2009-05-28

Developing and Implementing a Simulation Program: Baccalaureate Nursing Education

Patricia K. Ravert
Brigham Young University - Provo, patricia-ravert@byu.edu

CHAPTER 3

Developing and Implementing a Simulation Program: Baccalaureate Nursing Education

Patricia Ravert

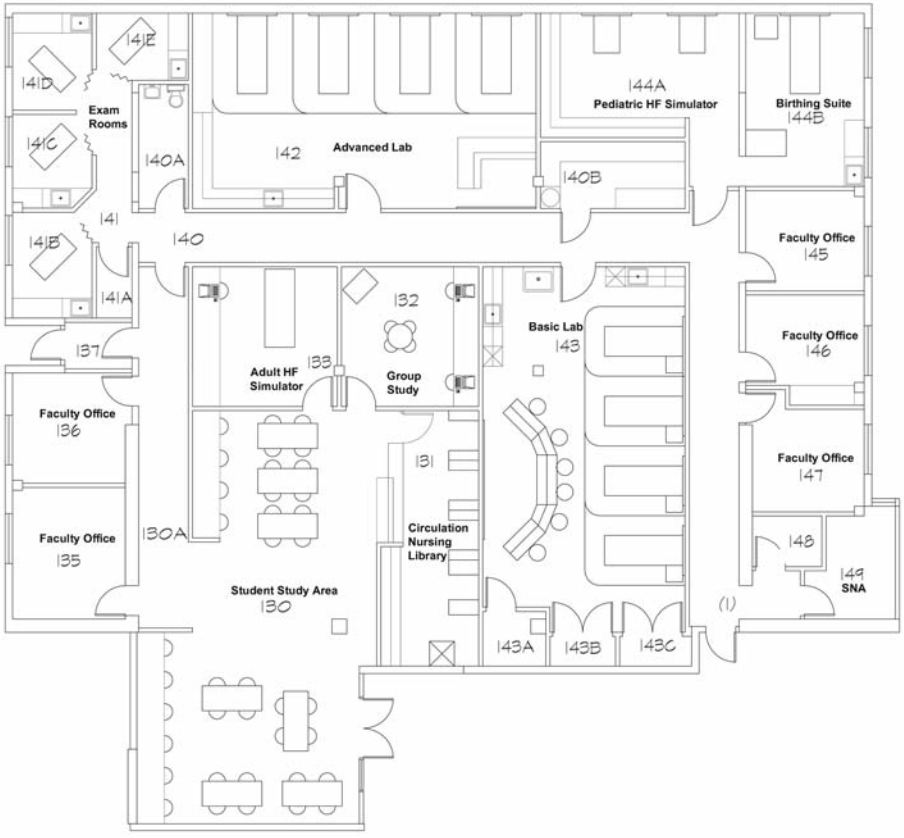
Brigham Young University (BYU) is a private university (owned by the Church of Jesus Christ of Latter-day Saints), established in 1875. The main campus is located in Provo, Utah, 45 miles south of Salt Lake City at the base of the Wasatch Mountains and serves approximately 33,000 students. The College of Nursing (CON) was founded in 1952. The CON offers two programs, the undergraduate Bachelor of Science and the Master of Science; the latter program prepares family nurse practitioners. The CON programs are approved by the Utah State Board of Nursing and are accredited by the National League for Nursing Accrediting Commission and the Commission on Collegiate Nursing Education.

The theme for the CON is "Learning the Healer's Art," and its defined mission is to develop professional nurses who promote health, care for the suffering, engage in the scholarship of the discipline, invite the Spirit into health and healing, and lead with faith and integrity. The baccalaureate program prepares students with the knowledge, competencies, values, and leadership abilities to enter into professional nursing practice. The CON builds on a broad liberal foundation of arts, sciences, and humanities. All but 3 of the 15 nursing courses incorporate didactic, clinical, and laboratory components, which all figure into the grade for the course. Three courses—Pharmacology in Nursing, Ethics in Nursing, and Scholarly Inquiry in Nursing—do not have a clinical or laboratory component.

