

Establishing a Simulation Center for Healthcare Education: A Primer for Faculty, Administrators and IT Staff

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Background

More than a decade ago, higher education became increasingly aware of the need for active, student-centered learning. The Learning Pyramid, for example, posits that learning by doing promotes retention and understanding far better than most other methods of teaching and learning (Barr and Tagg, 1995). This notion ushered in a gargantuan shift in the teaching/learning paradigm from the traditional teacher-centered, lecture mode. Personal computers, the Internet, and networks increased the options for faculty wishing to make this transition. The growth of computer games, simulations, 3D modeling, virtual environments, wireless and ubiquitous computing now offer new possibilities to design active learning experiences.

In healthcare education, this revolution is taking place in the form of high-fidelity simulation laboratories that allow students to learn by doing without jeopardizing patient safety. Faculty in healthcare education can choose among low-, medium- and high-fidelity teaching modalities. Case studies, films, and role playing are all examples of low-fidelity methods. Moderate-fidelity simulations offer more realism but lack many cues necessary for complete immersion of the participants. A manikin with breath sounds but no rise and fall of the chest is an example of a moderate-fidelity simulator.

High-fidelity simulations provide trainees with the more numerous cues necessary to suspend disbelief during dynamic, immersive, hands-on scenarios. Highfidelity, computerized simulation manikins are extremely realistic – they are anatomically accurate, they breathe, they have a heartbeat and pulse, they verbalize ("Help!"; "I want my lawyer!"), and they can even "die" during a simulated operation. Clinical scenarios are programmed into the system – a set of symptoms that students must diagnose, treat, and monitor.

Faculty in the health professions have long used low-fidelity teaching methods to give practice in individual clinical skills, such as intramuscular injections. Many medical schools have already implemented high-fidelity simulation technology. Thus, it is natural that nursing and allied health programs have turned increasingly to medium- and high-fidelity simulations to promote active learning.

Benefits and Costs of a Simulation Lab

Today's prospective students and faculty have an expectation that simulation laboratories will be part of healthcare education. Sim labs appeal to many incoming students because they are attracted to technology. In addition, many healthcare students have tactile/kinesthetic learning styles and learn best by doing.

Simulation laboratories are quite costly, so the question of the benefits of such labs is an important one. A single "SimMan" or "Sim Baby," which are high-fidelity manikins, can cost nearly \$40,000. A 3-member "family" of moderate-fidelity manikins costs some \$20,000. In addition, synthetic body fluids, replacement skin, bandages, syringes and other supplies are necessary to simulate the experience of treating real patients in a real hospital. What, then, are the benefits that justify these expenses?

Computerized simulations bridge the gap between theory and practice by immersing the student in a realistic, dynamic, and complex setting. Simulation manikins present a variety of symptoms that give students the chance to practice. Students may identify and follow up aberrant heart rhythms, perform a variety of medication administration methods, or provide wound care. The manikins react to the procedures and treatments, which cause changes in their life signs, "behavior," and test results.

Much of healthcare today is delivered in a team setting, and simulation labs can foster the critical thinking, communication skills, and teamwork necessary to function successfully in that environment. Students develop higher order cognitive skills and gain the opportunity to acquire and refine cognate, technical and behavioral skills by solving complex, multidimensional problems in an environment without risk to patients (Yaeger, Halamek, Coyle, Murphy, Anderson, Boyle, Braccia, McAuley, De Sandre, Smith, 2004). Students needing remediation in clinical skills can also benefit greatly from simulation scenarios.

Realistic educational experiences that give students the chance to hone skills before working with real patients are more important than ever. Because of cost, only the most seriously ill patients are admitted to a hospital today – those with multi-system involvement that demands multi-factorial, interdisciplinary care. In this complex environment, medical errors have become the eighth leading cause of death in the U.S. at a cost of \$29 billion annually (Kohn, Donaldson, Corrigan, 1999), so students must be well prepared before they walk through a hospital door. A human simulation laboratory will allow students to become familiar with more sickly patients in a zero fault environment, thus providing for highly trained individuals who will be less likely to make life-threatening or costly medical errors.

