

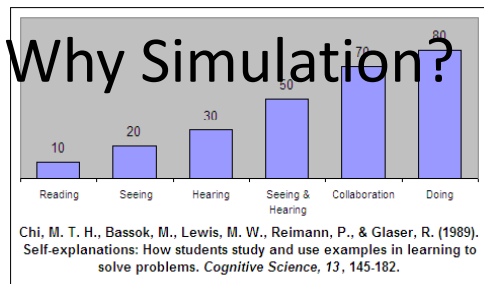
Developing Problem Based Simulations: Goals, Objectives, Curricular Fit and Outcomes

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Outline for Presentation

- Why simulation?
- Our experience at the University of Pittsburgh
- What are the advantages & disadvantages of simulation?
- How, when and where to incorporate simulation into a curriculum?
- How to prepare a course?
- What is the best way to debrief?
- How to determine success?

% Retention: various activities



Why Simulation?

Pitt School of Nursing



Pitt School of Nursing Experience with Simulation

- Undergraduate
 - Freshman
 - Introduction – patient interaction & assessment
 - Sophomores
 - Partial task education
 - Junior
 - Pediatric, Obstetric, Med-surg
 - Senior
 - Crisis management

Pitt School of Nursing Experience with Simulation

- Graduate education
 - Acute care nurse practitioner
 - Clinical nurse specialist
 - Nurse anesthesia



What are the advantages & disadvantages of simulation?

Advantages of Simulation

- Students prefer simulation to traditional lecture
- Effectively conveys factual information and result in attitude change
- Allows experiential learning conducted in a safe, responsive environment
- Avoids the pitfalls of interruptions or unplanned events such as occur in the clinical setting
- Allows reflection

Disadvantages of Simulation

- Lack of full understanding of the consequences of an action to a real situation
- Poor design = poor experience
- More time consumption for educators
- Educators may not have the expertise / are uncomfortable with the new format
- Lack of prospective evidence on validity and reliability
- Lack of standardized development tools
- Cost in development and administration

Simulation training represents an opportunity for competency evaluation that is unique....

What is competence?

- More generally, competence is “the state or quality of being adequately or well qualified, having the ability to perform a specific role.”

The competence development process

- Is a lifelong series of doing and reflecting
- Occurs during clinical practice after a baseline has been established
- Novices require more rules and structure

Competency Development

- Levels of competence in competence development
 - Novice: Rule based behavior, strongly limited and inflexible
 - Experienced Beginner: Incorporates aspects of the situation
 - Practitioner: Acting consciously from long term goals and plans
 - Knowledgeable practitioner: Sees the situation as a whole and acts from personal conviction

Dreyfus, SE, Dreyfus HL. Mind over Machine. 1986. New York NY. Blackwell Publishers

Competency Development

- Levels of competence in competence development.
 - **Expert**: Has an intuitive understanding of the situation and zooms in on the central aspects (Benner stops here)
 - Virtuoso: Has a higher degree of competence, advances the standards and has an easy and creative way of doing things
 - Maestro: Changes the history in a field by inventing and introducing radical innovations

Dreyfus, SE, Dreyfus HL. Mind over Machine. 1986. New York NY. Blackwell Publishers

How, when and where to incorporate simulation into a curriculum?

Proposed Definition

- Curriculum Integration Plan
 - A comprehensive plan consisting of categorizing the problem, developing a 'traditional' educational plan (including simulation activity) and then developing a corresponding operational plan

Important Considerations in Curricular Integration

- Simulation fit to purpose
 - What methods?
 - Skill training vs. team training, fidelity, partial vs. full context
- Adequacy of instruction and demonstration
- Learner centeredness (respect for individual learning curves)
- Use of deliberate and repetitive practice
- Clinical variation and increasing complexity
- Immediacy, frequency and validity of feedback

Initial Triage Questions

- Is it suited to simulation?
- What are the specific educational and outcome objectives?
- Who can be assigned to the work team to help create the course?
- Is there leadership support and can we afford it?
- What is the target date for alpha testing and offering the course?
- Is there existing content?