Throughout the course of the CON's existence, there have been areas designated to support the development of psychomotor skills. In the 1970s, a single room was furnished with hospital beds and basic care models so students could practice basic skills. In the 1990s, a Nursing Learning Center (NLC) was created to facilitate student learning in a variety of settings such as critical care, pediatric health, and maternal health. The current 6000-square-foot NLC was completed in 1998 and serves as the hub of student activity in the CON, as

suggested by Hodson-Carlton and Worrell-Carlisle (2005). The NLC includes several rooms for a variety of student uses (see Figure 3-1). The initial area of the NLC is an open student study area with computer stations, two group student study rooms, and a satellite nursing library and circulation desk. The remaining areas include a four-bay exam area and four nursing skill laboratories designed for advanced, basic, pediatric, and maternal health nursing skills teaching and learning. The NLC is open approximately 70 hours each week and is staffed by student workers, a full-time supervisor, and a faculty coordinator. Other faculty members and approximately six part-time registered nurses hired as teaching assistants work with students in the NLC each week.

Figure 3-1 Nursing Learning Center



The CON has used clinical simulation for many years, as part of its efforts to replicate the clinical environment. When the NLC was completed in 1998, the computer programs, manikins, equipment, and medical supplies were state-of-the-art. The laboratory hours are a required part of the curriculum and are figured into the clinical and laboratory requirements for 7 of the 15 courses. A faculty member, Professor Sandra Mangum, was the NLC coordinator for more than 20 years and led the CON through the construction of the NLC in the 1990s. She was instrumental in the development of the laboratory experiences for BYU nursing students. Professor Mangum planned a retirement for mid-2001, and I took the NLC coordinator position beginning in January 2001 to allow for time for orientation to the position.

At the end of 2000, Dean Elaine Marshall creatively used instructional technology/computer funds to order a high-fidelity patient simulator, the Human Patient Simulator (HPS) from Medical Education Technology Incorporated (METI). At that time, the simulators were constructed as ordered and BYU's high-fidelity patient simulator was scheduled for a mid-2001 delivery. During my orientation to the NLC, Professor Mangum informed me of the purchase and stated I would have to figure out how to use the high-fidelity patient simulator and integrate it into the curriculum. I was not familiar with high-fidelity patient simulators, so I investigated the matter further and found that the University of Utah, Department of Anesthesia, had an HPS. I made a visit to the University of Utah and then attended the Human Patient Simulator Network (HPSN) 2001 presentation sponsored by METI in February. Thus BYU's journey of high-fidelity simulation began in 2001.

THE BYU EXPERIENCE: PLANNING AND INTEGRATION

To prepare for the high-fidelity patient simulator, one of the two group student study rooms was remodeled to function as a high-fidelity adult simulation room. A door was added to facilitate access to supplies and medical gases. The medical gases and compressed air were piped in from another storage room, and cabinets and shelving were added. Later a headwall unit was added.

The HPS was delivered and set up in spring 2001. Initially the technicians taught me how to operate the high-fidelity patient simulator. I practiced throughout the summer and learned much, but knew there was much more to learn if the CON staff and students were to effectively use the high-fidelity patient simulator. An educator from METI came to the CON in September 2001, and 10 faculty members attended the 2-day education course. Faculty members were selected from each of the basic courses. During the school year, none of these faculty members used the high-fidelity patient simulator. During

the next year, I worked on a plan to use the high-fidelity patient simulator with students in the basic medical–surgical course.

Basic medical–surgical nursing scenarios had not been developed for the HPS. As a consequence, I spent many hours programming two or three scenarios. I also networked with other nurse educators; obtained programming for scenarios that would teach and facilitate learning of ideas; and shared the ones I developed. As a result of this work, I came to realize that I needed more help: I could not set up programming, run the high-fidelity patient simulator computer, and facilitate all scenarios for a class of 48–64 students.

To obtain funding for assistance in the integration of simulation, I applied for a Mentored Environment Grant and research funds from BYU. I planned a research project (doctoral project) using the high-fidelity patient simulator. Part of the grant and research funds were used to hire undergraduate students as research assistants. The research assistants were taught to run the high-fidelity patient simulator computer, act as the patient voice, act as the health-care provider's voice, set up and take down the simulation environment, and perform typical research activities of data collection and entry.

