

## **High Fidelity Simulation Use in an Undergraduate Nursing Program**

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### **Introduction**

Educational preparation of students in the 21<sup>st</sup> century must be accomplished within a changing educational delivery environment. This educational preparation of health care professionals, such as nurses, may take on an even more challenging role since the health care environment is also changing at a pace that is often difficult to keep up with. The availability of appropriate hospital-based clinical sites is diminishing, faculty shortages are projected to increase, and the need for additional nurses is increasing (Kovalsky & Swanson, 2004; O'Neil, 1998; Schoening, Sittner & Todd, 2006; American Association of Colleges of Nursing, 2007). These shifting dynamics pose challenges for faculty in meeting the educational needs of a diverse, non-traditional student nursing body and in preparing clinically competent health care professionals to meet the nation's demands (Jeffreys, 2007; O'Shea, 2003).

In addition the students that faculty face in the 21<sup>st</sup> century is more technologically savvy and need educational opportunities that blend traditional pedagogy with technologically advanced pedagogical principles. One method of technologically advanced pedagogy, high-fidelity simulation, can meet some of these challenges in preparing undergraduate nursing students.

### **What is High-Fidelity Simulation?**

Simulation is the artificial replication of the real world situation in which students or individuals work in order to gain knowledge and psychomotor skills to be able to critically think through complex scenarios in a safe and non-threatening environment (Gaba, 2001; Medley & Horne, 2005; Hovancsek, 2007). Well constructed simulation has many of the needed clinical aspects that a student can become immersed in so that when the clinical situation is presented in a real-life situation, the student may be more prepared to handle the decision-making process and implement higher level care. Simulation is "an approach to experiential learning and is a 'learner-

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centric' educational method, which integrates the cognitive, psychomotor, and affective domains in a non-threatening and safe environment (Lamb, 2007, p.34).

Simulation has been used in nursing at various fidelity levels for more than twenty years (Gaba, 2001; Bezyack, 2007, Hovancsek, 2007). Fidelity ranges on a continuum from low to high fidelity. Low fidelity simulation refers to the use of strategies such as basic written case studies, role playing, and administration of injections using partial task trainers (Bezyack, 2007, Hovancsek, 2007). According to Bezyack (2007) medium fidelity simulation involves the use of more realism but without the automatic cues such as the rise of the chest on inspiration or pupillary constriction from an administered medication needed for complete realism. High fidelity simulation provides the most realistic simulated experience with a mannequin that is computer-based and driven by pre-defined software derived scenarios or faculty-driven direct control such as the SimMan or Sim Baby from Laerdal.

So, what is high-fidelity simulation? It is a form of experiential learning that is learner-centered, integrating cognitive, psychomotor, and affective domains of learning through the use of SimMan or SimBaby in the High-Fidelity Simulation Center.

### **Historical Context**

Simulation use is not something new. Simulation in nursing began with the use of low-tech task trainers such as Mrs. Chase in the 1950's followed by Harvey Cardiology Patient Simulator (Hudson-Carlton & Worrell-Carlton, 2005; Nehring, Lashley, & Ellis, 2002; Schoening, Sittner & Todd, 2006). The use of more cost effective high fidelity simulations in nursing has only been available since the year 2000 (Gaba, 2001).

Simulation has been used in the training of professionals in settings such as aviation, armed services, maritime industries, and medicine since the 1930's but more focus has been placed on simulation over the last 30 years (Gaba, 2004; Hudson-Carlton & Worrell-Carlton, 2005; Lupien & George-Gay, 2001; Nehring, Lashley, & Ellis, 2002). There has been an evolution of high fidelity simulators starting with Sim One development by the Sierra Engineering Company in the late 1960's for use in anesthesiology (Gaba, 2001; Nehring, Lashley, & Ellis, 2002). As Gaba (2001) points out the model faded away since faculty did not have a good grasp of simulation technology and potential use in the preparation of health care professionals.

The 1980's and 1990's ushered in more advanced simulation models such as the Gainesville Anesthesia Simulator (GAS) and the Medical Educational Technologies, Inc (METI) human patient simulator (Gaba, 2001). Laerdal, from Stagner, Norway developed SimMan in 2000 followed by VitalSim released a few years later. These high-fidelity mannequins are generally set up in an environment that is as reality based as possible. In addition to the setting there are numerous audio-visual and technological components that go into the creation of a simulated clinical experience for the student to engage in.