Typical Goals or Learning Targets




Assessment



Individual Psychomotor Skills



Monitoring and Intervention Skills



Clinical Problem Solving



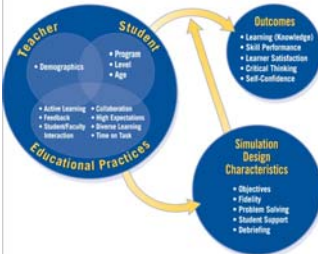
Communication and Teamwork skills



Clinical Reasoning

7 Principles of Best Practices in Undergraduate Education (Chickering and Gamson 1987)

1. Active learning
2. Prompt feedback
3. Student/faculty interaction
4. Collaborative learning
5. High expectations
6. Allowing for diverse learning styles
7. Time on task must be adequate




NLN-Laerdal Best Practices Model

Courtesy Dr. Pam Jeffries, NLN-Laerdal Project # 1

What are Simulation “best practices”

- Establish clear learner outcomes
- Clearly connecting course & clinical objectives to simulation session
- Establishing ongoing training & supervision of faculty, staff & participants
- Collaborating with participants and faculty in planning, implementation and evaluation of each session
- Offering a debriefing session after each simulation experience



Brenner, M. N., K. Aduddell, et al. (2006). "The use of human patient simulators: best practices with novice nursing students." *Nurse Educ* 31(4): 170-4.

Curriculum Integration – WISER Model

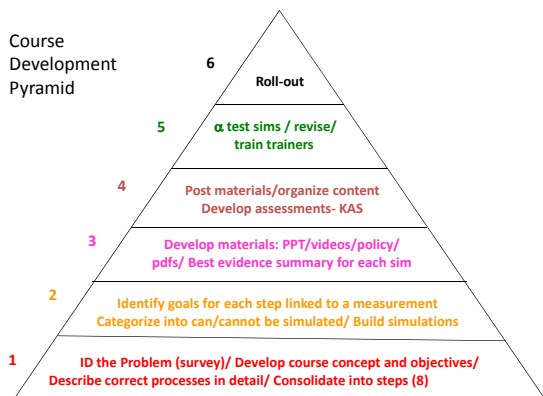
1. Initial contact
2. Triage and funding discussions- **WHAT IS IT?**
3. Planning meeting- **WHERE DOES IT FIT?**
4. Form a team (course bus)- **WHO?**
5. Use of Tools and Templates (scenario, course, instructor)
6. Technology 101 (PPT, SIMS, pdf, audio, video, SimMan & other software etc....)
7. Curriculum development- pre, intra and post-course materials that integrate within the current curriculum
8. Assessment development and testing
9. Overall course testing and administration- **WHEN?**
10. Quality improvement activities (meetings and observation)

10 Point Checklist in Scenario Development

1. Identify student level
2. Refer to course objectives*
3. Develop scenario outline and student stem
4. Develop instructor notes and scenario flow
5. Create programming or assessment construct and embed in SimMan software system
6. Create appropriate order set
7. Establish pre-course student preparation requirement
8. Develop study/debriefing questions
9. Identify and gather equipment, supplies and props
10. Reference topics to best evidence or standards in education

Kuzminsky, O'Donnell 2008 in Nehring, Simulation for Nursing Educators

Course Development Pyramid



Incorporation of Simulation in the Nurse Anesthesia Program at Pitt

- Foundations of Nursing Anesthesia
 - Positioning workshop
 - IV, arterial line insertion, suturing
 - Spinal & epidural workshop
 - Airway management
 - Mock induction
 - Think on your feet
- Chemistry and Physics
 - Gas machine workshop



Incorporation of Simulation in the Nurse Anesthesia Program at Pitt

- Applied Physiology and Pathophysiology
 - Problem based learning simulation
- Advanced Principles I
 - Pediatric simulation
 - Regional anesthesia techniques



Incorporation of Simulation in the Nurse Anesthesia Program at Pitt

- Advanced Principles II
 - Regional anesthesia technique
 - Central line workshop
 - Double lumen endobrochial tube workshop & high frequency jet ventilation



Incorporation of Simulation in the Nurse Anesthesia Program at Pitt

- Advanced Principles III
 - Anesthesia crisis leadership training
 - Trauma workshop
 - Difficult airway workshop
- Team Training in Patient Safety
 - Teach in a simulation course
 - Teach in undergraduate simulation
 - Teach in 1st year anesthesia courses



