Proposal Guidance for Institutions Seeking Educational Grants for Human Patient Simulation

Offered by

CAE Healthcare

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Background

The purpose of this documentation package is to help educational facilities obtain human patient simulators through grant funding. CAE Healthcare recognizes the extraordinary opportunities presented by available grant funding, as well as the extraordinary challenges in pulling a proposal together in such a short time. With that recognition, the following information has been compiled to assist grant writers in preparing proposals to establish healthcare education clinical simulation programs. Where appropriate, supplemental materials are referenced and attached.

We hope that this information is valuable to you and furthers the message of CAE Healthcare's commitment as a comprehensive medical education and systems technology organization. Of course, we are directly available to you. Should you have any questions or need further information please contact your Regional Sales Manager as listed on the CAE Healthcare website, www.caehealthcare.com.

Elements of a Successful Proposal

To create a successful proposal, it is important to identify how clinical simulation equipment will be used as a solution to address clinical placement issues and how it will enhance healthcare education.

Identifying Clinical Simulation as a Solution

Clinical simulation equipment like the Human Patient Simulator (HPS®), iStan™, METIman®, Caesar®, Emergency Care Simulator (ECS®), PediaSIM®, and BabySIM® can address clinical placement issues at multiple levels. At the first level, patient simulation can be used as a recruiting tool to engage secondary and post-secondary students about the opportunities of a career in medical education and the exciting cutting edge technologies currently in use. Simulation captures the attention of the "video-game" generation and actively engages them in the learning process. Many healthcare education programs use simulation as a way not only to attract students into a particular field, but also to attract them to their particular school. At this level, **patient simulation can increase the supply of available healthcare and nursing students.**

At the second level, patient simulation keeps students actively involved in learning by offering the opportunity to apply knowledge learned from reading and lecture to the clinical setting thus "making it real." Students who are active learners remain positively engaged with their education and are ultimately more likely to matriculate. At this level, **patient simulation can increase the completion rates of healthcare education programs.**

At the third level, patient simulation keeps practicing healthcare providers engaged in their profession. Continuing education and professional development programs allow providers the opportunity to nurture themselves with enriched learning opportunities. Today's sophisticated health care quality assurance processes identify what areas need attention, yet most health care institutions rely on age-old didactic learning techniques, such as readings, lectures, and brown-bag lunches. As the proverb goes "HEAR, and I forget, SEE, and I remember, DO, and I understand." Patient simulation brings the quality and safety issue into reality to effectively impact patient care, by **allowing the healthcare provider to update their professional practice.**

Furthermore, patient simulation offers professional development opportunities to advance careers, such as EMT-P to RN and RN to Nurse Practitioner. At this level, **patient simulation can increase the retention of healthcare providers currently in practice through ongoing professional development.**

Administrative Buy-In

Applicants should include information regarding administration and faculty buy-in for the introduction of clinical simulation – how have you engaged these groups in the development application.

Experience over the past decade has shown a consistent trend among the more successful patient simulation programs. While it is possible to start a patient simulation program with a single advocate (e.g., instructor) and a funder (e.g., foundation gift, granting agency), this model is not sustainable without faculty buy-in and administration emphasis on long-term viability.

Engaging the administration requires demonstrating how patient simulation will impact the entire healthcare education program, including recruitment, curriculum, student learning, competency testing achievement, and student placement. Faculty will also want to know how patient simulation will impact their portion of the curriculum, the courses that they teach, and the time investment they will be required to make.

To address other concerns for nursing programs, CAE Healthcare offers the Program for Nursing Curriculum Integration (PNCI®), a product that includes a roadmap of all of the fundamental nursing education concepts and competencies. This roadmap encompasses a complete nursing undergraduate education curriculum. The PNCI includes 100 evidence-based, clinical simulations to plug into the matrix. Each clinical simulation offers patient care opportunities that are appropriate for student competencies at multiple levels of nursing student education. Each clinical simulation can be used for learning and competency assessment. Additionally, faculty development workshops are included to bring the faculty up to speed on patient simulation education and integration with existing courses. One of the benefits of the PNCI is that it is focused on nursing educational concepts and competencies, thus no adjustments to the curriculum are required because it is already based on the same foundation. Minimizing the impact on existing curriculum decreases faculty resistance to including patient simulation because it requires minimal incremental work on their part. The PNCI has been designed as a turnkey program to overlay patient simulation onto an entire nursing program, pervasive throughout the curriculum. A representative portion of the curriculum roadmap is included in Appendix A and a representative portion of an evidence-based Simulated Clinical Experience (SCE™) is included in Appendices B and C.

CAE Healthcare also offers Learning Applications similar to the PNCI that are specifically focused on easily integrating specific learning content into educational programs of a wide range of clinical specialties.

Administrative and faculty buy-in are also increased when they have confidence that the patient simulation program can be successful. To assist with this aspect, CAE Healthcare sponsors regional, national and international meetings of the Human Patient Simulation Network (HPSN). Not only do these meetings offer the opportunity to network with other simulation users, they provide a support system for those who are new to patient simulation and are looking for guidance for their programs. Each meeting offers workshops for users or potential users, by users, to learn more about the practical "how-tos" of patient simulation and to learn more about the innovative practices at other sites. Additionally, the meetings offer the opportunity to speak directly with CAE Healthcare staff in education and training, customer service, sales, and senior management. Dates for all HPSN Meetings and Conferences can be found on the HPSN website at www.hpsn.com.

Structure and Stewardship

As previously mentioned, past experience has shown a consistent trend among successful patient simulation programs. While it is possible to start a patient simulation program with a single advocate (e.g., instructor or financier), this model is difficult to sustain.

Many successful patient simulation programs open their facility and capabilities to all disciplines, not just the founding program. For a typical school, this means making the patient simulation environment open to other allied health sciences, such as pre-hospital and emergency medicine, cardiopulmonary technology, respiratory care, dentistry and physical and occupational therapy. In fact, many programs are not started by a single department or school. They span the entirety of the health education programs or the health center itself, involving multiple programs and multiple disciplines. This approach offers the benefits of a wider support base and the opportunity to provide richer learning experiences that involve multidisciplinary student providers, reflective of contemporary health care. Indeed, this is reflected in the HPSN Conference program, with workshop tracks in nursing, respiratory care, emergency medicine, anesthesia, surgery, disaster medicine, air transport and general interest categories.

In terms of structure, one program typically takes the lead, being the primary driver and funder for patient simulation technology enabled through the grant you are applying for. This program will want to clearly establish a responsibility (new or existing position) for the patient simulation environment and operations. This includes custody of the patient simulation equipment, maintenance of ancillary equipment and supplies for the patient care environment (e.g., patient monitors, clinical supplies), scheduling simulation time, and working with faculty to facilitate patient simulation exercises.

Despite an innate desire to "recover" start-up and operational expenses, experience has shown that a "fee-for-service" model tends to dissuade other academic disciplines from participating in the patient simulation program. What is more tenable (and often more valuable) is in-kind support, including personnel support (e.g., faculty from other programs instructing in simulation exercises), equipment support (e.g., patient monitors and clinical supplies), and physical space. Often, physical space requires support from the higher-level administration (Dean, Provost or Chair of the primary healthcare program). Note that the primary healthcare program bringing patient simulation to the educational facility has leverage to ask for space in exchange for opening the patient simulation program to all disciplines.

Fee-for-service models have been shown to be workable in certain instances, however, as discussed in subsequent sections, student course lab fees and continuing professional education programs can also provide an income source, which offset ongoing operational expenses of a patient simulation program.

Type of Simulation

Full-scale patient simulation offers the closest facsimile to actual patient care and will provide the best opportunity for learners to practice their critical thinking and patient care skills without threat of harm. Contemporary patient simulators are anatomical and physiological replicas of human adult, pediatric, and infant patients. Patient simulators exhibit clinical signs, such as blinking eyes, breathing, heart and breath sounds, as well as monitored parameters, such as ECG, blood pressure, and oxygen saturation. Only CAE Healthcare patient simulators have mathematical models of human physiology and pharmacology, thus the patient simulators automatically respond to therapeutic interventions, including ventilation, oxygen therapy, and intravenous medications. Students must assess and monitor the patient, apply critical thinking, perform psychomotor skills for treatment using real equipment, and repeat this cycle of patient

care, all within a replica of an actual patient care environment. Furthermore, because CAE Healthcare patient simulators are physiologically modeled, patient outcome is the direct result of the care provided, not the subjective assessment of an observer controlling the patient simulator. This enables objective assessment of clinical competencies and allows the instructor to focus on student learning, not operating the patient simulator.

Faculty Training

In your grant application, it is important to describe how the faculty will be trained and maintain their knowledge on simulation. Faculty should have time to learn the scope of the equipment and have access to specialists.

CAE Healthcare offers a variety of faculty education programs. First, Product Education is available for all patient simulators, at multiple levels. These programs are provided by faculty from CAE Healthcare Academy, all of whom are clinical educators and are CAE Healthcare staff and/or current users. These courses focus on how to facilitate learning using patient simulation. Each course runs two days and is instructed by a peer clinical educator.

Instruction by a peer clinician educator offers numerous benefits—they know the fundamental educational subject matter, they know the process of establishing and running a thriving patient simulation program, and they offer an additional specialist resource besides CAE Healthcare for advice and support.

As previously described, CAE Healthcare offers regional and international meetings of the Human Patient Simulation Network. There is no fee to participate in these meetings. The annual, global HPSN Conference includes workshops by users, for users, on the application of patient simulation for learning, assessment, and research. On average over 1,000 health care educators participate in this meeting, representing nursing, medicine, pre-hospital medicine, surgical, allied health, military medicine and more. Again, perhaps the greatest benefit of this conference is the opportunity to network with other users. All were once just starting out with patient simulation and all have been successful through a variety of means and experiences. The workshops and networking offer an invaluable opportunity to learn from other specialists in any field and interact with CAE Healthcare staff. Regional HPSN meetings offer similar opportunities at a smaller scale throughout the year. Information on past HPSN meetings can be found at www.hpsn.com.

As previously described, CAE Healthcare offers the Program for Nursing Curriculum Integration, which provides faculty development and instruction on implementing patient simulation pervasively throughout the undergraduate nursing education. This goes beyond the product education courses and focuses on faculty implementation of previously developed, evidence-based, clinical simulations into a school's existing nursing education curriculum. With instructional guidance from peer nurse educators, faculty will learn how to utilize the clinical simulation environment for student learning and assessment of core nursing clinical concepts and competencies. CAE Healthcare also offers Learning Applications focused on integrating simulation into many different clinical specialty areas.

Education courses, the networking possibilities at the HPSN meetings and the turnkey learning applications provide a wealth of training opportunity for the faculty.

CAE Healthcare also offers a variety of additional faculty support services. Applications support is provided as a standard component of the product warranty. More specialized services, such as consulting and custom simulation development, are also available.

Benefits to Population at Large

Identifying the population that will benefit from the use of clinical simulation is a key component to your grant application. Describing how they will benefit from the use of simulation is another critical part of developing a compelling grant. Some benefits to expound upon include:

- Learning of mechanical/process skills

- Remediation

- Evaluation

- Training

At least two key relevant populations can be served—students undertaking their principle coursework and practicing health care providers seeking continuing professional education opportunities. All of the benefits listed above (learning of mechanical/process skills, remediation, evaluation, training) apply to both groups, but with emphasis on different learning objectives.

Students

For students, learning of mechanical/process skills is fundamental to their undergraduate education and is an aspect where simulation offers clear learning benefits over the clinical environment. Psychomotor skills can be repeatedly rehearsed until proficiency is demonstrated. More importantly, however, physiologically based patient simulators allow students to witness and experience the results of their action and inaction as the patient responds or fails to respond to the intervention. Unlike the clinical environment, students can be allowed to perform a task incorrectly and deal with the consequences of their actions. Clearly, this type of experiential learning cannot take place in a clinical environment with a real patient. Moreover, given the increasing acuity of the patient population and decreasing access to patients for student learning, time spent in the clinical environment is increasingly valuable. Thus, students who learn mechanical/process skills in the patient simulation environment are better prepared to focus on the patient contact component of care upon entering the clinical arena.