During fall 2002, we practiced running scenarios with volunteers. We decided to use five patient scenarios: a male medical–surgical patient admitted following a motor vehicle accident, a female experiencing a postpartum hemorrhage, an antepartum female experiencing pregnancy-induced hypertension, a male experiencing chest pain, and a male experiencing disseminated intravascular coagulation. These scenarios were chosen because programming and supporting documents were available, rather than because the scenarios correlated with course objectives. After the initial implementation, scenarios were selected through survey of course and program objectives.

In 2003, the five scenarios became available for students in the medical–surgical course. Some were part of the study (Ravert, in press) regarding critical thinking; others were not. Once the study was completed, I met with the medical–surgical course coordinator to determine which scenarios would better fit the course objectives. It was determined that all students should have experience with a core group of patient diagnoses/experiences: assessment of the medical–surgical patient, diabetic ketoacidosis, cerebral vascular accident, congestive heart failure, chest pain in a medical–surgical patient, and gastrointestinal bleeding. The computer programming and supporting documents were developed or found for these scenarios. The medical–surgical scenarios were facilitated by a registered nurse hired as a teaching assistant with support from the student workers (former research assistants). The students involved in the study enjoyed doing the simulations and especially liked the maternal health scenarios (postpartum hemorrhage and pregnancy-induced hypertension),

even though they had not taken the obstetrical course and the content was not part of the medical–surgical curriculum. During the next semester, the scenarios were changed to better fit with the medical–surgical course objectives.

During the next school year, I met with the course coordinator for the Care of the Child-bearing Family course to facilitate high-fidelity simulation experiences with maternal health. A plan was developed to orient the faculty for this course on how to facilitate the simulation sessions and how to use student workers to assist in setting up for the sessions and running the computer. The first semester we planned to have all students experience the postpartum hemorrhage scenario. Later the pregnancy-induced hypertension scenario was added to the schedule. The schedule for the course lab was revised to allow for the simulation sessions without decreasing clinical hours.

During the 2004–2005 school year, scenarios were added for students in the advanced medical–surgical course (which covered intensive and critical care concepts and experiences). These scenarios focus on "code" situations, including a respiratory arrest from exacerbation of congestive heart failure, a classic myocardial infarction, a respiratory arrest from sedation medication, and an arrest of an alcoholic patient with gastrointestinal bleeding. The students find these scenarios helpful in utilizing the concepts they have learned in the didactic, lab, and clinical components of their courses. These experiences are sometimes observed in the clinical component, but most students have an opportunity to participate only through simulation.

METI began selling the Program for Nursing Curriculum Integration (PNCI) in 2005. The PNCI includes 90 simulated clinical experiences for the company's adult, pediatric, and baby high-fidelity patient simulators. The majority are geared toward the adult high-fidelity patient simulator. The package includes the programming, supporting documents, and consulting to assist in integrating plans. BYU purchased the PNCI as soon as it became available. The PNCI is worth the investment: Learning to develop and program scenarios is extremely time-consuming, and the PNCI saves much in time and effort, thereby allowing faculty to easily use a variety of scenarios with little start-up time. After purchasing the PNCI, BYU has converted most of the simulations to those developed by METI.

In 2006, a high-fidelity pediatric simulator, PediaSIM from METI, was purchased through donor funds. At the CON, the pediatric content is taught in the Care of the Child-rearing Family course, which students take during the same semester as the Care of the Child-bearing Family course. The pediatric clinical experiences vary according to assignment. There is a large pediatric facility in Salt Lake City, but not all students are able to have clinical experiences in the facility; the remaining students have pediatric clinical experiences in local hospitals, which sometimes do not have patients with much variation in their

patient populations. The simulation integration plan included using clinical time for simulation. Each clinical group is scheduled to come to the NLC and participate in two pediatric simulations, which replace a clinical day in the curriculum. The faculty members (full-time and part-time adjunct) have been trained to facilitate the simulation sessions. Some faculty members enjoy facilitating more than others, and occasionally negotiation of coursework occurs so that some faculty members act as facilitators for other clinical groups.