Incorporation of Simulation into the Applied Physiology and Pathophysiology Course

Problem-based learning

is a student-centered instructional strategy in which students collaboratively solve problems and reflect on their experiences. (Wikipedia, 2010)

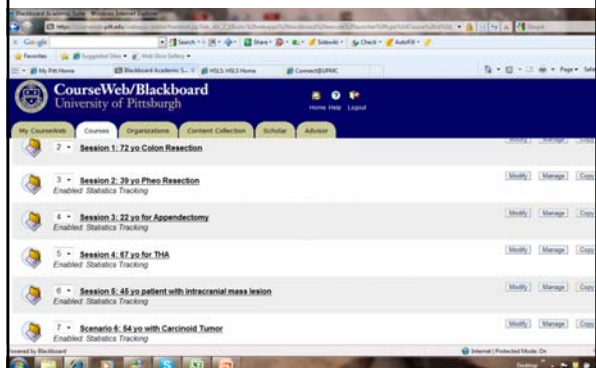
Characteristics of Problem Based Learning

- Students work in groups
- Faculty are facilitators
- Students work in a real world context
- Learning driven by open-ended, ill-defined problems

How to Apply PBL to Applied Physiology and Pathophysiology?

- Patient problems in simulation sessions reinforce lecture content
- Students are provided readings and the patients problems prior to the simulation sessions
- Students work with each other during the sessions and during the debriefing sessions to solve problems
- Faculty focus on facilitating the debriefing sessions

Simulation Sessions



Session 1: 72 yo Colon Resection

Objectives: Bronchospasm

At the end of the simulation training the student will:

1. Describe the etiology of bronchospasm
2. Discuss the typical situations that increase the risk for bronchospasm
3. Discuss appropriate measures to prevent bronchospasm
4. Describe the clinical manifestations of bronchospasm
5. Demonstrate appropriate management of a patient that develops bronchospasm
6. Describe potential complications from bronchospasm if not treated appropriately

Required Reading:

- Miller, R. D. et. al. (2005). *Miller's Anesthesia*. (sixth edition). Elsevier. Chapter 6
- Hirschman, C. A. (1983). Airway Reactivity in Humans. *Anesthesiology*, 58, 170-177.
- Crogan, S. J. Bishop, M. J. (1989). Delivery Efficiency of Metered Dose Aerosols given via endotracheal tubes. *Anesthesiology*, 70, 1008-1010.

Session 1: Case Stem

Mr. William Jones is a 72 yo, 73 inch, 93 kg patient for bowel surgery. Airway: M-2, oral opening > 5 cm, decreased CROM. 40 pk-yr history of smoking, currently ½ pack/day. Has diagnosis of COPD manifested by SOB and occasional wheezing. Uses albuterol inhaler. History of CAD, HTN, MI in '93, CABG in '93 X 3 vessels. Current EKG NSR with LBBB. Type II Diabetic. Osteoarthritis. Meds: Lipitor, ASA, Metoprolol, Metformin, HCTZ, naproxyn, plavix. The naproxyn and plavix were discontinued 2 days ago.

Preoperative Evaluation

Session 1: Scenario Flow

Patient has just entered the OR and will be induced. Will become bronchospastic with saturation falling to 75%. Will improve with deepened anesthesia, B2 agonist, increased FiO2. Patient has an epidural catheter in place and the GA level is 'light'

What is the best way to debrief?

Lots of Debriefing Modes

- Private bedside debrief by facilitator immediately post scenario
- Private 'debriefing room' debrief by facilitator immediately post-scenario
- Debrief by peers outside of simulation suite
- Self-guided reflection of video performance



Courtesy Nigel Wynne, 2008

Debriefing Methods based on Reflection

- GAS
 - Gather
 - Analyze
 - Summarize
- ADPIEC
 - Assess/anticipate
 - Diagnose
 - Plan
 - Intervene
 - Evaluate
 - Communication
- ADNOTE
 - Anticipation
 - Detection
 - Notification
 - Treatment
 - Evaluation

