Simulation as an Educational Tool

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Goal

• Introduce simulation education
• Medical student education at the University of Pittsburgh
• Envision how it will be used in the near future
Disclosures

• Nothing financial
• Rabid Penguins fan
• You know who taught me how to do do do this?
What is simulation?

• Full scale human-patient simulators
• Partial task trainer
• Computer (screen)-based simulation
• Standardized patient
• Cadavers
• Lab animals
• Patients
• “What would you do if…?”
Benefits of simulation education

- Reflective, experiential learning
- Reproducible
- Taking responsibility
- Build confidence
- Preparation for high risk procedures
- Team work
- Safety
- Standardized curriculum and experience
- Objective evaluation of skills, learning, abilities

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History

- Dr. Winter purchased Pitt’s first human patient simulator in 1994
- Used in medical student education from the beginning
WISER

- Opened in 2003
- 12,000 square feet
- In 07-08:
  - 4545 student encounters at WISER
  - 586 classes
  - 4315 hours of WISER courses
  - 12251 student-hours
Current themes in med student education

- Team training
- Communication
- Professionalism
- Teaching basic science
- Skills acquisition
- Objective performance evaluation
- In situ uses
Current Pitt courses

- **MS I’s:**
  - Biochemistry

- **MS II’s:**
  - Clinical procedures
    - Adult and pediatric basic airway management
    - Monitoring

- **MS III’s:**
  - Anesthesiology
  - Medicine

- **MS IV’s:**
  - Anesthesiology
  - Critical Care Medicine
  - Emergency Medicine
  - Preparation for residency

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My first format

• Lecture
• Lead the students through the simulation
• Lecture
My current course format

- Design sims based on the clerkship’s learning objectives
- Pre-sim material
  - Online video lectures, reading assignments, quizzes
- Perform the simulation
  - Do them in small groups
  - Instructor, keep quiet!
- Real time feedback
- Review/debrief

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Evolving into a format of:

- Pre sim material
- Group being presented with a case and given specific goals
- Formulate a plan
- Perform the simulation while the rest of the class observes
- Have the second half of the class perform the case
- Debrief and score the attempt
Scoring: subjective assessment

• Expert performance
• Use multivariate analysis to define expertise
  – Actions performed
  – Order of actions performed
  – Patient management (vital signs)
• Allow students to compare their behavior to experts
Persistent problem

- What do I do when they cause a complication?
  - VF, hypotension, etc
What makes a good simulation instructor?

- Paul Rogers
- Sue Dunmire
- Steve Orebaugh
- Shawn Beaman
- Trisha Dalby
- Ryan Romeo
- Bill McIvor

- Challenge:support ratio of ~25-33%
  - Don’t kill the mannequin
- Sense of humor
- Ability to make it up on the fly
Fuel metabolism

• “…helped me to internalize the material … I feel much more comfortable with the classroom material once it has been reinforced with hands-on experience.”
• “make biochemistry less esoteric”
• “Trial and error-had no idea what we were doing, but with guidance it turned out great.”
Future courses

- Anatomy
- Pharmacology
- CV
- Respiratory
- Renal
- Integrated case studies

- Clinical procedures course
- Orientations to clerkships and electives
- Subjective assessment
- Scholarly projects
Future directions

• Screen-based simulations
  – PA catheter insertion
  – Pharmacology

• Blended simulations
  – Respiratory pathophysiology
  – Team training

• Simulations for high school and college undergraduates

• A center in Scaife

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Does it work?
• Simulation-based education improves quality of care during cardiac arrest team responses at an academic teaching hospital: a case-control study. *Chest* 133,56-61

• Beta test results of a new system assessing competence in laparoscopic surgery. *J Am Coll Surg* 2006;202,62-69

• Computer simulator training enhances the competency of gastroenterology fellows at colonoscopy: results of a pilot study. *Am J Gastroenterol* 2004;99,33-
• Achieving house staff competence in emergency airway management: results of a teaching program using a computerized patient simulator. *Crit Care Med* 2004;32,2422-2427

• Incorporating simulation-based objective structured clinical examination into the Israeli National Board Examination in Anesthesiology. *Anesth Analg* 2006;102,853-858

• Parachute use to prevent death and major trauma related to gravitational challenge: a systematic review of randomised controlled trials. *BMJ 2003; 327, 20-27*

• “…those who advocate EBM and criticise use of interventions that lack EB will not hesitate to demonstrate their commitment by volunteering for double blind, randomised, placebo controlled, crossover trial.”
HROs

• If aviation were merely 99.99% reliable:
  – 1 airline accident every 20 days at a regional airport with 500 flights per day

• Hospital errors account for an estimated 200,000 deaths per year
  – 3rd leading cause of death behind heart disease and cancer
  – 390 jumbo jet crashes per year
“…we were simply doing the job we were trained to do”

-Chesley "Sully" Sullenberger III
My goals

• Increase the amount of time students spend in the simulator
  – Pre-clinical years
• Improve the fidelity of the simulations
• Study the human patient simulator as a teaching platform
• Foster students’ interest in human patient simulation