Remediation is critical to maximizing matriculation rates, particularly when the need for healthcare providers is high, educational program enrollments are limited, and the investment in their education is also high. Students who drop-out or are unable to meet practice standards simply come at too great a cost. Remediation comes at two levels—first as a standard of the learning process, and second, as a final measure to help the marginal student succeed. One of the benefits of patient simulation is that tasks, skills, and simulations can be repeatedly practiced until mastered. In the past with clinical education, time was fixed and thus learning was variable. Students and instructors were reliant on the cases that happened to come into the clinical environment while students were on their rotations. If a particular patient case was not present during that fixed time period of clinical exposure, then didactic techniques, rather than experiential learning, were relied upon for student competency achievement. Patient simulation completely turns the tables. Instead, learning is fixed and time is variable. With specific learning objectives and established competencies, patient simulation offers students the opportunity to practice and hone critical thinking and psychomotor skills in a risk-free environment. Unlike the clinical environment, a full compendium of patient cases can be presented in a short period of time. More importantly, students can practice on those simulated patients until they have achieved mastery, all as part of the standard learning process. In the event that further remediation is required, however, additional special attention can be offered in the simulation environment for those who are at risk of "washing-out" of the program.

This technique has been shown effective with the 18-Delta Combat Medical Training Program at the Joint Special Operations Medical Training Center, Fort Bragg, North Carolina.

Patient simulation greatly facilitates the evaluation of clinical competency. First, unlike written tests and oral examinations, patient simulation provides the closest possible replica of actual patient care conditions. Students must think critically and take actions as they would with a real patient. Second, physiologically based patient simulators provide realistic, predictable, and repeatable interactions throughout the evaluation process. The simulated patient will automatically respond to correct, incorrect, or absence of treatment. Meanwhile, all internal and external patient variables are being recorded in real-time at the instructor workstation computer. Thus, objective measures of patient outcomes can be assessed: How low did the blood pressure get? How long was the patient not breathing? How low did the oxygen saturation get? How much medication was administered? Third, because all of this is playing out just like a real patient case, instructors can focus on evaluating the student, identifying strengths and areas for improvement, ultimately coming to a better understanding of the student's ability to provide competent patient care.

"Train as you care, care as you train" best sums up the benefits of simulation based training. If students are faced with a variety of patient care conditions in the simulation environment, then they will be better prepared to provide care in the clinical setting when faced with similar situations. Experiential learning creates confidence and competence. Moreover, in the clinical environment patient care is the top priority while in the simulation environment learning is the primary focus. Thus, from this perspective, patient simulation equals training.

Practicing Health Care Providers

Like their undergraduate student counterparts, practicing health care providers also benefit from patient simulation through continuing professional education programs. New techniques, new medications, new equipment, and new care pathways offer a variety of ongoing opportunities for training and learning in current mechanical/process skills. In certain circumstances, remediation may be required for caregivers who are returning to the health care workforce after having been out of practice for an extended period of time. Evaluation may also be required when bringing new providers onboard, particularly those who were formerly practicing overseas or for those whose practice is under review. As stated above, the benefits of patient simulation apply equally to learners during their principle education, as well as their life-long practice.

Integration Plan

Your grant should include a detailed plan for the integration of clinical simulation into the curriculum. Be sure to identify the process the school will use to adapt curriculum and timelines for integration.

There are several key milestones on the timeline for integration of clinical simulation into a healthcare program curriculum:

- Identification of lead faculty simulation educators (Who will lead the way and how will they get other faculty onboard?)

- Identification of target opportunities for integration (Where will we place our educational focus?)

- Identification of simulation educational partners (Who can best support us and help establish our patient simulation program?)

- Establishment of a start-up and acquisitions budget (How much will it cost?)

- Identification of funding sources (How will we pay for it?)

- Identification and acquisition of commercial solutions for our program needs (What companies can provide the best value and support with simulation equipment and educational products and services?)

- Identification and acquisition of space to support the clinical simulation program (Where will our patient simulation program be established?)

- Establishment of the patient simulation environment (Who will help us get set up?)

- Faculty development and product education (Who will teach our educators?)

- Integration into the curriculum (Who can show us how to do this?)

- First patient simulation student exercises (When do we bring the benefits to our learners?)

The CAE Healthcare Academy staff and Adjunct Faculty are well versed in asking and answering these questions. As previously mentioned, the entire faculty is comprised of peer clinician educators who have extensive experience in establishing and running patient simulation programs. Likewise, CAE Healthcare offers a wide variety of entry-level and advance-level patient simulators and product education courses to craft solutions customized to meet the needs of a specific customer. Finally, CAE Healthcare offers a variety of learning applications for several different disciplines, including the Program for Nursing Curriculum Integration, which includes a curriculum integration roadmap, preconfigured evidence-based clinical simulations, and an instructional program for faculty development and program integration. As a medical education and technology company, these are examples of the kinds of benefits offered by CAE Healthcare.

Application – Partnerships: Opportunities for Collaboration

How do you sustain simulation programs beyond the seed funding e.g., ongoing maintenance costs, etc.? There are several elements critical to sustaining simulation programs beyond the seed funding. As discussed previously, buy-in from the administration and faculty are critical. Top-level administration provides the institutional support, command emphasis, and commitment to "make it so" and the faculty ultimately are the ones who bring the energy to make it happen in the simulation environment. Beyond faculty energy and administrative emphasis, however, a commitment must be made to embed patient simulation into every aspect of healthcare education. As it has already established itself in approximately 1,000 healthcare programs in North America, patient simulation is becoming an established standard in undergraduate & graduate healthcare programs—so much so that it would be untenable to have a program without simulation. All of these aspects are important to the cultural acceptance and sustainability of patient simulation programs.

Financial commitment is also required. Depending upon the size and scope of a particular program, personnel support anywhere from 0.25 to 1.00 full-time equivalent is typical for dedicated support of a patient simulation program. Annual operating costs range from $1,000 to $20,000 per year, again depending upon size and scope of the program. Other ongoing operational costs include equipment warranty support, clinical supplies and lodging and per-diem costs to attend patient simulation conferences, such as the HPSN Conference.

Funding for these incremental ongoing costs can come from a variety of sources, such as student academic program lab fee assessments, health care provider continuing education courses, and other custom developed programs (e.g., medical equipment/pharmaceutical sales training, community outreach health care courses and more).

Partnership Benefits

Strong partnerships will give applicants a competitive advantage. Partnerships may be with:

- Other faculties or programs within the school
- Collaborative healthcare partners
- A local health facility

Be sure to describe the nature of the partnership and how it contributes to the strength of the program. As previously described, many successful patient simulation programs include all program disciplines encompassed within the health sciences campus. To participate, each discipline or department should bring something to the program, whether it is space, equipment, supplies, students or in-kind clinical educators. Of course, if student course lab fees are included, the more programs involved, the greater the student-based revenue to sustain the patient simulation program. Likewise, collaborative partnerships with other healthcare programs offer the opportunities to share costs for initial establishment of patient simulation programs. Multiple programs contributing to a multidisciplinary patient simulation program provide a solid base of internal strength for operational support.

A natural benefit of establishing a patient simulation program is that it immediately becomes a source of pride for the faculty, administration, and the school. Nothing says "high-tech, high-touch" more than patient simulation because even the layperson instantly understands the importance of applying advanced technology for health care education. At almost every school, the patient simulation environment is a stop on the VIP tour. Perhaps more importantly, not only does the value immediately ring true with alumni, donors, government officials, granting agencies, and educational accrediting organizations, but it also speaks volumes about the school—its commitment to educational excellence, ability to bring high-tech into the curriculum, and commitment to safe health care. Having the support from these groups offers long-term external influence and strength. Many schools actively reach out to demonstrate what they are doing with patient simulation.

Partnerships among schools are commonplace in healthcare education patient simulation programs. A salient example is the Chippewa Valley Nursing Alliance, a partnership between the University of Wisconsin-Eau Claire (UW-Eau Claire) and Chippewa Valley Technical College (CVTC). The principle objective of the alliance was to meet the regional rising demand for nursing providers by expanding school enrollments, resulting in an additional 32 new nurses in the workforce, annually. The agreement promotes dual-enrollments in the schools, providing opportunities for students to enroll in CVTC nursing classes and UW- Eau Claire general education classes, concurrently. The capacity for nursing education was recently expanded due to the opening of a new Health Education Center in Eau Claire. The health center combines traditional classrooms, a health clinic, and an extensive patient simulation environment. In part the expanded enrollment was facilitated by the patient simulation environment, which addresses a shortage of clinical sites for students to obtain firsthand experience.

Perhaps the greatest opportunity, however, lies in partnerships with local health care delivery organizations. Schools such as Columbus State Community College (CSCC) have been very successful in developing continuing professional education programs with a variety of local organizations, such as:

- OhioHealth Hospital System

- Upper Arlington Fire Department

- Rural/Metro Ambulance Company

- Regional Long Term Care Agencies

At Columbus State Community College, satisfaction rates scored 4.8 out of 5 (5 being the best score) with learners finding the simulation programs stimulating, challenging, and professionally rewarding. Potential learners include registered nurses, licensed practical nurses, emergency medical technicians, paramedics, respiratory care practitioners, certified registered nurse anesthetists, registered dental hygienists, and physicians.

Reaching out to the health care providing agencies provides added external strength by providing more valuable and rewarding continuing professional education programs. Such programs enhance health care provider job satisfaction because they know that their employer is committed to their professional education and to the high level of patient care quality that they are able to provide as a result of these educational experiences. The expectation, of course, is that higher job satisfaction translates to decreased professional attrition.

Application - Physical Space

Schools must give assurances that an appropriate physical space will be designated for clinical simulation.

Physical space dedicated for patient simulation is largely dictated by the clinical care environment being replicated. At a minimum, sufficient space must be allocated for the patient mannequin, patient bed, monitors, and other patient care equipment and clinical supplies. The space must also provide room for the patient simulator electronic equipment, compressed gas supplies, and instructor workstation.

Many schools initially elect to place the patient simulator in an already existing learning space or clinical classroom environment. In other instances, schools have partnered with health care organizations to embed the patient simulator into the clinical environment by taking advantage of available spaces that are no longer in use for patient care. This arrangement is advantageous because clinical cases immediately can be replicated in the simulation environment for further learning and exploration. In some exceptional examples, the more portable patient simulators (such at the iStan and METIman) are set-up in the classroom environment only when they are in use and stored in between learning sessions.

Renovation or construction of new facilities is NOT a requirement. However, some institutions do choose to leverage initiation of a patient simulation program to obtain additional funding and space to more fully replicate multiple patient care environments. Riverside Methodist Hospital (Columbus, Ohio) has established a Virtual Care Unit™, which replicates the chain of care as patients move from the emergency department, to operating room, to intensive care unit, and to patient care unit. This is part of a 20,000 square-foot Center for Medical Education and Innovation™.

Seeking outside expertise from others who have constructed simulation facilities is recommended.

Below is a sample of CAE Healthcare users who have recently constructed state-of-the-art patient simulation facilities and will freely offer their wealth of expertise to those looking to establish their own facilities. With each contact, a web link is provided with information directly pertaining to the patient simulation facilities.