Phase	Goal	Actions	Sample Questions	Time
Gather	Listen to participants to understand what they think & how they feel about session	<ul style="list-style-type: none"> • Request narrative from team leader • Request clarifying or supplemental information from team 	All: How do you feel? Team Leader: Can you tell us what happened? Team members: Can you add to the account?	5 min
Analyze	Facilitate participants reflection on & analysis of their actions	<ul style="list-style-type: none"> • Review of accurate record of events • Report observations (correct & incorrect steps) • Ask a series of question to reveal participants' thinking processes • Assist participants to reflect on their performance • Direct/redirect participants to assure continuous focus on session objectives 	<ul style="list-style-type: none"> • I noticed... • Tell me more about... • How did you feel about... • What were you thinking when... • I understand, however, tell me about "X"...aspect of the scenario... • Conflict resolution: <ul style="list-style-type: none"> • Let's refocus: "what's important is not who is right but what is right for the patient..." 	10 min
Summarize	Facilitate identification & review of lessons learned	<ul style="list-style-type: none"> • Participants identify positive aspects of team or individual behaviors & behaviors that require change • Summary of comments or statements 	<ul style="list-style-type: none"> • List two actions or events that you felt were effective or well done • Describe two areas that you think you/team need to work on... 	5 min

Adapted from: O'Donnell, J.M., Rodgers, D.L., Lee, W., Edelson, D. P., Haag, J., Hamilton, M.F., Hoadley, T., McCullough, A., Meeks, R., (2009), Structured and Supported Debriefing [Computer Software]. American Heart Association, Dallas, TX.

SCENARIO 1: 72 Y/O WITH COPD UNDERGOING COLON RESECTION DEVELOPS BRONCHOSPASM

Debriefing Template

Overall Goal: Detect and treat bronchospasm related to the patient with COPD

Specific Goals:

- Demonstrate safety behaviors in avoidance of bronchospasm
- Demonstrate skill in prompt detection and assessment of bronchospasm
- Demonstrate skill in managing an acute bronchospasm event
- Develop plan for definitive treatment and follow-up

Scenario 1: Pre-Event Anticipation Behaviors

ANTICIPATION: RISK ASSESSMENT BEHAVIORS

- Obtain adequate report (using SBAR?)
- Verify with written record
- Patient assessment
- Environmental assessment

**Debriefing Powerpoint -
Bronchospasm**

- Bronchospasm is caused by airway hyperreactivity to physical, chemical, and pharmacologic stimuli. Causes: histamine, cholinergic agonists, prostaglandin, irritant gases, chemically inert dusts, and cold air.
- In patients with COPD, irritant reflex mechanisms usually predominate; blocking either the afferent or efferent limb of the irritant reflex effectively prevents and treats bronchospasm.
- Airway viral infections render normal people hyperreactive for at least three weeks following symptomatic recovery.

**Bronchospasm
Anesthetic management**

- The goal of the anesthetist is to prevent the development or reverse the occurrence of airway constriction.
- Anesthetics block parasympathetic irritant reflexes by directly relaxing the smooth muscle of the airway, by inhibiting release of mediators, and by augmenting beta2-adrenergic sympathetic responses.
- Lidocaine (1mg/kg) and atropine prevent irritant-induced airway constriction.

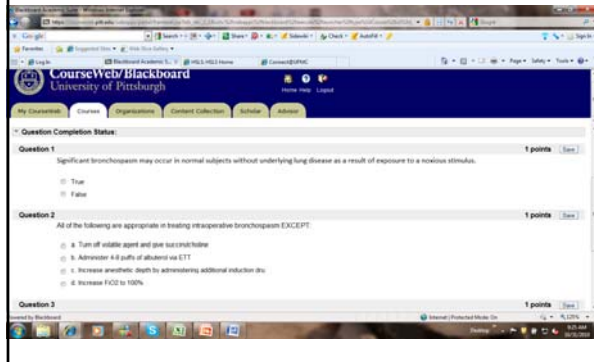
Debriefing Points

- Impossible to debrief everything at once
- Debriefing should be learner-centric and conducted within a safe environment
- Participants need and value the feedback
- An accurate log should be created and used
 - Video, SimMan log, checklist
 - Debriefing points are derived through setting appropriate session/ course objectives
 - In other words, looking for specific points

How can we determine success?

- Instructor perceptions
- Trainee perceptions
- Program/ faculty evaluation
- Trainee assessment
- Clinical change in providers or patients
- Change in clinical costs

Pre/Post Quiz



Post Course Evaluation by Students