In addition, it is increasingly difficult to place students in certain types of clinical settings, such as pediatric and maternal-obstetric units, because of liability concerns and the consolidation of specialized services in certain major metropolitan hospitals. Simulations can help compensate for these limitations, providing experience that students and practitioners might not otherwise receive.

Simulation labs can also make it possible to provide more standardized and more comprehensive healthcare education. Rare conditions that are unlikely to present themselves in a real clinical setting can be programmed into simulated scenarios.

Finally, the benefits of simulation labs can extend beyond the University to the community at large. They make it possible to furnish sophisticated continuing education for healthcare and other professionals.

Critical Elements and Costs of a Simulation Lab

Indiana University of Pennsylvania (IUP) of one of 14 public universities in the PA State System of Higher Education. It is a comprehensive, doctoral/research university that grants degrees through the doctorate. Tuition is very affordable, but resources for innovations and improvements are limited. Cost efficiency, therefore, looms even larger in this environment than at many other universities.

It was decided to start the lab with 10 moderate-fidelity manikins, one high-fidelity Sim Man, a blood pressure trainer, and a hands-on IV tutorial unit. It is possible for some labs to start much smaller, but the size of the IUP nursing program (150 in the current entering freshman class) necessitates this scale. Among the items needed to start and operate a simulation lab on this scale are:

Item Needed	Description	Source of funds	Cost	1X or Annual
11 manikins and peripherals		College Academic Affairs Accreditation funds Internal and external grants Alumni and corporations	\$98,000	One-time
Set-up	Partial compensation to faculty director	Internal grant funds summer contract	\$5,000	One-time
Space	Renovation of space where stations are adequate for equipment and separated to control sound	Make do with existing small lab; add part of newly vacated space for critical care unit	\$50,000	One-time
Training for director	Training for one person provided as part of purchase price	Manufacturer	\$6,000	One-time
Professional Development for Director	Visit established lab	Manufacturer grant, internal grant, state car.	\$1,000	One-time
Profess. Development for Director	Conference on set-up and maintenance of lab	College; internal grant.	\$1,000	One-time

Item Needed	Description	Source of funds	Cost	1X or Annual
Maintenance	Write proposal to create center Maintain equipment	Create center that can receive fees for service for CE Existing tech support staff Manufacturer	-	One-time Ongoing
Clothing for manikins	To simulate reality	Volunteer from Dept. of Fashion Merchandising	\$50	One-time
Release time or summer contract for director		Grants College or Academic Affairs	\$20,000	Annual
Add-ons and supplies	e.g., Synthetic body fluids, replacement skin	Same	\$1,500	Annual
Medical supplies	Bandages, syringes, hospital beds, etc.	Discontinued items from healthcare institutions/medical supply firms Donations	\$20,000	Annual
Research	Research on technology adoption, curriculum development, and efficacy of simulation uses	Collaborate with faculty and staff Grant writing support – college & research institute Internal & external grants		Annual
Profess. Development/ incentives for participating faculty	Travel money for present research at conferences and/or incentives	College, internal and external grants	\$5,000	Annual
Training for faculty users	Train the trainer model	Director trains faculty	-	Annual
Assistant for lab	Grad assistant or staff to schedule and support	Academic Affairs funded 1 GA	\$15,000	Annual
Additional simulation scenarios	Programming	Communications Media graduate students in a practicum develop first module	-	Annual
Technical support	Help set up and maintain	Start with existing technical staff		Annual

Although the table appears to cover most of the bases, it does not tell us the extent to which each item is funded. As of May 2007, the manikins listed had all been ordered, for example, but we had only begun to deal with the continuing costs of supplies, maintenance, staffing and the need for a fund-raising campaign.

Neither does the table fully convey the effort necessary to achieve start-up. Most of the initial effort rested on the unflagging enthusiasm and energy of the (uncompensated) director. It was she who made the initial contacts that made it possible to network among faculty and administrators and build collaborative and financial support. She did most of the searching for grant sources, conferences, and established labs. Such effort will need to be institutionalized to sustain the lab.