By 2007, the adult HPS system that BYU obtained in 2001 had begun to have a variety of problems during use, most notably with the respiratory system. A decision was made to replace the HPS with a METI Emergency Care Simulator (ECS). The ECS system meets all the needs of a baccalaureate program. The new system was put into service prior to the fall 2007 semester.

During the latter part of 2005 and 2006, Colleen Tingey, the NLC supervisor, learned to use a Noelle birthing simulator (Gaumard Scientific) that BYU had purchased several years before but had not utilized. Several birthing simulations were done with students. Some sessions could not be completed due to technical problems with the simulator. After consulting with the manufacturer, Colleen and the course coordinator traveled to Florida for further training from the Gaumard Scientific personnel. During this training, they were introduced to the updated tetherless Noelle childbirthing system. In late 2007, BYU purchased the new system along with the Newborn Hal. An educator from Gaumard came to BYU and conducted a two-day training session on the new system. BYU also had two personnel from the campus instrument shop go to Florida for technical training; they can now perform most of the adjustments and repairs without having to send the system to Florida. The BYU technicians have been extremely helpful to the CON. When we have experienced problems, they have been able to immediately respond and get the system up and running usually within 15–20 minutes.

During the winter 2008 semester, the postpartum hemorrhage and pregnancy-induced hypertension simulations were done on the Noelle simulator. The faculty members had found it difficult to get everything ready (equipment, supplies, and patient documentation forms) for the simulation experience and to run the computer, making changes to the patient as needed, as well as facilitate the sessions. To assist the faculty, one of the experienced student workers completed her senior project by programming the computers for birthing, postpartum hemorrhage, and pregnancy-induced hypertension simulations; developing the supporting documentation; setting up procedures; and filling boxes of supplies and items to set the scene. The student worker also assisted in several scenarios to help faculty to use the items she had developed.

In 2008, the BYU baccalaureate students participated in 15 high-fidelity simulation experiences throughout the curriculum. The masters of nursing

students did not use the high-fidelity patient simulators. There has been some interest from a new faculty member, so the future may include integration of the graduate students into the simulation program.

At the outset of implementation of the high-fidelity patient simulation system, a decision was made to use the simulation sessions as part of a teaching/learning strategy rather than as part of an evaluation process. Students are required to attend, and preparation is highly encouraged. Most students prepare by completing 5–10 questions on the type of patient or disease entity, and they have reported that they have a better experience when they have prepared. Throughout the implementation, students have been surveyed regarding their perception and satisfaction of the simulation experience. Focus groups have been conducted with the students during most semesters, and several key themes have been identified. The data from written surveys are evaluated through SPSS, with the software-analysis results and focus-group themes being shared with faculty members, student workers, and teaching assistants. Overall, the students report they enjoy and value the simulation experiences and suggest more experiences be included. The results of the evaluations have been used to improve the sessions across the curriculum.

SUGGESTIONS FOR SUCCESSFUL IMPLEMENTATION

Simulation Specialist

If a program is contemplating integrating high-fidelity simulation experiences into the curriculum, it is recommended that a simulation specialist or champion be appointed. The simulation specialist needs to have designated time to facilitate the integration. Initial helpful tasks are to visit other programs that use high-fidelity simulation experiences and to watch others actually running sessions with students. The simulation specialist also ought to attend conferences and workshops where much networking occurs.

Simulation Integration Team

The simulation specialist will need others to assist in the integration work. Many programs develop a team or task force to deal with this issue. Members may include an administrative representative, faculty members who have expressed an interest in simulation, a faculty member from each major clinical course, and technical/computer support personnel. The team tasks may include performing a curriculum review, determining scheduling of simulation activities, setting student expectations, and determining a simulation integration timeline and plan.