Department of Medical Education

Riverside Methodist Hospital

3535 Olentangy River Rd.

Columbus, Ohio 43214

Phone: 614-566-5426

Web: http://www.ohiohealth.com/cmei

Health Education Center

Chippewa Valley Technical College

620 W. Clairemont Avenue

Eau Claire, Wisconsin 54701-6162

Phone: 715-833-6417

Web: http://www.cvtc.edu

Video tour of Health Education Center:

http://www.cvtc.edu/future-students/visit/virtual-tour/pages/health-education-center.aspx

Education Coordinator

Mayo Clinic

200 First Street SW Rochester, MN 55905

Phone: 507-266-0684

Web: http://www.mayo.edu/multidisciplinary-simulation-center

Some vendors offer free consultation on physical space requirements and information on how to set up a lab. CAE Healthcare offers complimentary consultation on physical space requirements and information on how to set up a patient simulation environment. This includes consultation with clinical educators, school administrators, facilities managers, and architectural firms. The institutions cited above are outstanding examples that highlight the results of the extent of this service. Please contact your Regional Sales Manager to request a consultation visit from CAE Healthcare.

Application – Sustainability

How will you maintain your clinical simulation lab? Most funding is one time only. Schools must demonstrate that they have a plan for ongoing sustainability.

As previously stated, ongoing sustainability requires buy-in and commitment from the administration and faculty. Beyond initial buy-in, the administration and faculty must remain involved in the ongoing success of the program as patient simulation becomes embedded in the educational curriculum. They must see their success as aligned with the success of the program, which provides a sustainable internal foundation of support.

External sustainability comes in the form of support from alumni, government officials, accrediting organizations, granting agencies, benevolent donors, and the local community. A vibrant patient simulation program speaks volumes about a school's commitment to education and health care, as well as its ability to infuse high-tech into the learning process. Schools such as Chippewa Valley Technical College (cited above) attribute the success of their educational programs, in part, to showcasing the patient simulation program to outside funders, principally as demonstrable evidence of the school's capabilities to bring advanced educational technologies into community-based health care programs. Over a two-year period, Chippewa Valley Technical College leveraged this technique to secure $12 million in external funding (one-third of which came from individual donors) for their new Health Education Center.

Identifying Ongoing Costs

This is an opportunity for you to demonstrate your understanding of how the equipment will be used.

As previously described, ongoing costs include:

- Personnel costs for operation and maintenance, typically 0.25 to 1.00 full- time equivalent.

- Warranty support costs for patient simulation equipment (see attached spreadsheet for details)

- Costs for ancillary equipment, clinical supplies, and compressed gases, typically ranging from $1,000 to $8,000 per year.

- Cost to participate in continuing education conferences, such as HPSN, to keep abreast of current practice in patient simulation education.

Planning for Ongoing Improvements

What are the school's plans for ongoing improvements with this initiative and how do you plan to lever this funding to remain a leader in healthcare education?

As an educational practice, high fidelity, physiologically based patient simulation education has only existed for about twelve years. Thus, this arena is fertile ground for educational innovation, research, and application for enhancing clinical care—all of which offer opportunities to leverage a leadership role in healthcare education. Educationally, we are seeing the first PhD graduates whose dissertation focused on the application of patient simulation for nursing and medical education. We are seeing research studies that show the educational validity of patient simulation education for learning and assessment. However, we have yet to see patient simulation included along with written and oral tests for high-stakes licensure examinations and credentialing. Finally, while we are seeing the first uses of patient simulation for continuing professional education, we are just now starting to see patient simulation embedded with the practice of health care as a standard tool for continuous quality improvement and enhancement of patient safety. These are but a few of the opportunities that lie ahead in the next decade of contemporary patient simulation.

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Appendix A: Representative Portion of the Program for Nursing Curriculum Integration (PNCI) Roadmap

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Assessment of Vital Signs

Life-Threatening Vital Signs

Focus Areas	PNCI Category	SCEs
	Fundamentals	• Postoperative Hemorrhage • Variations in Heart Rate with Drug Influences and Effects
	Medical-Surgical	• Acute Kidney Injury • Anaphylactic Reaction to Blood Administration • Brain Attack with Thrombolytic Therapy on the Medical-Surgical Unit
	High Acuity	• Acute Coronary Syndrome • Acute Heart Failure Exacerbation • Acute Respiratory Distress Syndrome • Acute Respiratory Distress Syndrome Secondary to Postoperative Pneumonia • Basic Dysrhythmia Recognition and Management • Cardiogenic Shock Secondary to Acute Myocardial Infarction • Cardiopulmonary Arrest • Gastrointestinal Bleed Secondary to Esophageal Varices • Intentional Overdose of a Hypnotic • Motor Vehicle Collision with Hypovolemic Shock • Postoperative Heart Valve Replacement • Postoperative Pulmonary Embolism • Sepsis, Septic Shock and Multiple Organ Dysfunction Syndrome • Spinal Cord Injured Patient with Neurogenic Shock

Analysis of Abnormal Vital Signs

Focus Areas	PNCI Category	SCEs
	Assessment	• Abnormal Variations of Heart Rate in a 16-Year-Old • Abnormal Variations of Heart Rate in an 87-Year-Old • Basic Assessment of the Adult Patient with Asthma • Basic Assessment of the Athlete with Fluid and Electrolyte Imbalance • Basic Assessment of the Cardiac Patient • Basic Assessment of the Hip Replacement Patient • Basic Assessment of the Postoperative Gastrectomy Patient • Basic Assessment of the Spinal Cord Injury Patient
	Fundamentals	• Postoperative Care of the Patient with Complications: Pneumonia • Suctioning and Tracheostomy Care with Hypoxia
	Medical-Surgical	• Chest Tube Insertion and General Ongoing Care • Chronic Heart Failure Exacerbation • Diabetic Ketoacidosis • Electrolyte Imbalance of the Older Adult • Gastrointestinal Bleed Secondary to Aspirin Abuse • Spinal Cord Injury

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Appendix B: Sample PNCI Simulated Clinical Experience - Faculty

Jillian Ferguson

Age: 46

Weight: 70 kg

Base: Norma L. Female

Overview

Synopsis

Recently divorced, 46-year-old Jillian Ferguson was admitted to the hospital yesterday morning for a total abdominal hysterectomy with bilateral salpingo-oophorectomy due to multiple large uterine fibroids. On her first postoperative day the patient develops the complication of hypovolemia that requires a blood transfusion.

This Simulated Clinical Experience (SCE) automatically progresses to anaphylaxis and subsequent shock states without prompt recognition of the transfusion reaction. With prompt recognition and intervention, the patient stabilizes.

This SCE consists of eight states that progress from onset of anaphylaxis which progresses from mild to severe. Automatic transitions are used in States 3, 4, 5 and 7 and are based on a programmed duration of time in each state. Manual transitions are used in States 1, 2 and 6. With manual transitions, facilitators should advance to the applicable state when appropriate interventions are performed.

In **State 1 Initial Assessment**, the patient demonstrates a HR in the 100s, BP in the 80s to 90s/50s, RR in the upper teens, SpO$_2$ in the mid 90s on oxygen at 2 LPM via nasal cannula and a temperature of 37.6C. Her breath sounds are clear and bowel sounds are hypoactive. The patient's cardiac rhythm is sinus tachycardia. She has a dry and intact abdominal wound dressing with a small amount of previously noted serosanguinous drainage. There is minimal discharge on her perineal pad. The patient has a urinary catheter in place draining clear yellow urine at 50 mL/hour. An IV fluid infusion is present in her right forearm and the site is without redness or swelling. Peripheral pulses are equal and there is no peripheral edema. She is complaining of increasing abdominal incision pain. When the learners request the results of the morning lab work, the facilitator should provide the following report: *CBC: Hgb 7.8, Hct 25%; Chemistry: Na 137, K 4.0, Cl 104, Glucose 90, BUN 18, Creatinine 1.1*. The learners are expected to assess the patient, report abnormal vital signs and identify appropriate medical and nursing management of the patient. The learners should also demonstrate effective verbal and written communication skills with the healthcare provider and patient.

The healthcare provider orders 2 units of packed red blood cells (PRBCs) to be transfused. The learners are expected to recognize that a second IV access is needed and insert a second IV. Local protocols to obtain and prepare the PRBCs for administration should be instituted. Patient education related to the blood transfusion should be completed. Baseline vital signs should be assessed and documented. Once the learners prepare the blood for safe administration and obtain consent to transfuse, the scenario should be manually advanced to **State 2 Blood Started 2 Hours Later**.

In **State 2 Blood Started 2 Hours Later**, the patient demonstrates a HR in the 110s, BP in the 80s/50s, RR in the upper teens, SpO_2 in the mid 90s on oxygen at 2 LPM via nasal cannula and a temperature of 37.6C. Her breath sounds are clear and bowel sounds are hypoactive. The patient's cardiac rhythm is sinus tachycardia. The patient continues to be restless and complains of abdominal pain. The learners are expected to administer the blood per local protocol.

When the learners administer the transfusion, the facilitator should open the Intervention Option and choose Fluids: PRBC Infusion: 175 mL/hr.

After the learners have set up and commenced the blood transfusion, the scenario should be manually advanced to **State 3 Beginning Anaphylaxis**.

In **State 3 Beginning Anaphylaxis**, the patient demonstrates a HR in the 110s, BP in the 80s/50s, RR in the low to mid 20s, SpO_2 in the low to mid 90s on oxygen at 2 LPM via nasal cannula and a temperature of 38.6C. Her breath sounds are clear and bowel sounds are hypoactive. Her cardiac rhythm is sinus tachycardia. The patient begins to complain of mild dyspnea and chest tightness. The learners are expected to repeat a focused assessment and identify the change in the patient's condition.

When learners identify anaphylaxis and provide appropriate IV fluid interventions, the facilitator should open the Intervention Option and choose Fluids: PRBC Infusion: Stop and then choose Fluids: Crystalloids: 250 mL/hr.

When learners titrate the oxygen, the facilitator should open the Oxygen Intervention Option and choose Oxygen: Nasal Cannula 4 LPM.

If the learners notify the healthcare provider of the change in condition, receive orders and administer epinephrine, the scenario should be manually transitioned to **State 7 Epinephrine Administered**. If the learners do not administer epinephrine within five minutes, the scenario automatically transitions to **State 4 Mild Anaphylaxis**.

The vital signs in **State 7 Epinephrine Administered** have been programmed to reflect the patient's response to interventions. Therefore, the facilitator does not need to administer epinephrine in the software as the learners administer the medication at the bedside.

In **State 4 Mild Anaphylaxis**, the patient demonstrates a HR in the 120s to 130s, BP in the 80s/50s, RR in the low to mid 20s, SpO_2 in the low 90s on oxygen at 4 LPM via nasal cannula and a temperature of 38.6C. Her breath sounds exhibit wheezing and her tongue has begun to swell. She complains of chills and abdominal pain and states that her dyspnea and chest tightness are getting worse. Her cardiac rhythm is sinus tachycardia. Her bowel sounds are hypoactive. The learners are expected to repeat a focused assessment and identify the change in the patient's condition.

When learners identify anaphylaxis and provide appropriate IV fluid interventions, the facilitator should open the Intervention Option and choose Fluids: PRBC Infusion: Stop and then choose Fluids: Crystalloids: 250 mL/hr.

When learners titrate the oxygen, the facilitator should open the Oxygen Intervention Option and choose Oxygen: Non-Rebreather Mask 70% FiO_2.

If the learners notify the healthcare provider of the change in condition, receive orders and administer epinephrine, the scenario should be manually transitioned to State 7 Epinephrine Administered. If the learners do not administer epinephrine within 75 seconds, the scenario automatically transitions to **State 5 Worsening Anaphylaxis**.

The vital signs in **State 7 Epinephrine Administered** have been programmed to reflect the patient's response to interventions. Therefore, the facilitator does not need to administer epinephrine in the software as the learners administer the medication at the bedside.