Communication and Buy-In

The notion of networking brings us to a critical factor for success in implementing any large project and, in particular, projects that encompass personnel from several levels and divisions of campus. In order to secure the support of administrators and funding sources, as well as potential faculty collaborators, the nature of the project must be clearly and repeatedly communicated. Understanding and support or "buy-in" must be developed among all major stakeholders – in this case, administrators, faculty, and technical staff. Previous IUP technology projects proved the importance of buy-in, networking and team building at all of these levels (Jackson, S., Brzycki, D., Cessna, M., 2000). These factors were critical to success in securing grant funding, carrying out the grant-funded projects, promoting the use of technology among the target audiences, conducting research and disseminating results.

The current simulation project demonstrates both dos and don'ts related to communication and buy-in! The director did an excellent job of developing initial contacts, who directed her to potential faculty collaborators, useful administrative offices (dean's office, technology services, institutional advancement, research institute, graduate school, etc.) and campus funding sources. Three of the administrators first contacted were already familiar either with simulations in healthcare education or with using technology in teaching and could immediately visualize their usage and the advantages. Faculty in Nursing and Allied Health grew interested both in teaching with simulation technology and in doing research on the effects. The director and assistant dean visited such departments as Communications Media and Military Science, which expressed interest in collaboration, perceiving opportunities where their faculty and students could use the technology or conduct research and development. Administrators, faculty and technical staff at the college and university levels were invited to demonstrations given by the manufacturer.

Similarly, the first proposals for internal grants went smoothly. Such applications are relatively short and simple, and the project was well described. The first bump in the road came after an external grant proposal was submitted. This particular proposal required IRB approval within a specified interval after the application. A great deal of effort had already been expended in describing the project to a variety of audiences, so the description of the project itself in the IRB proposal was shortened. When the IRB sent feedback, however, it became clear that many IRB members did not know what

simulations were and had been unable to visualize the overall project from the description in the IRB proposal. The IRB proposal had to be revised and resubmitted.

A valuable lesson, this experience made it clear that one must continue to define terms, give concrete examples, and make it possible for all target audiences to visualize and understand the nature and merits of the project. The director and college personnel took care to use many subsequent opportunities to publicize and explain the project on campus and in the community (e.g., a poster at the annual IUP Research Appreciation Week banquet, a visit to a community college beginning to implement simulations, and a presentation to a community healthcare consortium).

Technology Adoption

The IUP Simulation Laboratory is being set up during the summer of 2007. Faculty training will begin in Fall 2007, and participants will be encouraged to start using the manikins in courses as they complete training sessions. The lab will become fully operational in Fall 2008, with simulation use formally incorporated in all sections of two courses. The minimum steps to achieve this goal are:

- 1. procure additional hospital beds and supplies for the simulation stations
- 2. attend manufacturer training on equipment and simulation scenarios
- 3. set up simulation manikins, peripherals and beds
- 4. identify which features the faculty will need to know first
- 5. train faculty whose courses will be the first to incorporate simulations on the equipment
- 6. work with faculty to incorporate simulations appropriately in targeted courses
- 7. develop assessment methods for simulations used in targeted courses
- 8. assess the effectiveness of the initial simulations in teaching and learning
- 9. adjust usage to reflect lessons learned

These tasks show the ongoing need for communication. The priority task will no longer be to "sell" the idea of a simulation lab (although information must continue to go out), but to train the first group of faculty that will actually use the simulation manikins in target courses.

No matter how interesting and useful a new technology may be, there are nearly always obstacles to implementing it. Such barriers have been concisely captured by the Concerns Based Adoption Model (CBAM), which was based on field work in K-12 schools in the 1960's and 1970's by S. M. Hord and G. E. Hall. Wave after wave of innovation had swept through the schools, but teachers naturally did not fully embrace each one. CBAM defined 7 types of concerns that might prevent teachers from adopting innovations as well as 7 levels of use that teachers could achieve. Literature on technology change has used this model ever since. Decades later, CBAM was again put to use to predict and explain what happened both in higher education and in K-12 schools when personal computers were introduced into teaching in the 1990's and early 2000's.