Curriculum Review

The simulation specialist will lead the team in reviewing the curriculum to determine which concepts or objectives could or should be taught through simulation. An important part of the curriculum is "to assist students in obtaining the body of knowledge, attitudes, and skills necessary to practice as a registered nurse" (Jeffries & Norton, 2005). The curriculum is developed by faculty members and should be reviewed if simulation will be used. At BYU, care of the patient experiencing postpartum hemorrhage is taught only through high-fidelity simulation. Other concepts are taught partially through didactic content, with the patient care and management elements being taught through simulation.

Another decision is to determine which types of patients and situations to simulate. Some programs choose to simulate high-risk and low-frequency situations so that students will have an opportunity to experience these situations in a safe, simulated environment.

Scheduling Time for Simulation

The team must also discuss and determine where the time for simulation will come from within the program. Programs vary in this regard: Some use didactic time for simulation, others devote clinical or lab hours to the simulation activities. This decision may also vary from course to course. Once the decision is made about how the time for simulation will be allocated, the team should discuss how groups will be scheduled.

Scheduling of student groups can be accomplished in a variety of ways and may also vary from course to course. Some programs have all students in a clinical group come together. The students then participate in two or more different patient scenarios, with some of the students observing while the remainder do the actual patient care. The observing students may be involved by completing observation sheets, acting as resources for the group, or looking up information on the Internet or in books (such as information about drugs). Partway through the scenario, the students giving care may be instructed to give reports to the observing students, who then take over the care. Throughout the session, all students are involved, either through providing direct care, making observations, or acting as resources in all the scenarios. At BYU, the pediatric course schedules the clinical groups to come to the NLC rather than to clinical sites, and students participate in two different pediatric scenarios (an asthma patient and a diabetic patient).

Another scheduling option is to provide opportunities at various times and allow students to sign up for the simulation in groups of four to six. The groups then participate in the assigned scenario at the selected time. At BYU,

the basic medical–surgical students participate in five scenarios across the semester. At the beginning of the semester, students sign up with three other students to come at a specific time every other week for simulation activities. To accommodate the 64 students in the course, it requires two full days of simulation on our one adult high-fidelity patient simulator. The time for simulation is part of the scheduled lab hours for the course.

A third scheduling option is to determine specific dates and times that will accommodate the nursing students' schedules and then to either assign each student to a date and time or allow students to sign up on their own. The childbearing course at BYU uses this type of scheduling. If this option is selected, it is recommended that the dates and times be determined early in the semester so students may add the high-fidelity patient simulation experiences to their busy schedules.

A fourth scheduling option is to have the simulation experience be part of a lab day where several different lab stations are established. The students then rotate through the stations, one of which is a simulation activity. At BYU, this model is used with a group of students who are front-loading several essential skills at the beginning of the semester, with the simulation experience consisting of review and practice of assessment skills.

Other scheduling options can be developed that fit the unique needs of a particular course within a program. Whichever schedule or schedules are used, students should be informed early so they can plan for the simulation experience.

Student Expectations

Another task the simulation integration team may choose to discuss is expectations for students regarding attendance, preparation work, and student dress (Spunt & Covington, 2008). Many programs use the simulation experiences as a teaching/learning strategy and expect students to come prepared for the particular patient case. Some assign reading, questions to answer, or packets of information to read and complete. Other programs require students to develop care maps or care plans, as in a regular clinical experience. At BYU, students are given basic written information on the patient situation prior to the simulation activity, usually one to two weeks before their session. The information also contains 5–10 questions which students answer, either individually or as a group, to prepare for the high-fidelity patient simulation experience. The preparation work is not collected but serves to assist the students in getting ready for the experience.

The team should also discuss the expectations of attendance. In particular, it should determine whether the simulation experiences will be required or

optional and whether grades or points for attendance will be given. At BYU, students are required to attend the simulation experiences and are given a small number of points for attendance, which are then incorporated into their overall course grade.