In **State 5 Worsening Anaphylaxis**, the patient demonstrates a HR in the 130s, BP in the 70s to 80s/40s to 50s, RR in the high 20s, SpO_2 in the low 90s on oxygen at 70% via non-rebreather facemask and a temperature of 38.6C. Her breath sounds are wheezing in all lobes, and her tongue is swollen. Her cardiac rhythm is sinus tachycardia. The patient complains of hoarseness and nausea and becomes more restless. Her bowel sounds are hypoactive. The learners are expected to repeat a focused assessment and identify the change in the patient's condition.

When learners identify anaphylaxis and provide appropriate IV fluid interventions, the facilitator should open the Intervention Option and choose Fluids: PRBC Infusion: Stop and then choose Fluids: Crystalloids: 250 mL/hr.

If the learners notify the healthcare provider of a change in the patient's condition, receive orders and administer epinephrine, the scenario should be manually transitioned to **State 7 Epinephrine Administered**. If the learners do not administer epinephrine within one minute, the scenario automatically transitions to **State 6 Severe Anaphylaxis**.

The vital signs in **State 7 Epinephrine Administered** have been programmed to reflect the patient's response to interventions. Therefore, the facilitator does not need to administer epinephrine in the software as the learners administer the medication at the bedside.

In **State 6 Severe Anaphylaxis**, the patient demonstrates a HR in the 140s BP in the 70s to 80s/40s to 50s, RR in the high 20s to low 30s, SpO_2 in the low 90s on oxygen at 70% via non-rebreather facemask and a temperature of 38.6C. Her breath sounds are wheezing in all lobes, and her tongue is swollen. Her cardiac rhythm is sinus tachycardia. The patient complains of impending doom and is extremely anxious. Her bowel sounds are hypoactive. The learners are expected to repeat a focused assessment and identify the change in the patient's condition.

When learners identify anaphylaxis and provide appropriate IV fluid interventions, the facilitator should open the Intervention Option and choose Fluids: PRBC Infusion: Stop and then choose Fluids: Crystalloids: 250 mL/hr.

When the learners notify the healthcare provider of a change in condition, receive orders and administer epinephrine the scenario should be manually transitioned to **State 7 Epinephrine Administered**.

The vital signs in **State 7 Epinephrine Administered** have been programmed to reflect the patient's response to interventions. Therefore, the facilitator does not need to administer epinephrine in the software as the learners administer the medication at the bedside.

In **State 7 Epinephrine Administered**, the patient demonstrates a HR in the 150s, BP in the 120s/90s, RR in the low 20s, SpO_2 in the mid 90s on oxygen at 70% via non-rebreather facemask and a temperature of 38.6C. Her breath sounds are clear in all lobes, and her tongue is not swollen. Her cardiac rhythm is sinus tachycardia. The patient remains anxious. Her bowel sounds are hypoactive. The learners are expected to repeat a focused assessment and identify the change in the patient's condition. The learners should monitor the side effects of the medication given. The learners should remain with the patient and demonstrate effective communication.

After two minutes the scenario automatically transitions to State 8 Complete Recovery.

In **State 8 Complete Recovery**, the patient demonstrates a HR in the 90s to 100s, BP in the 110s to 120s/80s, RR in the high teens to low 20s, SpO_2 in the high 90s on oxygen at 10 to 15 LPM via non-rebreather facemask and a temperature of 38.6C. Her breath sounds are clear in all lobes, and her tongue is not swollen. Her cardiac rhythm is sinus tachycardia. The patient remains anxious. Her bowel sounds are hypoactive. The learners are expected to repeat the assessment of the patient and identify the change in the patient's condition. The learners should monitor the side effects of the medication given. The learners should remain with the patient and demonstrate effective communication with the patient.

This SCE prepares the learner for the following items of the NCLEX-RN test format:

NCLEX-RN Test Plan:
　X Safe and Effective Care Environment
　　　X Management of Care
　　　X Safety and Infection Control
　X Health Promotion and Maintenance
　X Psychosocial Integrity
　X Physiological Integrity
　　　X Basic Care and Comfort
　　　X Pharmacological and Parenteral Therapies
　　　X Reduction of Risk Potential
　　　X Physiological Adaptations

Authors

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Background

Patient History

Past Medical History: Patient has a history of large uterine fibroids. Over the past two years, she had increasing pain that was not relieved with medication, an excessively large menstrual flow and long-standing anemia refractory to standard treatment. Despite earlier recommendations from her healthcare provider to seek surgical intervention, she elected to wait due to multiple personal issues including her recent divorce and having two teenage children at home. During this time of postponing the surgery, she required two outpatient blood transfusions due to the severe anemia. Her significant preoperative lab values included a hemoglobin of 8.4 and a hematocrit of 32%

Allergies: No known allergies

Medications: Over-the-counter daily vitamins and iron supplements

Code Status: Full code

Social/Family History: Recently divorced with two teenage children at home

Handoff Report

The learner is expected to notify the healthcare provider of abnormal assessment findings where appropriate and necessary.

The report should follow the SBAR format and include:

Situation:
The patient is a recently divorced, 46-year-old female in her first day post-operative following a total abdominal hysterectomy with bilateral salpingo-oophorectomy due to multiple large uterine fibroids. She has an increased respiratory rate and low blood pressure.

Background:
Upon admission on the morning of her surgery, the patient demonstrated a HR of 78, BP of 110/70, RR of 16 and a temperature of 37C. Her blood type is A negative. Intraoperatively, her estimated blood loss was 450 mL. Her postoperative period has been uneventful so far. The patient slept well last night but has been awake complaining of discomfort for a few hours.

Assessment:

Vital Signs: HR 88, BP 102/60, RR 18, SpO$_2$ 92, Temp 37.4C

General Appearance: Restless

Cardiovascular: Sinus rhythm

Respiratory: Clear in all lobes. Nasal cannula in place with oxygen at 2 LPM

GI: Hypoactive bowel sounds. Abdomen soft. Complaining of increasing pain around incision. Abdominal dressing intact with small amount of previously noted serosanguinous drainage

GU: Urinary catheter in place. Urine output 50 mL/hour. Perineal pad in place with scant sanguinous drainage

Extremities: No edema. Full range of motion to extremities

Skin: Warm, dry and pale

Neurological: Alert and oriented to person, place and time. Pupils equal, round, reactive to light and accommodation. No neurological deficits

IVs: IV in the right forearm, patent and non-reddened. Dextrose 5% in Lactated Ringers with 20 mEq KCl/Liter infusing at 125 mL/hour

Labs: Drawn this morning, results pending

Pain: Has morphine patient-controlled analgesia (PCA) that she is using

Recommendations:

Perform routine assessment and obtain lab results

Orders

Initial Healthcare Provider's Orders:
Admit to Medical Surgical Unit
Diagnosis: Status post total abdominal hysterectomy with bilateral salpingo-oophorectomy
Full code
NPO until passing flatus, then begin clear liquid diet and advance as tolerated
Out of bed to chair evening of surgery and then ambulate 3 times per day
Vital signs every 4 hours
Notify healthcare provider for acute changes
Continuous pulse oximeter
Oxygen to maintain SpO$_2$ greater than 92%
IV of D5LR with KCl 20 mEq per liter at 125 mL/hour
Morphine PCA: 1 mg/mL concentration; 1 mg every 15 min with 4-hour lockout of 16 mg
Ondansetron 4 mg IV push every 8 hours prn nausea
Ketorolac 30 mg IV push every 6 hours for 3 days
Ferrous sulfate 325 mg PO twice a day with meals, begin when oral intake resumes
Docusate sodium 100 mg PO daily
Milk of Magnesia 30 mL PO daily prn constipation
Incentive spirometer every hour while awake
Sequential compression devices (SCD) on while in bed
Urinary catheter to bedside drainage, discontinue morning of postoperative day one
Intake and output every shift
AM labs: Hemoglobin and hematocrit, BUN and electrolytes, creatinine, glucose

Orders Received in State 1:
Transfuse 2 units packed red blood cells (PRBC) 2 per protocol
Decrease D5LR with KCl 20 mEq per liter to 30 mL/hr while blood is infusing

Transfusion Reaction Orders Received in State 3, 4, 5 or 6:
NS at 200 mL/hour
EPINEPHrine 1:1000 0.5 mg IM
Bilirubin, LDH, haptoglobin and urinalysis for hemoglobinuria
Administer diphenhydrAMINE 25 mg IV push
MethylPREDNISolone 100 mg IV push STAT

Preparation

Learning Objectives

- Differentiates between, discusses the implications for and describes the differences in the nursing management for the various types of blood and blood products (UNDERSTANDING)
- Formulates a nursing plan of care for a patient receiving blood or blood products (CREATING)
- Prioritizes the implementation and approach to the nursing management of a patient receiving blood or blood products (ANALYZING)
- Evaluates the patient's response to interventions and modifies the nursing care as appropriate for the patient experiencing an adverse reaction to blood administration (EVALUATING)
- Identifies and differentiates clinical manifestations of various blood transfusion reactions (APPLYING)

Recommended eDose modules for learners to complete before the SCE:
   Medication Dosage Calculation Skills
      X Medication Orders & S. I. Units
      X Tablets & Capsules
         Liquid Medicines
      X Injections
      X I.V. Infusions
   Injectable Medicines Therapy
      X Slow I.V. Injections
      X Intermittent Infusions
         Continuous Infusions
   Pediatrics

This SCE addresses the following QSEN Competencies:
   X Patient-Centered Care
   X Teamwork and Collaboration
   X Evidence-Based Practice
      Quality Improvement
   X Safety
      Informatics

Learner Performance Measures

Essential Performance Measures for SCE:
- Reviews patient's medical record
- Performs hand hygiene before and after patient contact
- Demonstrates appropriate use of personal protective equipment
- Introduces self to patient
- Verifies patient identity with two identifiers
- Conducts basic environmental safety assessment and maintains safety measures
- Uses therapeutic communication to establish rapport and reduce patient anxiety
- Calculates and administers medications safely according to the Six Rights
- Provides developmentally appropriate education
- Evaluates effectiveness of communication
- Evaluates effectiveness of education
- Documents all findings, interventions and patient responses

State 1 Initial Assessment:
- Performs a complete physical assessment
- Monitors pulse oximetry
- Evaluates vital signs and explains abnormal findings
- Evaluates pain
- Ensures accuracy of IV fluid rate and delivery
- Requests laboratory values
- Discontinues urinary catheter
- Monitors output
- Reports abnormal assessment findings and lab results to the healthcare provider

Performance Measures after State 1 Orders Received:
- Determines that second IV access is needed, selects appropriate gauged catheter and begins line using aseptic technique
- Institutes protocol to obtain and prepare the PRBCs for administration
- Obtains baseline vital signs and documents on correct form
- Prioritizes teaching need related to blood transfusion
- Obtains consent for transfusion
- Prepares for PRBC transfusion using appropriate equipment and IV solution

State 2 Blood Started 2 Hours Later:
- Performs focused assessment
- Initiates transfusion of PRBCs per protocol
- Remains with patient after blood is started
- Reassesses vital signs every 5 minutes for the first 15 minutes of the transfusion (or per protocol)
- Documents appropriately on transfusion form

State 3 Beginning Anaphylaxis:
- Performs focused assessment and evaluates findings
- Monitors vital signs, pulse oximetry, cardiac monitor and symptoms
- Identifies changes in the patient's condition
- Increases oxygen delivery to 4 LPM per nasal cannula
- Immediately stops transfusion and begins 0.9% Sodium Chloride infusion with new IV tubing
- Calls healthcare provider STAT to notify of change in condition and clarifies verbal orders by reading them back to healthcare provider
- Notifies blood bank of potential reaction and reviews protocol
- Communicates appropriately with dyspneic patient
- Remains with patient

State 4 Mild Anaphylaxis:
- Performs focused assessment and evaluates findings
- Monitors vital signs, pulse oximetry, cardiac monitor and symptoms
- Identifies changes in the patient's condition
- Applies oxygen per non-rebreather mask at 10 to 15 LPM
- Immediately stops transfusion and begins 0.9% Sodium Chloride infusion with new IV tubing
- Calls healthcare provider STAT to notify of change in condition and clarifies verbal orders by reading them back to healthcare provider
- Notifies blood bank of potential reaction and reviews protocol
- Communicates appropriately with dyspneic patient
- Remains with patient

