year, the Florida Center for Nursing (Center) completes the Nursing Education Program Annual Report and Workforce Survey. The survey monitors trends in nursing education, and the data are used to make projections regarding the state's nurse workforce supply and demand. In the most recent projections (2008), a shortage of 52,000 registered nurse full-time equivalents (FTEs) was predicted by the year 2020 unless new efforts are initiated to resolve the shortage.¹

Many individuals are interested in nursing as a career. However, schools and colleges in Florida turn away about half of qualified nursing applicants each year because enrollment capacity is reached. Lack of sites for clinical training is a major barrier to increasing enrollment in nursing programs. Another barrier to increasing enrollment is a lack of funds to hire additional faculty members to accommodate higher enrollment.

To explore possible solutions to the shortage, The Blue Foundation for a Healthy Florida and the Center, are serving as the project leaders for a Partners Investing in Nursing's Future (PIN) grant. The PIN program is a national initiative led by the Robert Wood Johnson Foundation and the Northwest Health Foundation to address the nursing shortage. The purpose of the two-year project is to evaluate how simulation technology is being used to provide clinical experiences for both educating new nurses, and in retention of nurses through retraining in new skills. The state of Florida permits the use of simulation to substitute for up to 25 percent of the clinical practice hours in a basic nursing education program. Knowledge of issues, barriers, and effective strategies related to use of simulation is critical in designing best practices for using simulation to address nursing workforce issues. In addition options for the creation of regional simulation centers to promote excellence and efficiency will be explored.

What is simulation?

Simulation is an educational practice, process, or strategy designed to imitate the workplace or clinical environment. Simulation experiences are designed for the learner to demonstrate knowledge, skills, decision making, and critical thinking.^{2,3} Simulation often incorporates technology and devices developed for these various purposes, such as a computer enhanced mannequin.

This paper is provided through the project – *Promoting the Use of Simulation Technology in Florida Nurse Education* – funded by The Blue Foundation for a Healthy Florida.

Various types of simulation are available for nursing education in both schools of nursing and clinical settings. Fidelity of simulation is defined as the degree of realism that the simulators provide. Types of simulation include the following:⁴

- Task trainer—anatomical model to practice or demonstrate competency in a specific skill. Examples include a training arm for inserting an intravenous (IV) catheter, or a torso for practicing wound care.
- Haptic system—simulator that incorporates virtual reality with a mannequin to provide visual and touch feedback. Giving feedback differentiates this device from a task trainer. An example is an IV insertion simulator that provides realistic visual cues and sensations of inserting an intravenous catheter.
- Static mannequin (low fidelity)—mannequin designed for practice of skills; does not have a computer interface; similar to a doll. Examples include mannequins for practicing insertion of tubes, performing bathing procedures, or demonstrating medication injection techniques.
- Human patient simulator (medium to high fidelity)—mannequin that uses computer technology to provide physiological data to the learner, such as heart rate, blood pressure, and pulse. The computer can be programmed to demonstrate clinical conditions, such as childbirth or shock, and responds to treatments that are delivered during the simulation activity, such as medication administration. Several manufacturers have developed these mannequins. Mannequins and software have been designed to represent the lifespan, including premature neonates, children, pregnant women, and the elderly.
- Computer simulations—software designed to allow the learner to gain knowledge, make decisions, and provide feedback. An example is a computer simulation designed for the learner to manage a patient with a cardiac arrest.
- Virtual reality—computer-generated environment that provides multi-sensory experiences for the learner; immerses the learner in a simulated environment. For example, virtual online hospitals and communities are being developed where student avatars can interact in real time with patient avatars. Virtual reality can be designed for the learner to experience clinical conditions, such as decreased vision or impaired mobility. Some virtual reality is used for skill training as well.
- Standardized patients—Individuals trained to act out various situations and scenarios. Allow for interaction of the learner with an actual patient. Standardized patients can be used in a wide variety of learning activities, such as practicing interview techniques and physical examination skills.