Expectations for student dress during simulation activities vary from program to program. It has been observed that students act in a more "professional" role when they are dressed as a "nurse." Some programs require students to follow clinical uniform guidelines whenever they work in the skill lab. Other programs require students to wear uniforms only when they participate in high-fidelity simulation experiences. For many years, BYU students wore street clothes in the NLC for their lab experiences. In 2007, after watching several videos of groups of students (some in uniforms and some in street clothes), I brought up the issue of wearing uniforms in the NLC during faculty assembly. The faculty members were mixed on their opinions and recommended the issue be addressed by the Student Nurses' Association. The students understood the rationale but didn't want to have the requirement for another day for a "clean and crisp" uniform; instead, they suggested the college purchase lab coats that students would put on as they came into the high-fidelity simulation room. The college obtained inexpensive lab coats and required students to wear them. Now students automatically pick up the lab coats and actually choose to wear them in other labs as well. The first-semester students wear uniforms for any lab pass-off/competency evaluation.

Integration Timeline

An integration timeline and plan for implementation of the simulation also need to be developed. Some programs decide to implement one high-fidelity patient simulation experience in each course during the initial semester or year. Other programs start with those courses in which the faculty are willing to learn to facilitate high-fidelity patient simulation sessions. These faculty members may choose to integrate one or more different simulations within the course. After successful integration in the first course, another course is selected to begin high-fidelity patient simulation use. Still other programs choose to simulate patient conditions that they believe all students should have experience with, such as postpartum hemorrhage, chest pain in medical–surgical patients, and "code" situations.

Simulation Support Staff

Besides designating a simulation specialist, it is necessary to determine who will provide the needed services for simulation experiences, such as scheduling of simulation equipment and rooms/areas, operating the computer

(i.e., "running the computer"), facilitating and debriefing sessions, and providing technology support.

Scheduling of Equipment and Simulation Areas

Some colleges or programs have centralized scheduling programming, so that the simulation areas and equipment are simply added to the existing programming. Others do the programming through a designated person in the laboratory area. The scheduling may be done electronically or in paper format. The advantage to an electronic schedule is faculty members can see whether the resource is available without having to track down an actual person and make inquiries. Policies regarding scheduling, such as priority in scheduling, may need to be developed as the use of simulation equipment and areas increases.

Computer Operators

Running the computer is often an intimidating task for many faculty members. If faculty members are expected to operate the computer, they must have adequate training and practice to feel comfortable. Jones and Hegge (2007) suggest the simulation specialist organize high-fidelity patient simulation demonstrations initially and then provide training and practice for faculty to become familiar with the equipment and programming. Other colleges or programs hire a nonfaculty staff member to "run the computer." This person may have a medical or a computer/technology background that enables him or her to assist in simulation activities.

BYU uses nursing students to run the computer and assist in setting up and cleaning up for simulation experiences. Students apply to act as a student simulation worker after they have completed several medical–surgical simulations. Usually we have two to three students employed, each of whom works 5–10 hours per week. The student simulation workers assist with nearly all the simulation activities in the college, which relieves the faculty from having to both run the computer and facilitate the session. This strategy has supported the faculty and greatly decreased their anxiety.

Facilitators/Debriefing

In most colleges and programs, the faculty members do the facilitating and debriefing of the simulation activities. Some programs have faculty members who are assigned to the simulation laboratory as part of their workload. These faculty members facilitate and debrief sessions for the majority of the simulation activities. In most programs, faculty members do the facilitating/debriefing for their own course, sometimes with each person doing his or her

own clinical section. In other programs, one faculty member is assigned to do the facilitating/debriefing for all students in the same course.

Another option is to hire nonfaculty registered nurses to assist in the simulation activities. In their study, Foster, Sheriff, and Cheney (2008) reported that using nonfaculty registered nurses in simulation activities (as facilitators and in debriefing) resulted in nearly all of the students experiencing high self-confidence, satisfaction, and acquisition of knowledge with this learning methodology. The students also reported that the nonfaculty registered nurses were highly effective in the simulation activities.

BYU uses full-time faculty, part-time adjunct faculty, and nonfaculty registered nurses for facilitating and debriefing. The nonfaculty registered nurses have clinical experience, and students frequently state they enjoy the sharing of current and "real-life" patient experiences as related to the scenario.