State 5 Worsening Anaphylaxis:
- Performs focused assessment and evaluates findings
- Monitors vital signs, pulse oximetry, cardiac monitor and symptoms
- Identifies changes in the patient's condition
- Immediately stops transfusion and begins 0.9% Sodium Chloride infusion with new IV tubing
- Calls healthcare provider STAT to notify of change in condition and clarifies verbal orders by reading them back to healthcare provider
- Notifies blood bank of potential reaction and reviews protocol
- Communicates appropriately with dyspneic patient
- Remains with patient

State 6 Worsening Anaphylaxis:
- Performs focused assessment and evaluates findings
- Monitors vital signs, pulse oximetry, cardiac monitor and symptoms
- Identifies changes in the patient's condition
- Immediately stops transfusion and begins 0.9% Sodium Chloride infusion with new IV tubing
- Calls healthcare provider STAT to notify of change in condition and clarifies verbal orders by reading them back to healthcare provider
- Notifies blood bank of potential reaction and reviews protocol
- Communicates appropriately with dyspneic patient
- Remains with patient

Performance Measures after Transfusion Reaction Orders Received in State 3, State 4, State 5 or State 6:
- Notifies lab of orders and states how to obtain specimens
- Ensures accuracy of IV fluid and rate change
- Ensures crash cart is at the bedside
- Attaches patient to cardiac monitor
- Administers epinephrine, diphenhydramine and methylprednisolone safely using the Six Rights

State 7 Epinephrine Administered:
- Performs focused assessment and evaluates findings
- Monitors vital signs, pulse oximetry, cardiac monitor and symptoms
- Anticipates and monitors for side effects of epinephrine administration
- Identifies changes in the patient's condition

State 8 Complete Recovery:
- Performs focused assessment
- Monitors vital signs, pulse oximetry, cardiac monitor and symptoms
- Identifies improvement in the patient's condition
- Increases rate of primary IV fluids to 125 mL/hour

Preparation Questions

- Discuss the nursing management of the postoperative patient who has undergone a total abdominal hysterectomy with bilateral salpingo-oophorectomy.
- Identify priority nursing care to prevent potential complications following this type of surgery.
- Discuss treatment modalities for potential complications as identified above.
- Discuss the standard of nursing care when transfusing any blood product.
- Summarize the assessment data needed to detect an adverse blood transfusion reaction.
- Describe blood transfusion reactions including clinical manifestations, treatment, and potential short and long-term complications.
- Describe the pathophysiology of anaphylaxis.
- What is the protocol for the treatment of anaphylaxis?

Equipment and Supplies

IV Supplies
20 gauge IV catheter (2)
Transparent dressing (2)
Distilled water 1000 mL (4) labeled:
- Dextrose 5% in Lactated Ringers with 20 mEq KCl
- 0.9% Sodium Chloride
- Lactated Ringers
- Dextrose 5% in Water

Distilled water colored with red food coloring 250 mL (labeled Packed Red Blood Cells)(2)
Y-type blood administration set
IV tubing
IV pump (2)

Medication Supplies
PCA pump and tubing
Distilled water 50 mL (labeled Morphine 1 mg/mL)
Distilled water 2 mL vial (2) labeled:
- Ondansetron 4 mg/2mL
- Ketorolac 30 mg/mL

Distilled water 1 mL vial (labeled DiphenhydrAMINE 50 mg/mL)
Cartridge syringe (labeled
EPINEPHrine 1:1000 1 mg/mL)
Powder vial (labeled
MethylPREDNISolone 125 mg/reconstitute with 2 mL 0.9% Sodium Chloride to get a concentration of 125 mg/2 mL)
Distilled water 5 mL vial (labeled
0.9% Sodium Chloride)
Simulated oral medications labeled:
- Ferrous sulfate 30 mg
- Docusate sodium 100 mg
- Magnesium Hydroxide (360 mL bottle)

Oxygen, Airway and Ventilation Supplies
Oxygen flowmeter
Oxygen source
Nasal cannula
Non-rebreather mask
Incentive spirometer

Genitourinary Supplies
14 Fr urinary catheter
Distilled water 1000 mL for urine source

Dressing Supplies
4X9 Dressing
1 inch cloth tape (1 roll)

Miscellaneous
Patient chart with appropriate forms and order sheets
Patient identification band
Stethoscope
BP cuff adapted for use with simulator
Non-sterile gloves (1 box)
Sharps container
Audio and video recording devices
Female wig
Simulated breasts
Red, blue, and yellow food coloring
Blood bank label
Sequential compression devices
Perineal pad

Monitors Required
ECG
NIBP
SpO_2

Notes
Facilitator Notes

This SCE was created with the patient Jillian Ferguson, and only this patient can be used. The physiological values documented indicate appropriate and timely interventions. Differences will be encountered when care is not appropriate or timely. The facilitator should not click "Run" until ready to start the SCE.

Learners should perform an appropriate physical exam. The facilitator or patient should verbalize the physical findings the learners are seeking but are not enabled by the simulator (such as pain on palpation). The facilitator should use the microphone and/or preprogrammed vocal or audio sounds to respond to the learners' questions, if present on your simulator.

Where appropriate, do not provide information unless specifically asked by the learners. In addition, ancillary results (e.g., ECG, chest x-ray, labs) should not be provided until the learners request them.

If the patient becomes unconscious in the SCE, then speaking and vocalization should cease.

It is important to moulage the simulator to enhance the fidelity or realism of the SCE. For this patient:
- Dress the simulator in a hospital gown with identification band, simulated breasts and wig
- Provide several types of IV solutions for learners to choose from, even though some may be inappropriate for administration with blood
- Simulated packed red blood cells may be made by adding red and blue food coloring to achieve the desired color. Obtain a label from a local blood bank. Examples are also available on the Internet. Obtain blood bank forms from your local hospital
- Abdominal dressing saturated with a small amount of theatrical blood or red food coloring should be placed on the simulator after allowed to dry. Circle an amount of the drainage to indicate prior check
- Place incentive spirometer out of reach of the patient at the beginning of the SCE
- Perineal pad with a scant amount of theatrical blood or red food coloring should be placed on the simulator after drying
- For simulators without the cyanosis feature, use a thin coating of mortician's wax or petroleum jelly as a base, then apply moulage paints or ordinary cosmetics (e.g., blue eye shadow) to the lips and nail beds, as indicated
- Prime the genitourinary system feature prior to the simulation. As the patient will have a urinary catheter already in place at the start of the SCE, leave the indwelling catheter in place to a drainage bag. Add one to three drops of yellow food coloring to the appropriate amount of distilled water, and prefill the drainage bag with 200 mL of urine to simulate urine that has already drained
- Place an IV in the right arm of the simulator and connect to a 1000 mL bag of distilled water labeled as Dextrose 5% in Lactated Ringers with 20 mEq KCl. Set the fluid to infuse at 125 mL/hr
- When learners identify the need for a second IV, have learners start another IV in the left or right arm

Place a code cart either outside of the room or away from the patient area in the room to allow the secondary nurse to retrieve it and bring it to the bedside, if needed. Have either an automated external defibrillator or a defibrillator with the code cart.

When the learners initiate cardiac monitoring, the tracing and heart rate appear on a real ECG monitor. For facilities without ECG monitoring, have the learners apply ECG electrodes to the mannequin and attach the leads. Once all 3 or 5 leads are in place, reveal the TouchPro ECG tracing.

Simulation personnel should play the following roles:
- Healthcare provider
- Laboratory technician
- Offgoing nurse
- Blood bank personnel

Make a patient chart with the appropriate written order forms, MARs, diagnostic results, etc. for learners to utilize. The chart should include the specific patient identification information.

Begin the simulation with the offgoing medical/surgical nurse (simulation personnel) providing verbal handoff to the oncoming nurse (learner) using SBAR.

Have the learners role-play inter-professional communication by reporting the patient's response to interventions. If the data presented is disorganized or missing vital components, have the healthcare provider respond inappropriately. Emphasize the importance of data organization and completeness when communicating.

Role-play intra-professional communication by having the learners hand off to the admitting or transferring unit or have the learners hand off to the next shift.

Debriefing and instruction after the scenario are critical. Learners and facilitators may wish to view a video of the scenario afterward for instructional and debriefing purposes.

Debriefing Points

The facilitator should begin by introducing the process of debriefing:
- Introduction: Discuss faculty role as a facilitator, expectations, confidentiality, safe-discussion environment
- Personal Reactions: Allow learners to recognize and release emotions, explore student reactions
- Discussion of Events: Analyze what happened during the SCE, using video playback if available
- Summary: Review what went well and what did not, identify areas for improvement and evaluate the experience

Questions to be asked during debriefing:
- What was the experience like for you?
- What happened and why?
- What did you do and was it effective?
- Discuss your interventions (technical and non-technical). Were they performed appropriately and in a timely manner?
- How did you decide on your priorities for care and what would you change?
- How did patient safety concerns influence your care? What did you overlook?
- In what ways did you personalize your care for this patient and family members (recognition of culture, concerns, anxiety)?
- Discuss your teamwork. How did you communicate and collaborate? What worked, what didn't work and what will you do differently next time?
- What are you going to take away from this experience?

Teaching Q&A

State 1 Initial Assessment:

What changes in this patient's condition should concern the nurse? Why?
- *Restlessness*
- *Increasing abdominal incision pain*
- *Increased respiratory rate and heart rate*
- *Decreased blood pressure*
- *Decreased hemoglobin and hematocrit*
- *Signs and symptoms of hypovolemia and worsening condition*

What would explain the changes in this patient's condition?
- *Blood loss*
- *Hypovolemia*

What orders would the nurse anticipate receiving from the surgeon to address these changes?
- *Blood transfusion*
- *Fluids*

Explain why the surgeon has ordered supplemental oxygen for this patient.
- *Hgb 7.8*
- *Diminished oxygen-carrying capacity*
- *Low oxygen saturation levels*

What potential postoperative complications should the nursing care be able to prevent?
- *Atelectasis*
- *Hemorrhage*
- *Infection*

Why has the healthcare provider ordered this specific solution and rate?
- *Replaces extracellular deficits from surgical blood loss*
- *Provides modest calories and supplemental potassium*
- *Rate is 125 mL/hour because patient is still taking nothing by mouth*

What are possible explanations for the drop in this patient's hemoglobin and hematocrit?
- *Internal hemorrhage*
- *Dilution of blood with IV fluids*
- *Blood loss during surgery compounded the patient's long-standing anemia*

State 2 Blood Started 2 Hours Later:

What risk factors may predispose this patient to an adverse reaction to the blood transfusion?
- *Prior blood transfusions*
- *History of Immunoglobulin A sensitivity*

What are the different types of transfusion reactions?
- *Hemolytic*
- *Non-hemolytic febrile*
- *Anaphylactic*
- *Mild allergic*

Why is a second IV site indicated?
- *No medications or IV solutions may be added or infused through tubing with blood components except normal saline*
- *The patient is receiving IV fluids with dextrose and potassium and also receiving morphine*

Why is the IV catheter size a consideration with blood product administration?
- *Larger gauge catheters encourage the flow of blood*
- *Blood cells are large and packed red blood cells are more viscous*

What would be an appropriate response if the nurse is unable to obtain a secondary access for IV administration?
- *Disconnect dextrose 5% in lactated ringers with potassium chloride and flush the IV with 0.9% sodium chloride*
- *Hang the packed red blood cells with 0.9% sodium c hloride*
- *Notify healthcare provider of inability to start second IV for fluids*

What type of IV solution may be used with blood and blood product administration? Why?
- *Only 0.9% sodium chloride*
- *Dextrose solutions induce red cell aggregation*
- *Lactated ringers and other solutions containing calcium are also incompatible*