Use of Simulation

Simulation is used in many nursing programs and in clinical agencies to provide scenarios or situations for the learners, which may include nursing students, nurses, and those in other disciplines. Simulation may be used to teach basic health assessment skills or to demonstrate competence in clinical skills, such as giving medications, inserting tubes and lines, and wound care. Others use simulation to practice and learn complex skills, develop critical thinking abilities, and to develop team training and collaboration skills. Simulation can be used to depict any health care condition at any time, depending on the type and fidelity of the equipment, and the knowledge and abilities of the staff who conduct the simulation experiences.

Benefits of Simulation

Simulation is gaining increased use in nursing education programs. Many advantages are described for using simulation:³

- Allows a student to attain knowledge and learn skills in a safe and controlled environment. Provides opportunities to learn from the experience and make mistakes without increasing risk to the patient.
- May increase speed of learning skills and developing competence.
- Guarantees the same learning experience for each student for a given clinical scenario. It reduces the variability in the teaching / learning process.
- Each student can gain the same clinical experience, regardless of what experiences are available at a clinical site. Students can learn patient care management skills for high-risk conditions that they may not see or be given the opportunity in which to participate, such as a cardiac arrest or an emergency during childbirth.
- Allows for immediate feedback related to performance. Debriefing after a simulation provides an opportunity to enhance learning through review and reflection of the simulation scenario. Debriefing often includes a review of a video recording of the event for all to critique.
- Allows flexibility in scheduling clinical experiences for a variety of learners.
- May enhance patient safety and prevent errors.
- May be implemented quickly to educate and train in best practice procedures or to remediate a skill.
- Can be used for multi-disciplinary team training, providing a more realistic approach to patient care management. Team training allows for communication and collaboration among team members.

Disadvantages and Barriers to Using Simulation

Although simulation has many advantages, several disadvantages and barriers related to simulation have been identified:

- Simulation is not real. The realism of the simulation varies, depending on the fidelity of the equipment. In addition, it is difficult to replicate all aspects of physiological and clinical responses in a given situation.³
- The learner may not participate in the situation nor take it seriously.³
- Because the simulation is not “real,” it is difficult to replicate the same communication and emotional responses that would be seen in the actual clinical setting.³
- Costs associated with simulation equipment and laboratories are high.³ For example, newer high-fidelity mannequins range from \$27,000 to \$60,000, and extended warranties cost over \$3,000 per year for each mannequin owned. Researchers in Australia reported costs for renovating space to establish a center for simulation at nearly \$900,000 with annual operating costs of approximately \$400,000.⁵
- Simulation equipment may have a limited lifespan. Regular upkeep of equipment, hardware, and software is required. Equipment may become obsolete or outdated.

- Simulation is most effective with small groups of students, followed by debriefing. This increases the amount of time needed to schedule simulated experiences, and limits the number of students that can participate in a simulation at a given time.
- Adequate teaching personnel, technical support, and faculty and staff development are essential for effective simulation. However, these elements are often overlooked when developing simulation resources.⁶
- Faculty training regarding use of simulation equipment, writing and editing scenarios and in implementing a scenario is often lacking.
- Faculty and administrative support and commitment for simulation are not always strong.
- Unless feedback and debriefing are provided, students can learn something incorrectly. This is referred to as “negative transfer” of learning.³

Outcomes of Simulation in Nursing Education

Studies have shown that students who participate in simulated learning attain desired knowledge, demonstrate competence in skills, and gain increased confidence in their abilities to perform a specific skill or in a given situation.⁶⁻¹³ The majority of studies have been done in educational settings with limited research on outcomes of simulation in continuing education of nurses.

No large scale studies have presented compelling evidence to support the use of simulation as an alternative to clinical practice. However, neither has the value of learning in the actual clinical setting been supported by research.¹⁴ Ongoing research is needed to assess the transfer of knowledge and skills from the simulated setting to the clinical setting. Research is also needed to determine if learning outcomes with simulation are equal to, or better than, learning in an actual clinical setting.