The Concerns Based Adoption Model sets forth 7 stages of concern through which teachers may go when dealing with innovation:

Concern	Description
1 Awareness	Little or no awareness. What is it?
2 Informational	How does it work?
3 Personal	How does it affect me? What should I do about it?
4 Management	How do I manage it, master the skills, find the time, collect the resources?
5 Consequence/ Impact	Is it working? What is the impact on students, customers, etc.?
6 Collaboration	It's working, but how are others doing this?
7 Refocusing	Can this be improved? Is there something better?

The 7 levels of using technology that teachers may exhibit are:

Level of Use	Definition/Action
0 Non-Use	Little or no knowledge Decide to get info
1 Orientation	Acquire some information Decide to use
2 Preparation	Prepare to Use Make first use of innovation
3 Mechanical Use	Focus on immediate needs to implement Strive to reach routine
4a Routinization	Use it in routine way with few changes Decide to make minor changes
4b Refinement	Make a few changes to refine use Decide to seek ideas from other users
5 Integration	Collaborate with colleagues to learn more, impact students Begin to explore alternatives
6 Renewal	Reevaluate use, seek major changes, explore new developments

Teachers may proceed through each level of concern and usage or may stop at a certain level. Occasionally multiple levels of concern may come into play at one time. Finally, when newer technologies emerge, teachers may experience the same stages for the new technology even if they have mastered older technologies.

The levels of concern and usage can be identified through survey tools and observation. The results can help the trainer or technology advocate devise training that addresses both the skills level of the subjects and their concerns about technology use. CBAM will be utilized in implementing the training for faculty in the IUP Simulation Laboratory.

To prepare the faculty to employ simulation in their classes, the IUP Simulation Lab director will use a train the trainer approach, small group workshops throughout Fall 2007. There will be three initial faculty, who will teach a total of 75 students in the fall. At first these faculty will be trained only on the moderate-fidelity manikins, which are less complex. As they become comfortable with the fundamentals of using the equipment, the second step will be to help them incorporate a small bit of the simulation technology into one or more specific classes in a course they are teaching. The table at the end of this paper demonstrates how technology will be introduced into the curriculum, one course at a time.

During the semester, the director will also provide 1:1 just-in-time help to this first group of faculty users. She will respond when the faculty request assistance on how best to use the technology in their class, how to set up a lesson that includes the technology or how to evaluate the effectiveness of the technology for their teaching. She will also be proactive about checking in with faculty to see if they need help. If desired, the director or the graduate assistant can help the faculty teach the initial classes in which simulation technology is introduced. Learning simulation technology together, the first user group will be encouraged to form a team for mutual support and to help keep other faculty informed and interested. This cycle will continue until all faculty members have a working knowledge of the technology. The director will also deliver status reports at general faculty meetings to keep all faculty up to date.

A given technology can be adopted as a complete package or in stages. It is usually preferable to phase in technology so that faculty need to learn and apply only limited aspects for each class or course. In the literature of technology adoption, an entire concept has grown up around this chunking approach called Low Threshold Applications (LTA's). LTA's are defined as teaching/learning applications of information technology that are readily available, reliable, easy to learn, non-intimidating, and incrementally inexpensive (http://www.tltgroup.org/ltas.htm). They have concrete, positive results and contribute to long-term, widespread changes in teaching or learning. If we disregard the low-cost aspect of this definition, LTA's can be seen to apply to simulation labs as well. They are the small components of the moderate-fidelity simulations that will be introduced in the early stages. In terms of CBAM, LTA's address the concerns of faculty that have limited time, are still mastering the skills to use the technology, and wish to maintain teaching quality without risking excessive mishaps with the new technology. Such faculty are in the Preparation stage of use and have concerns related to Management of the technology.