Why is the rate of the primary IV fluid decreased when the blood is started?
- *To prevent fluid overload*

Discuss the standard of care related to blood and blood product administration, including type of IV tubing, use of IV pumps or pressure bags and time period for administration.
- *Explain procedure*
- *Obtain signed consent*
- *Record baseline vital signs*
- *Begin blood transfusion within 30 minutes of obtaining blood*
- *Check expiration date*
- *Check blood for abnormal color, clumping, gas bubbles or extraneous materials*
- *Return outdated or abnormal blood*
- *Compare name and unit number with patient's identification (ID) band against the blood label*

- *Check ABO grouping and Rh compatibility with label against ID band*
- *Do comparisons at bedside with another licensed professional*
- *Don gown, gloves and face shield*
- *Prime Y-type blood tubing with normal saline, attach blood and connect to IV catheter*
- *Clamp saline and open blood*
- *Begin rate no greater than 5 mL/minute for first 15 minutes*
- *Remain with patient and observe for signs of reaction*
- *Increase rate per protocol, if no reaction noted*
- *Transfusion must be completed within four hours*
- *Use IV pumps per protocol*
- *Use pressure bags for rapid replacement; however, excessive pressure may lead to broken blood vessels, extravasation and hemolysis of red blood cells*

State 3 Beginning Anaphylaxis:

What data suggests an adverse blood reaction?
- *Temperature elevation greater than 1C*
- *Hypotension*
- *Tachycardia*
- *Tachypnea*
- *Dyspnea*
- *Chills*
- *Tightness in chest*
- *Abdominal pain*
- *Increasing restlessness*
- *Oozing from IV site or puncture areas*
- *Hematuria*
- *Flushing*
- *Urticaria*

Why is the nurse's first response to immediately stop the transfusion?
- *Prevents additional exposure to offending antigen or infectious agent*

What are the priorities in managing this patient's symptoms?
- *Administer EPINEPHrine 0.3 to 0.5 mL 1:1000 intramuscular (IM) in the anterior lateral muscle site (upper thigh) every five to 15 minutes until resolution of anaphylaxis or signs of hyperadrenalism (hypertension, volume expansion, hyperglycemia)*
- *Maintain adequate airway and be prepared for endotracheal intubation*
- *Give supplemental oxygen to keep SpO2 greater than 92% with non-rebreather mask*
- *Treat hypotension with crystalloid infusion*
- *Position in a supine position with lower extremities elevated unless precluded by shortness of breath or vomiting*
- *Administer vasopressors for severe hypotension if unresponsive to fluids*
- *Administer diphenhydrAMINE 25 to 50 mg IV not to exceed 40 mg/day to assist with potential allergic response of mast cells*
- *Administer methylPREDNISolone 100 to 250 mg IV every 2 to 6 hours or 30 mg/kg to stabilize the inflammatory response and prevent a protracted or biphasic reaction*

What is the rationale behind infusing a crystalloid solution?

- *Fluid replacement for massive vasodilation*
- *Increases renal blood flow to prevent development of acute tubular necrosis*

How would the nurse intervene to decrease the patient's anxiety?

- *Make patient as comfortable as possible*
- *Provide reassurance as needed*
- *Present a calm composure*

If this patient requires a future transfusion, what precautions would be taken?

- *Notify blood bank of previous reaction*
- *Possibly pre-medicate with acetaminophen and diphenhydrAMINE*
- *Keep emergency supplies nearby*

What should patient teaching include?

- *Medical alert bracelet*
- *Direct relationship between number of transfusions received and number of circulating antibodies, thus increasing the likelihood of a future transfusion reaction*
- *Possible need for pre-medication*
- *Possibility of autologous transfusions*

After Healthcare Provider Orders for State 3, 4, 5, or 6:

- *What is the rationale for the ordered lab work?*
- *Bilirubin: Red blood cell breakdown leads to heme which is converted to bilirubin*
- *Haptoglobin: Assesses rate at which red blood cells are being destroyed; hemoglobin is released with hemochancelysis*
- *Hemoglobinuria: Measures free unbound hemoglobin in urine*

Why did the surgeon increase the IV rate?

- *For volume replacement due to massive vasodilation, peripheral pooling and relative hypovolemia*

What is the rationale for ordering methylPREDNISolone?

- *Controls systemic manifestations of anaphylaxis by providing an anti-inflammatory effect. Also decreases the uptake of histamine and inhibits cytokines*

State 8 Complete Recovery:

What is the therapeutic effect of epinephrine in the treatment of anaphylaxis?

- *Increases peripheral vascular resistance*
- *Improves blood pressure and coronary perfusion*
- *Reverses peripheral vasodilation*
- *Decreases angioedema*
- *Creates positive inotropic and chronotropic cardiac effects*
- *Improves bronchodilation*
- *Reduces inflammatory mediators*

What is the rationale behind administering the epinephrine IM versus subcutaneous or IV push?
- *Current evidence supports IM route as relatively safe and associated with improved push?*
- *Higher plasma concentration levels than subcutaneous (SUBCUT) route*
- *Striking difference in time of maximum plasma concentration levels (IM=8 minutes, SUBCUT=34 minutes)*
- *IV associated with induction of fatal cardiac arrhythmias and myocardial infarction*
- *Major adverse effects when given too rapidly, inadequately diluted, or in excessive dose*

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Appendix C: Sample PNCI Simulated Clinical Experience - Learner

Jillian Ferguson

Age: 46

Weight: 70 kg

Location: Medical-Surgical Unit

Background

Patient History

Past Medical History: Patient has a history of large uterine fibroids. Over the past two years, she had increasing pain that was not relieved with medication, an excessively large menstrual flow and long-standing anemia refractory to standard treatment. Despite earlier recommendations from her healthcare provider to seek surgical intervention, she elected to wait due to multiple personal issues including her recent divorce and having two teenage children at home. During this time of postponing the surgery, she required two outpatient blood transfusions due to the severe anemia. Her significant preoperative lab values included a hemoglobin of 8.4 and a hematocrit of 32%

Allergies: No known allergies

Medications: Over-the-counter daily vitamins and iron supplements

Code Status: Full code

Social/Family History: Recently divorced with two teenage children at home

Handoff Report

Situation:
The patient is a recently divorced, 46-year-old female in her first day post-operative following a total abdominal hysterectomy with bilateral salpingo-oophorectomy due to multiple large uterine fibroids. She has an increased respiratory rate and low blood pressure.

Background:
Upon admission on the morning of her surgery, the patient demonstrated a HR of 78, BP of 110/70, RR of 16 and a temperature of 37C. Her blood type is A negative. Intraoperatively, her estimated blood loss was 450 mL. Her postoperative period has been uneventful so far. The patient slept well last night but has been awake complaining of discomfort for a few hours.

Handoff Report Continued

Assessment:
Vital Signs: HR 88, BP 102/60, RR 18, SpO$_2$ 92, Temp 37.4C
General Appearance: Restless
Cardiovascular: Sinus rhythm
Respiratory: Clear in all lobes. Nasal cannula in place with oxygen at 2 LPM
GI: Hypoactive bowel sounds. Abdomen soft. Complaining of increasing pain around incision. Abdominal dressing intact with small amount of previously noted serosanguinous drainage
GU: Urinary catheter in place. Urine output 50 mL/hour. Perineal pad in place with scant sanguinous drainage
Extremities: No edema. Full range of motion to extremities
Skin: Warm, dry and pale
Neurological: Alert and oriented to person, place and time. Pupils equal, round, reactive to light and accommodation. No neurological deficits
IVs: IV in the right forearm, patent and non-reddened. Dextrose 5% in Lactated Ringers with 20 mEq KCl/Liter infusing at 125 mL/hour
Labs: Drawn this morning, results pending
Pain: Has morphine patient-controlled analgesia (PCA) that she is using

Recommendations:
Perform routine assessment and obtain lab results

Orders

Initial Healthcare Provider's Orders:

Admit to Medical Surgical Unit
Diagnosis: Status post total abdominal hysterectomy with bilateral salpingo-oophorectomy
Full code
NPO until passing flatus, then begin clear liquid diet and advance as tolerated
Out of bed to chair evening of surgery and then ambulate 3 times per day
Vital signs every 4 hours
Notify healthcare provider for acute changes
Continuous pulse oximeter
Oxygen to maintain SpO_2 greater than 92%
IV of D5LR with KCl 20 mEq per liter at 125 mL/hour
Morphine PCA: 1 mg/mL concentration; 1 mg every 15 min with 4-hour lockout of 16 mg
Ondansetron 4 mg IV push every 8 hours prn nausea
Ketorolac 30 mg IV push every 6 hours for 3 days
Ferrous sulfate 325 mg PO twice a day with meals, begin when oral intake resumes
Docusate sodium 100 mg PO daily
Milk of Magnesia 30 mL PO daily prn constipation
Incentive spirometer every hour while awake
Sequential compression devices (SCD) on while in bed
Urinary catheter to bedside drainage, discontinue morning of postoperative day one
Intake and output every shift
AM labs: Hemoglobin and hematocrit, BUN and electrolytes, creatinine, glucose

Preparation

Learning Objectives

- Differentiates between, discusses the implications for and describes the differences in the nursing management for the various types of blood and blood products (UNDERSTANDING)
- Formulates a nursing plan of care for a patient receiving blood or blood products (CREATING)
- Prioritizes the implementation and approach to the nursing management of a patient receiving blood or blood products (ANALYZING)
- Evaluates the patient's response to interventions and modifies the nursing care as appropriate for the patient experiencing an adverse reaction to blood administration (EVALUATING)
- Identifies and differentiates clinical manifestations of various blood transfusion reactions (APPLYING)

Recommended eDose modules for learners to complete before the SCE:
Medication Dosage Calculation Skills
   X Medication Orders & S. I. Units
   X Tablets & Capsules
      Liquid Medicines
   X Injections
   X I.V. Infusions
Injectable Medicines Therapy
   X Slow I.V. Injections
   X Intermittent Infusions
      Continuous Infusions
   Pediatrics

This SCE addresses the following QSEN Competencies:
   X Patient-Centered Care
   X Teamwork and Collaboration
   X Evidence-Based Practice
      Quality Improvement
   X Safety
      Informatics

Preparation Questions

- Discuss the nursing management of the postoperative patient who has undergone a total abdominal hysterectomy with bilateral salpingo-oophorectomy.
- Identify priority nursing care to prevent potential complications following this type of surgery.
- Discuss treatment modalities for potential complications as identified above.
- Discuss the standard of nursing care when transfusing any blood product.
- Summarize the assessment data needed to detect an adverse blood transfusion reaction.
- Describe blood transfusion reactions including clinical manifestations, treatment, and potential short and long-term complications.
- Describe the pathophysiology of anaphylaxis.
- What is the protocol for the treatment of anaphylaxis?

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Appendix D: Columbus State Community College Patient Simulator Program Business Plan

CAE Healthcare

**Columbus State Community College Department of Nursing
and Related Services Patient Simulator Program**

BUSINESS PLAN

For the

PATIENT SIMULATOR PROGRAM

April 2002

Submitted by:

Thomas J. Doyle, MSN, RN

Program Coordinator

SUMMARY

The Patient Simulator Program was initiated in September 1999 with the purchase and installation of the Human Patient Simulator [HPS] manufactured by Medical Education Technologies, Inc. The Columbus Medical Association Foundation made the HPS purchase possible with a grant funding a considerable amount of the initial purchase price. The grant proposal outlined a plan where the College would utilize the HPS in our health science academic programs in addition to partnering with our community providers to provide Continuing Professional Education utilizing the HPS at a nominal cost. To date, numerous academic programs are utilizing both the HPS and PediaSim in the curriculum. These programs include nursing, emergency medical services, medical assisting, and dental hygiene. Additionally several community providers have entered into agreements with the College and are utilizing the program for continuing education of their professionals. Despite the success of the program in both the academic programs and continuing education offerings, it has been very difficult to expand usage with our current partners. While there are numerous issues that have been identified as challenges to program expansion, one of the most pressing has been the lack of our acute care providers [e.g., OhioHealth and the Mount Carmel Health System] to provide the necessary financial resources to offer simulator training to their employees. Another pressing issue has been available time for the Program Coordinator to market the program to new community providers due to teaching responsibilities and other program commitments. A summary of usage, in hours, by fiscal year appears below.