Simulation Resources in Florida

A comprehensive assessment of simulation resources in the state of Florida is needed. Many schools and clinical agencies own simulation equipment. Several have developed simulation centers, and other centers are in various stages of development. A comprehensive inventory of resources and knowledge of how simulation is used in academic and clinical settings is needed. A previous study funded by the Florida Banner Center for Health Sciences was conducted to identify simulation equipment in the state of Florida.¹⁵ Seventeen of 45 nursing schools took part in a phone survey. At the time of the report, most schools indicated that they either had simulation equipment available or were awaiting delivery of recent purchases. The report identified 30 high-fidelity simulators in these schools.¹⁵ This PIN grant project will assist in identifying resources and needs related to simulation among Florida nursing education programs and clinical agencies.

Simulation Initiatives in Other States

Other states have initiated simulation projects for nursing and healthcare education. Many state initiatives have been developed to address nursing workforce issues. The states of Arizona, North Carolina, Alaska, Oklahoma, and Oregon have explored or developed partnerships for providing simulation resources. Other states have implemented regional simulation projects. For example, the West Texas Alliance is a project, also funded by the PIN program, to facilitate sharing of equipment and simulation scenarios throughout the rural region.

The most well developed state initiative is in Oregon. The Oregon Simulation Alliance was formed to develop simulation resources to address the nursing shortage. The project was initially funded by the Northwest Health Foundation. The Simulation Alliance is described as an innovative public-private partnership to develop and expand simulation capacity in regions throughout the state of Oregon for both nursing and multi-disciplinary education. They began by surveying nursing programs to inventory resources, and identifying barriers and opportunities to increase simulation use.¹⁶ The use of simulation has been promoted to increase capacity in nursing education programs, develop career ladders for nursing advancement, and provide nursing re-entry or refresher programs. The Simulation Alliance is targeting increased simulation capacity, training of faculty, increasing access to simulation, and ensuring affordability of simulation resources.

The common factor among these initiatives has been the desire to combine simulation resources as one solution to addressing the nursing shortage. Barriers reported by statewide initiatives are similar to those presented earlier. Faculty development and adoption of simulation is often lacking. Extensive resources are required, such as space, equipment, and personnel. Lastly, sustainability for simulation equipment and learning laboratories is essential.

Issues and Opportunities Related to Implementation of Simulation

Faculty Development. Faculty development and faculty buy-in are essential to successful simulation programs. Faculty member reaction to simulation is often mixed. Faculty members generally agree that repetitive practice is important; however, they often hesitate to use and support implementation of simulation.^{17, 18} Faculty development is needed in several areas: operating simulation equipment; using and editing clinical scenarios; and identifying best practices for implementing simulation in a nursing education curriculum or a clinical setting.

Clinical Education Application. Employers are beginning to use simulation as a mechanism to evaluate competence for new nurses. They also use simulation for experienced nurses to demonstrate skill competence for complex and/or high-risk skills and procedures. Innovative programs use simulation in orientation programs to strengthen clinical and assessment skills, most frequently for specialty areas like critical care or emergency room. In addition, simulation has been used to remediate nurses returning to work or retrain nurses wishing to change clinical focus by orienting to their new specialty.¹⁹⁻²¹

Because of the potential for simulation to improve safety outcomes in the hospital setting, simulation has been embraced by national accrediting bodies and regulatory bodies as a mechanism to improve patient safety. Simulation is recommended to improve team training, improve interdisciplinary communication, and improve collaborative practice among healthcare providers.

The Potential for Innovative Models

Lessons learned from the Oregon experience may be useful to consider as Florida develops strategies to maximize simulation use statewide. The Oregon Simulation Alliance developed an innovative public / private partnership that garnered both financial and political support from the legislature, key government agencies, hospitals, and educational institutions to develop regional coalitions and centralized services. Outcomes included education on how to use simulation,

sharing of information related to simulation, consultation, funds for start-up equipment, and training for faculty and technical support staff. The Alliance serves as a resource for the development of simulation and strives to improve the quality of simulation but it is not a governing body.²² The regional model helps to reduce duplication of equipment and services while maximizing resources.