LTA's also facilitate training and support, limiting the range of training needed at any one time. In addition, with the chunked approach, trouble spots are more readily apparent and can be solved before they escalate to large, complex problems. Finally, the phase-in approach can also minimize the differences between the generation of students, who can be viewed as digital natives fluent in technology, and the generation of the faculty, who can be considered digital immigrants – they are familiar with technology but did not grow up with it. Educator B. King asserts that the best approach to adopting technology is to think small, plan smart and use rich cases (Educause Quarterly, 2007). LTA's make this possible.

Incorporation of Simulations into an Undergraduate Curriculum

Betty Neuman's System Model is used as the philosophical basis for the IUP undergraduate nursing curriculum. It is a comprehensive and holistic guide for nursing practice, research, education, and administration. The foundation is the liberal arts courses taken by freshmen. During the sophomore year, the Neuman model addresses primary and secondary prevention, where the focus of learning is on the individual patient. During the junior year, the focus expands to the family unit at the primary health promotion and wellness level and the attainment of health. The focus broadens further in the senior year to encompass the individual, family and community and the promotion of primary, secondary and tertiary prevention through health and wellness awareness, attainment, and maintenance. The student nurse will develop and internalize the roles of delegator, manager and coordinator of care. The individual patient focus now encompasses the primary, secondary and tertiary levels; the family is at the primary and secondary level; and the community focus encompasses primary prevention. The core values that are built into all curriculum levels include assessment, professional role development, critical thinking, technological skills, and communication.

Technology must be incorporated in a systematic, orderly manner. Simulation technology will, therefore, be incorporated into the undergraduate nursing curriculum based on this framework. Points in the curriculum will be identified where clinical skills, communication skills, critical thinking, and professional role internalization are taught and where simulations can enhance teaching and learning. In earlier implementations of technology, such as the introduction of PC's in universities and schools, this analytical step was often missed or shortchanged, so it is important to give it due attention early in the implementation of simulations. The lab director will identify these points in the curriculum as part of a professional development grant that provides access to each nursing course syllabus. She will review the syllabi and suggest simulation interventions appropriate to course objectives. The draft recommendations will be shared at the first fall faculty meeting and adoption will be requested based on current findings. It will then be incumbent upon the each faculty member to monitor, adapt, or refine them as meets the needs of specific courses.

Simulation technology will first be integrated into clinical nursing courses at the sophomore level, where an introduction to healthcare delivery in institutions occurs. The first course to be piloted will be NURS 211 (Nursing Practice I). A discrete learning module will be instituted in the sophomore level that can be utilized in all levels as students progress. This module is a comprehensive and fully interactive self-directed learning system for training intravenous catheterization. It guides the student through a complete course of study, progressively improving their skills and knowledge. For the faculty member, it is like an LTA in that the learning curve is low, it is easy to use and nearly runs itself.

The next technological component to be introduced will be Nursing Anne, which will be used in the clinical nursing course NURS 213 (Nursing Practice II). This is a foundation course on delivering care to acutely ill patients. Nursing Anne is an efficient, moderate-fidelity mechanism that allows the student to experiment and learn basic assessment and nursing skills without harming real patients. Examples include performing sterile techniques on patients, vital sign assessment, and proper positioning

and transfer of patients. For the faculty, this moderate-fidelity manikin will require more training than the IV module but much less training than high-fidelity simulations.

Next, enhancements to Nursing Anne will be introduced in the clinical nursing course NURS 337 (Adult Health Clinical I). This junior level course focuses on acute and critically ill patients. Wound assessment, dressing changes, tube placements, and sterile technique are clinical competencies for this class. Simulation technology will then be introduced in NURS 339 (Maternal-Child Health Clinical), which focuses on treating the pregnant mother, newborn and children. Nursing Anne will be utilized along with Nursing Baby and Nursing Kid. Modules that foster breast exam, fundal exam, and neonatal exam of the newborn will be used.