### **Creation of the High-Fidelity Simulation Center**

The team at the College of Staten Island set out to visit several different simulation centers in the north east. Collaborating with personnel in the centers and then returning to the CSI campus we began to develop the center that is now in operation. Through careful planning, acquisition of

resources and space, and funding for equipment purchases and part-time support staff salaries, a simulation environment was created. Known as the Nursing Technology Neighborhood, the project began ten years ago as a multi-faceted nursing resource center for student nurses (Jeffreys, 2004; Steefel, 2008). The Nursing Skills Laboratory had traditionally supported the students' acquisition of cognitive and clinical skills through low to moderate fidelity simulation capabilities (Childs & Sepples, 2006; Terman, 2007).

The Video Simulation Center (VSC) was opened in the spring of 2007 to service a student body of approximately 350 per semester through the use of simulation with hand-held or tripod videotaping for student self-assessment of skills and evaluation of clinical decision-making performance. As a result of student and faculty evaluations of the pilot project phase-in and through a generous donation of one of the boroughs leading senators we were able to create a simulation center with a two-bedded patient room, observation area where the computers, monitors, hard drive, and audio-visual equipment is contained, and a debriefing room which is set-up as a Smart Classroom where video streaming of live or taped simulated clinical scenarios are viewed.

### **State-of-the-Art Audio-Visual Technology**

After close collaboration between the Nursing department, the Office of Technology Systems, and Library Media Services, the High-Fidelity Simulation Center was equipped with state-of-the-art technology, including two patient simulators and a simulation capture system. We installed the Laerdal Advanced Video System (AVS) to serve as a foundation for all of the audio-visual systems. In order to capture all the activities involved in a student simulation, two remotely controlled cameras record the interaction between students, faculty, and patient simulators. Similarly, a simultaneous recording of all audio and patient monitor activity provides a detailed account of the simulated clinical scenario. Faculty and technicians can operate the AVS from a control room, not seen by the students, and technical staff pre-programmed the camera and other equipment settings to provide a user-friendly environment. Faculty and students can review and debrief previously recorded sessions that have been stored on a digital file server.

All simulations, whether live or recorded, can be viewed in an adjacent Smart Classroom that is equipped with a dedicated computer, projector, and audio link, all of which are connected to the AVS, allowing full interactivity between the two facilities.

### **Application in Undergraduate Nursing Program**

The High-Fidelity Simulation Center (HFSC) was opened in fall 2008 with nursing courses and selected simulated clinical experiences phased in. Careful attention to setting the stage for students and faculty for an experience in the use of high fidelity simulation was considered. Faculty meets students in the HFSC for one clinical day mid way through their semester. An introduction to simulation, general overview, and objectives for the simulated clinical experience (SCE) is shared with the students. They then listen to an oral report for their patient, and then individually enter the HFSC to engage in the videotaped SCE. After the activity the students write nursing diagnoses, a care plan, and a nurse's note. When all students completed the activity, the videotaped vignettes of each student are reviewed as a group. Debriefing follows and students engaged in open dialogue concerning their performance. A reflection followed the debriefing where key questions are used to facilitate affective and cognitive thought. Debriefing and group discussion provided feedback to facilitate adult learning (Jeffries & Rogers, 2008; Sacdeva, 1996).

Questionnaires for faculty and students are designed and used to assess aspects of the simulations that might need improvement how participants feel about the experience. Responses on the questionnaires are overwhelmingly positive with over 90% of participants rating the experience as excellent. As a result of the SCE, subsequent skills practices are observed to be better in those students that participated in the simulations relative to those students that use standard skills practices.

### **Lessons Learned and Future Paths**

The team at the College of Staten Island has embarked on an exciting pathway in the world of high-fidelity simulation through the use of technologically advanced pedagogical principles. There are lessons to be learned from both the creation and subsequent use of the center. Open communications made the creation of the center seamless. Collaboration between all involved departments provided the key to the design, development, and implementation of the project. As we continue to use the center we have already begun to realize the need for expansion since all levels of the nursing department are looking towards including the facilities into their particular curriculums. In addition we are discussing possible ways for the center to be used with the community in mind possibly through the use of the ‘patients’ in situations that might occur in the home where first aid and resuscitation methods can be taught. The future is bright and full of possibilities for the use of this high-fidelity technologically based center for faculty, students, and community.

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