The University of Texas at Arlington School of Nursing has recently built a “Smart Hospital” for nursing education. The School developed a public / private partnership to create an innovative 13,000 square-foot Smart Hospital that is dedicated to the education of nurses at all levels. Using a combination of patient simulators and live standardized patients, educators can recreate almost any scenario in all nursing specialties.²³ Learning opportunities can be tailored to meet the needs of learners. This state-of-the-art facility improves access for clinical learning and provides a mechanism to deliver continuing education.

Lessons learned from others that have developed innovative solutions to meet education needs of their nursing workforce are important to consider. Legislative support and development of public / private partnerships have been keys to success in innovative models. The overarching theme noted from this discussion is that pooling of resources may be beneficial.

Conclusions

The future of nursing education in Florida must be developed with a vision that includes innovative strategies, such as simulation. Simulation may be useful in preparing additional nurses to enter the workforce and in retraining experienced nurses for other specialty areas. As Florida’s population ages, two critical issues must be considered:

- The demand for nurses will increase
- Nursing care will grow more complex

Simulation technology can help nursing educators in Florida enhance the learning experience without sacrificing quality. It may be helpful in educating more students who desire to become nurses. In addition, retention in the nursing workforce can be improved if simulation technology is implemented in an organized and consistent manner.

The Center’s project will identify simulation resources within the state, improve the understanding of simulation activities, and facilitate educated dialogues among experts and industry. These carefully planned activities will inform the Center and The Blue Foundation for a Healthy Florida in making recommendations for simulation technologies in nursing education. Support will be needed from educational institutions, hospitals and other clinical agencies, private funders, and the legislature as these initiatives are identified.

Written for the *Promoting the Use of Simulation Technology in Florida Nurse Education* project by Mary Lou Sole, PhD, RN, CCNS, FAAN and Mary Elizabeth “Betsy” Guimond, MN, RN, WHNP-BC.

References

1. Florida Center for Nursing. (2008). *Forecasting Supply, Demand, and Shortage of RNs and LPNs in Florida, 2007-2020*. Retrieved February 8, 2010 from http://www.flcenterfornursing.org/files/RN_LPN_Forecasts.pdf2.
2. Gaba, D.M. The future vision of simulation in health care. (2004). *Quality and Safety in Health Care*, 13, Suppl 1, pp. i2-10.
3. Li, S. (2007). The role of simulation in nursing education: A regulatory perspective. Presented at the American Association of Colleges of Nursing Hot Issues Conference; Denver, CO. Retrieved February 8, 2010 from [https://www.ncsbn.org/Suling\(1\).ppt](https://www.ncsbn.org/Suling(1).ppt).
4. Decker, S., Sportsman, S., Puetz, L., & Billings, L. (2008). The evolution of simulation and its contribution to competency. *Journal of Continuing Education in Nursing*, 39, pp. 74-80.
5. McIntosh, C., Macario, A., Flanagan, B., & Gaba, D.M. (2006). Simulation: What does it really cost? [Abstract]. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*, 1, p. 109.
6. Hicks, F.D., Coke, L., & Li, S. (2009). The effect of high-fidelity simulation on nursing student's knowledge and performance: A pilot study. *NCSBN Research Brief*, 40.
7. Bambini, D., Washburn, J., & Perkins, R. (2009). Outcomes of clinical simulation for novice nursing students: Communication, confidence, clinical judgment. *Nursing Education Perspectives*, 30, pp. 79-82.
8. Bruce, S.A., Scherer, Y.K., Curran, C.C., Urschel, D.M., Erdley, S., & Ball, L.S. (2009). A collaborative exercise between graduate and undergraduate nursing students using a computer-assisted simulator in a mock cardiac arrest. *Nursing Education Perspectives*, 30, pp. 22-27.
9. Cannon-Diehl, M.R. (2009). Simulation in healthcare and nursing: State of the science. *Critical Care Nursing Quarterly*, 32, pp. 128-36.
10. Cheraghi, F., Hassani, P., Yaghmaei, F., & Alavi-Majed, H. (2009). Developing a valid and reliable self-efficacy in clinical performance scale. *International Nursing Review*, 56, pp. 214-221.
11. Dillard, N., Sideras, S., Ryan, M., Carlton, K.H., Lasater, K., & Siktberg, L. (2009). A collaborative project to apply and evaluate the clinical judgment model through simulation. *Nursing Education Perspectives*, 30, pp. 99-104.
12. Lambton, J. (2008, October). Simulation as a strategy to teach clinical pediatrics within a nursing curriculum. *Clinical Simulation in Nursing*, 4(3), pp.e79-e87.
13. Sinclair, B., & Ferguson, K. (2009). Integrating simulated teaching/learning strategies in undergraduate nursing education. *International Journal of Nursing Education Scholarship*, 6, pp. 1-11.
14. Tanda, R., & Denham, S.A. (2009). Clinical instruction and student outcomes. *Teaching and Learning in Nursing*, 4, pp. 139-147.
15. Florida Banner Center for Health Sciences. (Unpublished Report). *High Fidelity Human Patient Simulation*.
16. Oregon Center for Nursing. (2003). *Technology in nursing education. Oregon Education-based Technology Needs Assessment: Expanding Nursing Education Capacity* (Authored by Krautscheid, L., & Burton, D.). Retrieved February 8, 2010 from http://www.oregoncenterfornursing.org/documents/Tech_Assessment.