FISCAL YEAR 1999 — 2000

	Autumn 1999	Winter 2000	Spring 2000	TOTAL FY 99-00
Academic Programs	49.25	13.75	59.5	122.5
Continuing Education	0	0	0	0
Other Usage	11	22.75	15	48.75
TOTAL	60.25	36.5	74.5	171.25
Revenue Generated	$9169.20	$0.00	$8150.40	$17,319.60

FISCAL YEAR 2000 — 2001

	Summer 2000	Autumn 2000	Winter 2001	Spring 2001	Total FY 00-01
Academic Programs	22.25	53.5	38.75	63.5	178
Continuing Education	17.25	26.25	39.5	22.5	105.5
Other Usage	15.75	15	14.5	24	69.25
TOTAL	55.25	94.75	92.75	110	352.75
Revenue Generated	$1602.50	$10,725.45	$8084.10	$1215.00	$21,627.05

CAE Healthcare

The program data gathered thus far suggests that the continuing professional education offerings to date have been very successful. Overall participant evaluations have demonstrated a cumulative score of 4.8 out of 5 utilizing a standard Likert Scale evaluation tool. Additionally participant comments have been overwhelmingly positive with no negative comments received from the professionals participating in the continuing education offerings. Repeatedly comments have included the request for additional training to occur utilizing the simulators. This feedback is routinely shared with the community partner sponsoring the continuing education program. Participants have found the training stimulating, challenging, and personally rewarding. Using the simulators provides these professionals with a three- dimensional learning opportunity as it is extremely different than going to a conference or seminar where one sits in a chair and someone talks about the care of a certain type of patient. This is where our Simulator Program has the competitive edge in continuing professional education.

Furthermore what we have done at Columbus State Community College to date with the Simulator Program has no equal in the world among the colleges, universities, and hospitals that have either the HPS or PediaSim. While many community colleges and universities have been fairly successful in their integration of simulation technology into their academic programs, we know of only a very small handful that have ventured into the continuing education market. We have established on going relationships with OhioHealth, Upper Arlington Fire Department, and Rural/Metro Ambulance Company. We know of no program in the world that is marketing continuing professional education to the long-term care industry. We have established relationships with Wesley Glen Retirement Center, Westminster Thurber Community, Ohio Presbyterian Retirement System, and the Association of Ohio Philanthropic Homes, Housing and Services for the Aging [AOPHA]. Additionally there are absolutely no partnerships of the type Columbus State has entered into with The Ohio State University Department of Anesthesia for professional medical education. We have earned a growing reputation nationally, and now internationally, for being a leader in the use of simulation technology, innovation, creativity, and being a national benchmark for successful program development.

To follow is a brief outline of the Simulator Program's objectives, mission services strategy, marketing plan, and an analysis of the strengths, weaknesses, threats, and opportunities available to us at Columbus State Community College in the continued expansion and development of our Simulator Program.

OBJECTIVES

1. Provide continuing professional education utilizing the HPS and PediaSim to professionals [Registered Nurses, Licensed Practical Nurses, Emergency Medical Technicians, Respiratory Care Practitioners, Certified Registered Nurse Anesthetists, Registered Dental Hygienists, and Physicians] in the greater Central Ohio area, and expansion throughout Ohio, across the spectrum of health care including pre- hospital care, acute care, and long term care facilities to improve patient care.

2. Increase usage of the simulators in our academic programs fifteen percent by January 1, 2003 from 178 hours to 205 hours.

3. Increase usage of the simulators in our academic programs by an additional fifteen percent by January 1, 2004 from 205 hours to 236 hours.

4. Increase usage of the simulators for continuing professional education twenty-five percent by January 1, 2003 from 105 hours to 131 hours.

5. Increase usage of the simulators for continuing professional education by an additional twenty-five percent by January 1, 2004 from 131 hours to 164 hours.

6. Establish Columbus State Community College as a national benchmark center for the use of medical simulation in health care education.

MISSION STATEMENT

The Human Patient Simulator [HPS] and PediaSim [Pediatric Patient Simulator] are sophisticated, high-tech, adjunct clinical teaching tools for health care provider education. The Patient Simulator Program provides a cutting edge strategy for improving health care education that ultimately can improve patient care in the greater Central Ohio area through education utilizing highly interactive technology to increase clinical decision making skills and critical thinking in challenging patient care situations.

CUSTOMER NEEDS & TARGET AUDIENCE

Our academic programs in the health sciences are all facing serious challenges in the education of future health care providers. While these are well known to those of us in the academy, one of the most pressing is a need to restructure learning activities from the traditional lecture and sharing of one's knowledge, to one more focused on facilitating self-directed learning on the part of the student. Traditional classroom methodologies and strategies are not going to be successful in developing the future health care professional. Innovative and interactive strategies based in technology are the future of health science education. While research needs to validate the positive difference in thinking and performance we know empirically is present with simulation health science education, it is a strategy that has proven to be successful in other highly critical and technologically challenging professions. We have positioned our College well with the establishment of a Patient Simulation Center to meet these new challenges in academia.

With the changes in health care reimbursement and the health care industry as a whole, the need for health care professionals who can quickly process and integrate patient data, critically arrive at an action plan, and then respond to the patient's response has never been more in demand by society and employers. In both the prehospital and acute care settings, professionals are seeing patient's who are more acutely ill then we have ever seen before. Patient's who less than ten years ago were in an Intensive Care Unit for long periods of time while recovering or improving from their illness are now being sent home after a short hospital stay, usually a week or less. This dramatic change in patient acuity is highlighted by the revolution now occurring in the long-term care setting. The acuity and care being provided in the long term care setting today is similar to what was provided on a general hospital ward ten years ago. Thus the need for continuous life long learning on the part of the health care professional has never been greater. With the Patient Simulator Program the College is well positioned to help meet these development needs of the health care professional.

MARKETING PLAN & STRATEGIES

In order to grow the Patient Simulator Program at Columbus State Community College as outlined above, it will be necessary to carefully outline the steps that need to be taken over the next twelve months to accomplish these goals. The Coordinator of the program will need to actively be out in the community exposing and marketing the program. Based on current and projected usage we have identified the additional hours that are available for use of the simulators. These are 108 available hours in the fall and spring quarters and 190 available hours in the winter and summer quarters. While growth continues in the use of the simulators by our various health science academic programs, and will continue through 2002 and 2003, it is very feasible to accommodate a twenty-five percent increase in the use of these simulators for continuing professional education each of these years. Below are the steps necessary to achieve this growth.

1. Coordinator to continue to work with the faculty in the Nursing department to continue integration of the simulators in the curriculum by replacing traditional seminars with "Simulation Seminars". This to be accomplished as follows:

    a. Begin with one Simulation Seminar in NURS 212 Winter Quarter 2002 and a second to be added Summer Quarter 2002.

    b. Expand usage of the PediaSim in NURS 121 from an optional learning activity to a required activity beginning Winter Quarter 2002.

    c. Offer NURS 197, the Pediatric Nursing Elective, for the first time Winter Quarter 2002 and again in the Spring and Fall quarters.

    d. Begin with one Simulation Seminar in NURS 112 Spring Quarter 2002 and a second to be added Fall Quarter 2002.

2. Coordinator to continue to work with the faculty in the Emergency Medical Services department to continue integration of the simulators in the curriculum. This to be accomplished as follows:

    a. Expand usage of the HPS in EMS 110 by adding one additional scenario in Spring Quarter 2002.

    b. Expand usage of the HPS in EMS 213 by adding four sessions of Advanced Cardiac Life Support [ACLS] practice in Winter Quarter 2002 and continuing this throughout the year.

3. Coordinator to work closely with faculty in marketing NURS 194 [Critical Care Elective] to the Student Nurses so it is offered at least three [3] quarters per calendar year from the current two [2].

4. Coordenator to work closely with faculty in marketing NURS 197 [Pediatric Nursing Elective] to the Student Nurses so it is offered at least two [2] quarters in 2002.

5. Follow up by the Coordinator and Chairperson with The Ohio State University Medical Center Nursing Administration on their potential use[s] of the simulators by March 1, 2002. A preliminary discussion and demonstration of the simulators was held with their nursing administrators and educators in November 2001 with a subsequent draft agreement sent to the medical center.

6. Coordinator to actively pursue the Columbus Fire Department Emergency Medical Services. Initial contact was made in November 2001 and due to the holidays it was impossible to schedule a demonstration time for them. Columbus Fire to be contacted again by March 1, 2002 with a demonstration for them to be scheduled no later than March 30.

7. Coordinator to contact the Director of Nursing at Wexner Heritage House by March 1, 2002 to schedule an appointment to discuss staff development needs. Schedule a demonstration on site at Columbus State by April 1.

8. Coordinator to obtain a list of all Columbus area nursing homes by April 1, 2002 with the assistance of our Marketing and Communications department. This list will then be reviewed with the Coordinator, Patient Skills Training to prioritize the top twenty-five for initial contact regarding staff development needs by April 30, 2002. Marketing calls will commence in May 2002 with a goal of establishing at least ten new customers from these calls by Summer 2002.

9. Coordinator to obtain a list of all Columbus area Fire Departments with Emergency Medical Services by April 1, 2002 with the assistance of our Marketing and Communications department. This list will then be reviewed with the Coordinator of our EMS/Fire Science Programs to prioritize the top ten for initial contact regarding staff development needs by April 30, 2002. Marketing calls will commence in May 2002 with a goal of establishing at least four new customers from these calls by Summer 2002.

10. Coordinator to pursue and development an ongoing continuing education program for Registered Dental Hygienists in Ohio related to Emergency Dental Office procedures. This continuing education program is now mandatory on an annual basis for Dental Hygienists in Ohio for re-licensure. This program to be developed in conjunction with the Coordinator and Instructor in our Dental Hygiene program by June 30, 2002. Marketing of this program to commence in Summer Quarter 2002 with a goal for implementation in Fall Quarter 2002.

11. Coordinator to pursue and development an ongoing continuing education program for Certified Registered Nurse Anesthetists in Ohio as required for their re-licensure. This program to be developed in conjunction with faculty in the Department of Anesthesia at The Ohio State University by September 1, 2002. Marketing of this program to commence in Fall Quarter 2002 with a goal for implementation sometime in the same quarter.

12. Coordinator to informally survey Registered Nurses working in critical care areas in our local hospitals for educational needs that are pressing. This will be accomplished in Winter Quarter 2002 through the clinical rounds he makes at Riverside Methodist Hospital and Grant Medical Center. An all day program will then be developed and marketed directly to Registered Nurses in the Central Ohio area during Spring Quarter 2002 to be offered in May 2002 for the first time. If we choose to do a direct mailing to the Registered Nurses, this will require the purchase of a mailing list from either the Board of Registered Nursing in Ohio or a professional organization such as the American Association of Critical Care Nurses [AACN]. Coordinator to investigate the costs of purchasing these mailing lists in conjunction with our Marketing and Communications Department Winter Quarter 2002.

13. Coordinator to investigate the feasibility of developing and offering a continuing education program on Conscious Sedation to be marketed to non-anesthesiologist physicians and Registered Nurses in the Central Ohio area by June 1, 2002. It is known for instance that the

mortality rate during conscious sedation is 0.3/1000 endoscopic procedures, which exceeds the mortality rate associated with general anesthesia [International Meeting on Medical Simulation, 2002]. In today's environment of accountability, evidence-based medicine and clinical governance, training, evaluation, and re-evaluation are of paramount importance. This work will we done in concert with the Department of Anesthesia at The Ohio State University.