In the senior year SIM MAN will be introduced into NURS 436 and NURS 437 (Adult Health I & II), which concentrate on the adult/family coping with complex health problems. The relationships among disease states, treatment and associated nursing responsibilities are emphasized as students build their knowledge base of pharmacology, therapeutic procedures, rehabilitation needs and teaching-learning strategies. In these courses, the high-fidelity manikin "Sim Man," a realistic, anatomically correct, clinically functioning manikin will be utilized to challenge and test a student's clinical and decision-making skills during programmable scenarios. Its software and interactivity allow the student to learn in a zero fault environment. The scenarios provide highly realistic patient simulation experiences for the practice of teamwork, leadership, and communication skills as well as individual patient care.

The following table summarizes the sequence in which simulation technology will be integrated into the IUP undergraduate Nursing curriculum. Only those course objectives that can be more readily achieved using simulations are listed.

Course, Place in Curric. & Start	Course #, # Faculty, Students	Objectives	Time Frame	Tech. Interven.	Evaluation
NURS	Pilot	2. Demo safe	Weeks 13-14	Perform	1. Successful
211	course	behaviors as		IV	completion of
	_	a health care	Implementation	Module	the module.
Semester	3-4 faculty	professional	of Special	on the	2. Multiple
I-Fall/		4. Correctly	Nursing Skills	Virtual IV	choice
Soph.	10	perform		haptic	questions on
	students/	selected	IM injections	device.	final exam.
Fall 2008	instructor	assessment			3.
		and other	1. Principles of		Successfully
		nursing skills	medication		complete and
		5. Demo.	administration -		execute clinical
		behaviors	6 rights		competencies:
		consistent	2. Principles of		Clean
		with	IV admin.		technique
		professional			Sterile
		nursing			technique
		standards			Vital Signs

Course, Place in Curric. & Start	Course #, # Faculty, Students	Objectives	Time Frame	Tech. Interven.	Evaluation
		 2. Demo. skill in assisting clients with health promotion behaviors 3. Correctly use health assessment techniques in a variety of settings 4. Competently perform selected assessment and other nursing skills 	Weeks 1-7 Skills for Health 1. Hygiene and Comfort 2. Bed making 3. Body mechanics and transfer techniques 4. Range of motion Weeks 10-14 Assessing Health 1. Health histories. 2.	Interven. Utilize Nursing Anne's to 1. teach activities of daily living, assist with bed making, and transfer technique s. 2. perform physical assessm ent	Weight IM injection Correct Body Mechanics Client Transfer Positioning Successfully complete competencies: Bedpan/Inconti nence Mouth care Bathing Bed making Injections-ID, SQ Health assessment of body systems
		5. Demonstrate behaviors consistent with professional nursing standards	Psychosocial issues. 3. Physical assessment	Utilize Vital Sim Blood Pressure Trainer & Task trainers for breath, heart & abdomin al sounds.	
NURS	Third	1. Perform	Week 1	Utilize	1.
337	course	comprehensiv		Nursing	Successfully

Course, Place in Curric. & Start	Course #, # Faculty, Students	Objectives	Time Frame	Tech. Interven.	Evaluation
Semester I-Fall/ Junior Fall 2009	with sim technolog y 8 faculty 10 students/ instructor	e assessment on individuals/fa milies with acute and chronic health problems in a variety of clinical settings 2. Integrate knowledge of pathophysiolo gy into clinical practice 4. Demonstrate core values, knowledge, and skills in a variety of clinical settings 5. Function as a member of the health care team. 7. Demonstrate behaviors consistent with professional nursing standards	A. Expansion of health assessment skills in adults with acute and chronic illness Weeks 2-8 Nursing management of the adult with a chronic or acute illness Weeks 9-10 Nursing management of the surgical patient	Anne to 1. perform physical assessm ent on. 2. perform wound manage ment care.	complete clinical competencies such as: Application of ace wraps Wound management Oxygen therapy Specimen collection Insertion of indwelling foley catheter Medication administration (oral & topical) Management of IV therapy Intake and output Ostomy management Nasogastric feeding tube management/in sertion Identification of adventitious breath sounds Comprehensiv e health assessment of the acutely ill Enemas Nasopharynge al suctioning
NURS 339	Fourth course to have	 Perform a comprehensiv e health 	Weeks 1-7 Expansion of health	1. Utilize Nursing Anne to	1. Successful completion and execution of