17. Kardong-Edgren, S.E., Starkweather, A.R., & Ward, L.D. (2008). The integration of simulation into a clinical foundations of nursing course: Student and faculty perspectives. *International Journal of Nursing Education Scholarship*, 5, pp. 1-16.
18. Starkweather, A.R., & Kardong-Edgren, S. (2008). Diffusion of innovation: Embedding simulation into nursing curricula. *International Journal of Nursing Education Scholarship*, 5, pp. 1-11.
19. Ackermann, A.D., Kenny, G., & Walker, C. (2007). Simulator programs for new nurses' orientation: A retention strategy. *Journal for Nurses in Staff Development*, 23, pp. 136-139.
20. Beyea, S.C., von Reyn, L., & Slattery, M.J. (2007). A nurse residency program for competency development using human patient simulation. *Journal for Nurses in Staff Development*, 23, pp. 77-82.
21. Zekonis, D., & Gantt, L.T. (2007). New graduate nurse orientation in the emergency department: Use of a simulation scenario for teaching and learning. *JEN: Journal of Emergency Nursing*, 33, pp. 283-285.
22. Seropian, M.A., Driggers, B., Taylor, J., Gubrud-Howe, P., & Brady, G. (2006). The Oregon simulation experience: A statewide simulation network and alliance. *Simulation in Healthcare: Journal of the Society for Simulation in Healthcare*, 1, pp. 56-61.
23. University of Texas at Arlington. (2009). Smart hospital & health system: Revolutionizing healthcare education & training. Retrieved February 8, 2010 from <http://www.uta.edu/nursing/simulation>.

The Florida Center for Nursing is the definitive source for information, research, and strategies addressing the dynamic nurse workforce needs in Florida. Established in law (§ 464.0195), the Legislature finds that the Center will repay the state's investment by providing an ongoing strategy for the allocation of the state's resources directed towards nursing. For more information on the Florida Center for Nursing and the nursing shortage in Florida, please visit its Web site at www.FLCenterForNursing.org.

The Blue Foundation for a Healthy Florida is a separate, philanthropic affiliate of Blue Cross and Blue Shield of Florida (BCBSF), incorporated in the state of Florida. The Blue Foundation for a Healthy Florida, and its parent, BCBSF, are independent licensees of the Blue Cross and Blue Shield Association, an association of independent Blue Cross and Blue Shield companies. For more information on The Blue Foundation for a Healthy Florida, please visit its Web site at www.bluefoundationfl.com.

Partners Investing In Nursing's Future (PIN) is a collaborative partnership between the Northwest Health Foundation and Robert Wood Johnson Foundation. PIN provides support to local and regional foundations across the U.S. to make long-term investments in nursing workforce solutions. By supporting the capacity, involvement and leadership of these local funders, PIN addresses national nursing issues through a network of creative and innovative local partnerships. For more information on the PIN collaborative, please visit its Web site at www.partnersinnursing.org.