14. Coordinator to work with the EMS Instructor at Columbus State to identify the feasibility of an all day continuing education program for Paramedics that is problem- oriented learning based utilizing the HPS and/or PediaSim for clinical scenarios and simulation. Feasibility study to be concluded by June 1, 2002. Should we identify that such a program would be successful we will target implementation in Summer Quarter 2002.

15. Coordinator and the Coordinator of Patient Skills Training to complete planning for an all day continuing education program for licensed nursing home staff by February 1, 2002 that will be marketed in conjunction with the Association of Philanthropic Homes for the Aged [AOPHA], a new partner that has entered into an agreement with Columbus State and the Patient Simulator Program. Program is to be presented two days in March 2002 and to be repeated on a quarterly basis through marketing efforts by AOPHA.

16. Coordinator to continue to strengthen our existing community provider relationships and look to the key individuals from each entity to serve on a Patient Simulator Program Advisory Council. Coordinator to establish the advisory council by May 2002.

17. Coordinator and Columbus State to take a leadership role in the establishment of a Human Patient Simulator Network for Ohio. With the addition of simulators at Owens Community College, Lima Technical College, and on two campuses of Columbus State, the opportunity to establish a statewide network for collaboration in the expansion and development of our Simulator Programs is present. The vision is that programs could be developed at Columbus State that could then be marketed to these other Colleges as "turn-key" programs for marketing and presentation in their respective areas. This of course would be in addition to the collaboration and problem-solving such a group would facilitate. Coordinator to host the first meeting in Spring Quarter 2002 which would follow the national Human Patient Simulator Network meeting in late February 2002.

18. Coordinator to investigate potential continuing education needs of Respiratory Care Practitioners in the greater Central Ohio area by June 1, 2002. This will be accomplished in conjunction with Sinclair Community College. Marketing would commence in June with offerings to begin in Summer Quarter 2002.

19. Coordinator to continue to accept invitations to speak at local and national conferences on our work in simulation education at Columbus State. We have gained a national reputation for an excellent program and after his attendance at the International Meeting on Medical Simulation, now an international reputation. This will allow us to become a national benchmark for the use of simulation technology in health science education. In order to develop this exposure of our work to date is a necessary step in the development and continuation of that reputation and recognition as a benchmark.

20. Coordinator to work the Marketing & Communications Department in developing collaborative materials for each of these programs as necessary.

PERSONNEL

The Coordinator of the Program is involved in the teaching and operation of the simulators in every course or continuing education program where they are used. This will continue. Some of the continuing education programs to be developed will require the utilization of additional faculty at Columbus State and outside personnel. These costs, in addition to the standard operating costs of the program [e.g., consumable medical supplies and medical gases] will be incorporated into the fee charged for the various programs. The lab fees charged to students in the academic programs that utilize the HPS or PediaSim have been increased to reflect the cost of utilization, however the respective department, not the simulator program, captures these fees.

Financial Plan

Outlined below is the forecasted revenue to be generated in FY 2002-2003 based on the assumptions presented above and marketing strategies.

Tech III Subsidy:

NURS 194	3 quarters x 10 Students/per quarter	$30,564
NURS 197	3 quarters x 10 Students/per quarter	$30,564

Continuing Education Revenue:

25% Increase from FY 2000-2001	$6657.80

TOTAL REVENUE	**$67,785.81**

While expenses for consumable medical supplies and gases may increase, these will be incurred within the current budgeted amount for the Patient Simulator Program in the Multi-Competency Health cost center line item of $8,000. The only additional costs would be in personnel as outlined above in that section.

Non-financial gains to Columbus State Community College with the Simulator Program include the unique partnership between the College and The Ohio State University Department of Anesthesia. Over the last three years our Emergency Medical Services program lost all agreements with the local anesthesiologists for paramedic training for endotrachael intubation on "real" patients. While this a requirement for their program accreditation, it is a growing problem faced by programs across the country as physicians are pressed to increase their productivity due to managed care. Our program was meeting this requirement through the use of the HPS and was approved by the accreditating agency for the EMS Program. With the arrival of the HPS, the physicians at OSU approached Columbus State about developing a partnership where in they would take our paramedic students into the operating room for intubation experience in exchange for time on our simulator. This is a highly unique relationship between a major university and a community college.

Additional non-financial gains to the College are found in our growing local, national, and international reputation as a leader in the use of simulation technology for learning. The simulators have brought much publicity to the College, both print and television exposure. Our HPS was utilized to film a video series that was aired on the Health Science Television Network [HSTN] which has over one-thousand hospital subscribers. Panoramic views of the College were also filmed and appear in the credits thanking the College for it's participation in making the video series. Through exposure at local and national conferences which the Coordinator has been invited to speak at, our program now has a reputation as an innovative and expert utilizer of simulation technology in health science education. Our program, and it's Coordinator, are often mentioned or sought after by colleges and universities looking at simulation technology, just beginning to use the HPS, or established users who have issues in their simulation program.

STRENGTHS, WEAKNESSES, OPPORTUNITIES, & THREATS ANALYSIS

Strengths

The strengths that the Simulator Program and Columbus State bring to the marketplace are considerable. Columbus State has an excellent reputation in the greater Central Ohio area for quality education. Additionally we have a reputation for offering continuing education programs that are timely, real world based, and fill a need in the community. With the Patient Simulator Program we have an opportunity to take our academic programs and continuing education for health care professionals to a new heightened level. We have something no one else in Central Ohio has: growing expertise in the education methodology of simulation, Coordinator and Faculty expertise in critical and emergency patient care, the Human Patient Simulator and the PediaSim. The simulators are exciting, different, and take learning into a three dimensional experience for health care professionals. Additionally we have an anesthesia simulator, which allows us to develop and market programs to the anesthesia community and related areas such as conscious sedation. We are conveniently located in downtown Columbus which makes it easy for participants to come to the main campus and having the Simulator Lab located on the west side of the main campus makes parking relatively easy. Furthermore the leadership of Columbus State had the foresight to dedicate a full-time position to the Program, which is probably one of our greatest strengths.

Weaknesses

The Human Patient Simulator and PediaSim are like "real" patients in that it is difficult to do training with more than a maximum of eight people at the bedside at one time. Just as with a "real" patient, more than eight participants utilizing the simulator at one time leads some to become disengaged and not participate. This major weakness then limits the maximum number of participants we can accommodate in training programs. Through our creative use of alternate learning activities related to the simulation topic being taught, we have somewhat overcome this limitation by rotating the participants through the simulation lab and other stations. We however are still limited to a maximum of twenty-four participants for a half-day or all day continuing education offering. Without these alternate learning activities, we are limited to a maximum of eight professionals for the program regardless of the number of hours the program will run for. Ultimately our vision is to create a "virtual patient care unit" with multiple simulators to accommodate larger numbers for training. Additional simulators would also allow us to create problem oriented learning based simulations where professionals could be presented with a case load of four or five patients all with differing diagnoses and prioritize who they would care for first. While with the patient they selected acute problems could then develop among one or more of their other patients. An addition of at least a second HPS would allow us to double the number of participants in any given program as outlined above [e.g., forty-eight with additional learning stations and sixteen without additional learning stations].

Another major weakness in our Program is the lack of involvement in use of the simulators by our Respiratory Care Department. When attending conferences the Coordinator has learned of many programs that have successfully integrated the simulators into their academic programs and continuing education offerings for these professionals. Without their involvement at Columbus State we are restricted in that we cannot offer continuing education programs related to Respiratory Care without outside assistance. While the Coordinator has established professional contacts in Respiratory Care who are willing to assist us in developing these programs, this poses additional costs. Additionally, this also gives our program an appearance of not being complete which could impact our ability to become a national benchmark in simulation education.

Lastly, Medical Education Technologies, Inc has produced a new operating system and mannequin. The new operating system is Macintosh based which has addressed the memory allocation problems prevalent in the old Windows based system. The new "D" mannequin [ours is a "C" model] is much more realistic in terms of skin texture, lacks the cutouts for pulses our mannequin has, and actually has bones which may be palpated to locate more realistically the anatomical locations necessary for some clinical procedures. All of the colleges in Ohio with the exception of Sinclair Community College have the new system and mannequin. This places us behind in having the latest generation of the technology. The Coordinator is currently investigating the costs associated with upgrading our system and mannequin.

Opportunities

With implementation of the marketing plan outlined above, the opportunities are almost limitless for the Patient Simulator Program at Columbus State Community College. Not only will these marketing efforts increase utilization of our simulators and generate additional revenue to the College, they will continue to position us as leaders in health care education simulation and establish us as a national benchmark for other colleges and universities. These programs will also maintain and improve the College's reputation for innovation and cutting edge educational products.

Additionally we have an opportunity to establish Columbus State's Simulator Program as the "jewel" among simulator programs in the community colleges of Ohio. Through the Coordinator's leadership, a statewide Human Patient Simulator Network—Ohio will be established. This will allow us to continue to be seen as a leader in simulation education in Ohio and beyond. This will also present an opportunity for us to lead program development, which could then be marketed, to these other colleges for their use in presenting continuing education programs.

Furthermore, the Patient Simulator Program improves the quality of education for our health science students. The use of simulation technology provides our students with opportunities to increase their abilities in critical thinking and decision-making—the ultimate in active learning strategies. Through simulation we are better preparing our students, and Central Ohio's future health care professionals, for realistic application of scenarios they will encounter in the care of patients. Through expansion of the simulator program and the addition of multiple simulators, we have an opportunity to create the "virtual patient care unit" where students could be presented with multiple patients they are to care for that day and challenged to triage who they will care for first and then present them with developing problems on their other patients. Currently in academia we have no way to teach this type of critical thinking demanded of the health care professional. A virtual unit with multiple simulators would allow for facilitating this level of critical thinking.

Threats

A potential threat of competition may evolve if MedFlight Ohio purchases their own portable Human Patient Simulator. While marketing has occurred with MedFlight, to date they have yet to enter into an agreement with Columbus State for simulator training. The Coordinator of Education has made it very clear that they plan on investigating the purchase of a mobile unit and if found to be feasible, to place it in a mobile education van and move it throughout Ohio to their various locations. It is feasible that if they purchase their own HPS, and it is mobile, they could develop and market continuing education programs that would be in direct competition with us.

A less likely threat would be if The Ohio State University and any of its entities were to decide to purchase a HPS. The Department of Anesthesia did investigate this before entering into an agreement with us. At this time they found it to be more feasible to partner with Columbus State then purchase their own system. If they were to do this though, we would lose a large potential market for continuing education.

Another threat is if we do not keep up with the "state-of-the-art" in the technology. Since health care simulation technology is in it's infancy, there will constantly be new developments and upgrades. METI has manufactured a system that is based upon open architecture so that new developments and features may be easily installed on the system. These upgrades of course carry a price with them that is not cheap. It is essential that we have the support to keep our technology up to date so as to remain on the cutting edge of simulation education.

CONCLUSION

The Patient Simulator Program at Columbus State Community College is a national leader and is already seen as innovative and creative. No one else in the world has been working with his or her community health care providers to the extent we have at Columbus State since the inception of the Patient Simulator Program. While not all of these partnerships are directly producing revenue they do have additional benefits, which are difficult to quantify in dollars and cents. The best example of this is the partnership with The Ohio State University Department of Anesthesia. However we do have an opportunity to effectively increase our revenue producing continuing education programs by developing educational products that will meet the learning needs of health care professionals in Central Ohio and beyond. This business plan has outlined how we will accomplish this over the next twelve months. Through these efforts, and the continued support of the Patient Simulator Program by the administration, we will position Columbus State Community College as a national benchmark in health care education utilizing simulation technology.