Course, Place in Curric. & Start	Course #, # Faculty, Students	Objectives	Time Frame	Tech. Interven.	Evaluation
Semester II- Spring/ Junior Sp 2010	technolog y introduced into its lesson. About 4 faculty, 10 students per faculty.	assessment of a pregnant woman and of children of various ages 5. Identify ways in which maternal/child clinical practice is influenced by research 6. Demonstrate behaviors consistent with professional nursing standards	assessment skills – the woman of reproducing age, the pregnant woman, and the neonate 1.Communicati on 2. Screening 3. Health assessment 4. Physical assessment 5. Immunizations	perform physical assessm ent on. 2. Utilize the fundal module and breast exam module. 3. Utilize Nursing Baby to perform physical assessm ent on.	such clinical competencies as: Fetal Heart Tones Postpartum Assessment Neonatal Assessment Adapt physical assessment to include pregnant, labor, neonate, infant, toddler, and adolescent Perform urinary catheterization IV therapy to pregnant and pediatric clients Medication calculations for peds dosages Apply principles of oxygen therapy to pregnant woman, the fetus and children. Blue bulb suctioning Medication administration
NURS 436 & 437	Final Course with sim	1. Explain etiology, pathophysiolo	Weeks 3-5, &13-15.	1. Use Nursing Anne to	1. Successful completion and execution of

Course, Place in Curric. & Start	Course #, # Faculty, Students	Objectives	Time Frame	Tech. Interven.	Evaluation
Semester I/Fall Junior Fall 2010	technolog y introduced	gy, clinical manifestation s, sequelae and treatment of complex disorders 2. Analyze individual/fam ily needs for care based on patient responses to critical and/or complex disease states 4. Draw appropriate conclusions about learning needs and teaching strategies for individuals/ families coping with complex health problems 6. Evaluate usefulness of research- based data for the care of individuals/ families with complex health problems 6. Evaluate usefulness of research- based data for the care of individuals/ families with complex health needs 7. Perform comprehensiv e nursing	A. Shock B. Cardiac C. Oxygenatio n D. Neuro E. Musculoske letal. Weeks 1-3 A. Provide and coordinate care for complex/ acutely ill clients	perform physical assessm ent on. 2. Use SIM MAN to perform varied scenarios 3. Utilize SIM MAN to perform bedside tasks involving teamwork leadershi p, and communi cation skills.	clinical competencies such as: lead ECG/ recognize basic and life threatening Medication administration (IV) Principles of central lines Principles of TPN Monitor blood & blood products Manage chest tubes Manage chest tubes Manage chest tubes Manage artificial airways Neurological assessment 2. Successful execution of varied scenarios incorporating traditional emergencies seen in health care institutions.

Course, Place in Curric. & Start	Course #, # Faculty, Students	Objectives	Time Frame	Tech. Interven.	Evaluation
Curric. &		Objectives assessment of adults with critical/compl ex health problems. 8. Use knowledge of pathophysiolo gy and the nursing process to provide appropriate care for clients with critical/compl ex health problems 9. Assume a leadership role within one's scope of practice 10. Apply management principles in the delivery, supervision, & delegation of nursing care 12. Demo. the ability to foster team- building skills with a group	Time Frame		Evaluation
		13. Understand quality performance improvement 14. Analyze usefulness of			

Course, Place in Curric. & Start	Course #, # Faculty, Students	Objectives	Time Frame	Tech. Interven.	Evaluation
		outcomes research to evaluate the quality of care			

By identifying course objectives that can be achieved more effectively with the introduction of simulations, presenting these findings for faculty approval, introducing simulation technology gradually, and providing support, the director hopes to maximize the utilization and effectiveness of the IUP Simulation Laboratory.

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