Technology Support

Successful colleges and programs using high-fidelity patient simulators have adequate technology support. This support can be provided in a variety of ways. Some programs hire a technician to assist with the simulation activities. The technician may run the computer, program the computer for specific scenarios, and/or troubleshoot and fix problems with the equipment. Some technicians without medical background may struggle with programming, however, and need supervision and direction from the nursing faculty. Many programs rely on the information technology personnel from the college or school to assist with technology issues. Keeping the information technology personnel up-to-date and informed is a key to success.

The manufacturers of the simulation equipment provide support (some in person, others through phone consultation) and often training for those involved in support. Most manufacturers also offer warranties for the simulators. Although these warranties are costly, most programs view them as a needed insurance policy to ensure the ongoing functioning of the equipment.

Faculty/Staff Education

One of the most important keys to success with a high-fidelity patient simulator is education for faculty and staff. Given that high-fidelity simulation as a teaching/learning pedagogy is new to many nursing faculty, education and training are necessary to teach successful ways to use this technology. The education plan should be based on the expected role of the faculty and staff. If faculty members are expected to run the computer as well as facilitate and debrief simulation activities, then the plan would be different than that for those faculty members who will only facilitate sessions and debrief students.

If the expectation is that personnel will perform scenario development and editing as well as programming, the education will need to include instruction and practice in these tasks. The technology support personnel need a different education plan as well.

Many colleges and programs begin the education plan with an overview of high-fidelity simulation for all faculty and staff. The plan then includes sections based on the expectations for particular groups of personnel. Those expected to run or operate the computers need training in basic operation of simulator/computer/gases, basic troubleshooting, and assisting in role-play (such as healthcare providers). Those expected to facilitate sessions and debrief students need education in the principles of facilitating and purpose of debriefing. They also need to practice facilitating and debriefing, initially with other faculty members, then with a group of students while being supported by a faculty member with experience in high-fidelity simulation pedagogy. Those expected to develop scenarios will need education and training from the manufacturer of the specific simulation equipment. Depending on the extent of programming (i.e., programming of original scenarios versus editing existing scenarios), the training will need to be customized for the staff members who will undertake this role. Many colleges and programs purchase preprogrammed scenarios (such the METI PNCI) or obtain programming through the sharing of original scenarios through simulator user groups (program to program).

Jones and Hegge (2007) found that faculty members thought repeated education and training was preferable to in-depth initial training. The pedagogy has many aspects that must be learned; by providing ongoing updates and training, faculty members may better be able to integrate the concepts into their courses.

Costs

High-fidelity patient simulators are fairly expensive initially when compared to static manikins and task trainers. Most nursing colleges or programs use models that cost approximately $60,000. The initial purchase may be funded through donors or college/program funds.

During the purchase process, most manufacturers suggest purchase of a warranty as well. Keeping warranties in place will ensure that parts, repair, and maintenance of the unit will be covered. The warranty fee varies according to the manufacturer and the type of warranty. A basic warranty may include replacement parts and assistance with replacing parts, whereas an extended or supreme warranty may include having a technician visit the site to perform routine maintenance. Some colleges/programs decide not to purchase

a warranty and instead hire manufacturer technicians on an as-needed or hourly/daily charge basis.

The cost of the gases and compressed air required to run the high-fidelity patient simulator is often discussed in simulation literature. With the HPS, BYU did have construction costs to pipe the gases into the simulation area from a room across the hall (air is piped through the ceiling and walls). The HPS uses compressed air, carbon dioxide, oxygen, and nitrogen—it has a normal gas exchange. BYU utilizes gases provided by an on-campus source that is piped to all labs on campus. When BYU was running the HPS one to two days per week, the cost was $20–30 per month, which also included oxygen used in all other labs. With an ECS system, which uses only compressed air, no costs for gases are associated with the high-fidelity patient simulator.

As new scenarios are started with the high-fidelity patient simulator, new batches of disposable supplies will be needed. This increase in supplies is related to an increase in labs and the desire to have the simulation imitate the clinical site as closely as possible, rather than solely because a high-fidelity patient simulator is used. BYU does not require students to purchase laboratory packs; instead, the entire cost for lab experiences is part of its operating budget. With the use of a Microsoft Office Access database created for the NLC, in the past year we have determined how much is spent per student per semester for disposable medical supplies; this amount ranges from $10 to $104 depending on the semester. The highest cost is associated with the fundamental course, which teaches basic nursing skills and for which BYU provides actual medical supplies for each student. Very few supplies are reused during this course.

Depending on which equipment is already available, high-fidelity patient simulation activities may lead a program to purchase additional or new equipment, such as a crash cart, defibrillator, or additional intravenous pumps. At BYU, most of the equipment was already available. We did purchase a replacement defibrillator and an additional crash cart, rather than moving equipment from one lab to another, because this equipment is frequently used in both areas.

One of the goals of high-fidelity simulation activities is to mimic the actual clinical situation and patients involved. To set the scene in an attempt to "suspend disbelief," many programs obtain clothing, wigs, and items to make the scene more realistic. Initially, I gathered used clothing from family and friends. I also purchased jewelry and clothing, including shoes, eyeglasses, purses, and other items, from a used-clothing store. In addition, I purchased several wigs from a wig shop to simulate women and men of different ages. Halloween season provides a treasure trove of opportunities to find additional items such as tattoo sleeves, fake blood, and inexpensive artificial wounds.

BYU EVOLUTION AND FUTURE PLANS

After the CON obtained a METI HPS in 2001, BYU personnel took about a year to learn how to use the high-fidelity patient simulator, with one faculty member initially practicing on the unit and then adding other faculty to the training over time. We then invited students to volunteer to participate in simulation sessions. When BYU officially implemented scenarios into coursework, five scenarios were integrated in the basic medical–surgical course. Over the next five years, ten more simulation experiences were implemented in the remainder of the undergraduate clinical courses using adult, pediatric, and birthing simulators.

Our future plans include an expanded NLC with additional space for an additional adult simulator and an infant simulator. The college today is raising funds for this purpose, with a goal of obtaining $4 million to expand and remodel the NLC. The new area will include dedicated space for the additional simulators as well as the pediatric simulator and a control center. The control center will include the METI product METI LiVE, which facilitates the simulation of multiple patients from one control panel. The simulation may involve individual patients on one unit or may simulate the process of patient care (from emergency department, to operating room, then to patient care unit). The new simulation area will also include debriefing rooms so students can move out of the simulation room to participate in the debriefing session while the simulation room is prepared for the next group of students. Currently, the debriefing takes place in the simulation room because another area is not available.

Brigham Young University's College of Nursing is committed to excellence in nursing education, and one of our strategies is to have a state-of-art Nursing Learning Center to serve our students. High-fidelity patient simulation is an important aspect of these efforts. As we are able to expand the simulation areas, students will be able to have more high-fidelity patient simulation experiences. Until we are able to expand, the faculty and staff will continue strive to use our current resources in an effective manner to best accommodate students.

References

Foster, J. G., Sheriff, S., & Cheney, S. (2008). Using nonfaculty registered nurses to facilitate high-fidelity human patient simulation activities. *Nurse Educator*, *33*(3), 137–141.

Hodson-Carlton, K. E., & Worrell-Carlisle, P. J. (2005). The learning resource center. In D. M. Billings & J. A. Halstead (Eds.), *Teaching in nursing: A guide for faculty* (pp. 187–212). St Louis, MO: Elsevier Saunders.

Jeffries, P. R., & Norton, B. (2005). Selecting learning experiences to achieve curriculum outcomes. In D. M. Billings & J. A. Halstead (Eds.), *Teaching in nursing: A guide for faculty* (pp. 187–212). St Louis, MO: Elsevier Saunders.

Jones, A. L., & Hegge, M. (2007). Faculty comfort levels with simulation. *Clinical Simulation in Nursing Education: Journal of International Association for Simulation and Clinical Learning*, *3*(1). Retrieved July 5, 2008, from: http://www.inacsl.org

Ravert, P. (in press). Patient simulator sessions and critical thinking. *Journal of Nursing Education.*

Spunt, D., & Covington, B. G. (2008) Utilizing clinical simulation. In B. K. Penn (Ed.), *Mastering the teaching role: A guide for nurse educators* (pp. 233–251). Philadelphia: F. A. Davis.