

No Program Left Behind: Simulation on a Shoestring Budget

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COI

- Employee of the Johns Hopkins Medicine Simulation Center
 - Hospital-Based Education
 - Student Education
 - External clients
- No financial or other conflict of interest

To Do List

- What makes simulation effective?
- What kind of simulations can I do? What kind of simulators are out there?
- Everyday objects to enhance simulation fidelity
- Free (or almost free) options for simulation
- Maximize available simulation resources
- Improve the longevity of your trainers /manikins
- Opportunities for collaboration
- Idea sharing...

What makes simulation effective?

Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review.

- Providing Feedback
- Repetitive Practice
- Curriculum Integration
- Range of Difficulty Level
- Multiple Learning Strategies
- Capture Clinical Variation
- Controlled Environment
- Individualized Learning
- Defined Outcomes
- Simulator Validity

Issenberg, S. B., McGaghie, W.C., Petrusa, E.R., Gordon, D.L., Scalese, R.J. (2005) Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. *Medical Teacher*, 27(1), 10-28.

What makes simulation effective?

- **Providing Feedback**
 - **Debriefing:** when the facilitator and the participant have a dialogue to discuss the events of the simulation, why certain behaviors occurred, and develop a plan to affect change in future patient care.
 - **One of the most important events during simulation.**
 - Even simulations where nothing is done correctly can improve patient safety if there is an effective debriefing.

What makes simulation effective?

- **Repetitive Practice:**
 - repeat a skill until it is done successfully (usually impossible on real patients)
 - “Practice makes Perfect Permanent”
 - Vince Lombardi, “Perfect practice makes perfect”
- **Curriculum Integration:**
 - not a stand-alone learning modality
 - works best when integrated into a larger curriculum with other educational interventions

What makes simulation effective?

- **Range of Difficulty Level:**
 - scenarios can be adjusted based on the skill level of the participants
 - "Up the ante"
- **Multiple Learning Strategies:**
 - Adapt simulations for visual, read/write, aural, etc
- **Capture Clinical Variation**
 - simulators can be adjusted to capture similar patient states
 - Tweaking clinical conditions can create many unique patient care situations

What makes simulation effective?

- **Controlled Environment:**
 - patients are often unpredictable.
 - Simulation can allow you to control how patients respond to interventions
 - facilitators can control what learning occurs
- **Individualized (Active) Learning:**
 - participants in a simulation are active learners, not passive bystanders
 - engages them, encourages learning

What makes simulation effective?

- **Defined Outcomes**
 - Written, explicit learning objectives
 - One objective per knowledge/skill
 - Evidence-based??
- **Simulator Validity**
 - the degree of realism or fidelity the simulator provides as an approximation to complex clinical situations, principles and tasks
 - Higher = "better"

What makes simulation effective?

- **How many of these cost extra \$\$ to do???**

- Providing Feedback
- Repetitive Practice
- Curriculum Integration
- Range of Difficulty Level
- Multiple Learning Strategies
- Capture Clinical Variation
- Controlled Environment
- Individualized Learning
- Defined Outcomes
- Simulator Validity (high fidelity *can=* high tech); Sometimes!

Issenberg, S. B., McGaghie, W.C., Petrusa, E.R., Gordon, D.L., Scalese, R.J. (2005) Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. *Medical Teacher*, 27(1), 10-28.

Best Practices in Simulation Education

- Experiential Learning (Kolb)
- Contextual Learning (Kneebone)
- Situated Learning/Peripheral Participation (Lave & Wenger)
- Self-Efficacy and Competency (Maibach et al, Miller)
- Deliberate Practice (Ericsson)
- Feedback (Van de Ridder)
- Mastery Learning (Bloom)

Hunt et al, 2008

The Role of Simulation in Patient Safety

- Training for Emergencies
- Training for Teamwork
- Testing new Procedures for Safety
- Evaluating Competence
- Usability Testing of Devices
- Investigating Human Performance
- Skills Training for “Novices”

What kind of simulations can I do?

- Instructional
- Diagnostic
- Assessment

What kind of simulations can I do?

Instructional:

- Demonstrate something new to a person or group
- Augment/replace clinical experiences that aren't guaranteed to all students prior to graduation
- "Shorten learning curve"

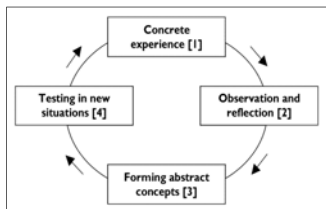
What kind of simulations can I do?

Instructional:

- How much education participants should be given on topics prior to attending instructional simulation?
 - Traditional: disease lecture first, then manage a patient (simulated or real)
 - If learning style isn't aural, students won't master knowledge in lecture
 - Simulation = Disorienting Dilemma (attention grabber)

Experiential Learning David Kolb

1. Direct encounter with the phenomenon being studied rather than merely thinking about the encounter, or only considering the possibility of doing something about it
2. Education that occurs as a direct participation in the events of life



What kind of simulations can I do?

Diagnostic-

- “Why are specific errors occurring?”
- Is a particular team prepared to safely manage emergency situations?
- Diagnose latent errors
 - less apparent failures of organization or design that contribute to the occurrence of errors or allow them to cause harm to patients

What kind of simulations can I do?

Diagnostic

- “Is our unit prepared to quickly, safely, and effectively care for a patient with an airway emergency?”
 - staffing adequacy
 - equipment and storage issues
 - availability of resources
 - assessment and decisions in patient care.

What kind of simulations can I do?

Diagnostic

- *PEDIATRIC RESPIRATORY THERAPISTS' PERFORMANCE AS A RAPID RESPONSE TEAM FIRST RESPONDER FOR AN INFANT IN RESPIRATORY DISTRESS-A VIDEO REVIEW*
 - ? Status Quo?
 - Respond to an infant in respiratory distress
 - Begin BMV within 1"
 - When it's unsuccessful, attempt 2 adjunct airway maneuvers within 2"
 - Did RTs follow a similar pattern when managing the airway (trends)?
 - Curriculum pre-assessment

What kind of simulations can I do?

Assessment-

- evaluates a person's ability to perform certain tasks
 - Patient assessment
 - Decision making
 - Psychomotor skills
- Assess new equipment, protocols
- Assess quality/effectiveness of new/existing curricula

What kind of simulations can I do?

Assessment-

- prior to beginning clinical rotations
 - "Can my students safely suction a patient with an artificial airway per the AARC's Clinical Practice Guidelines (CPG)?"
- end of clinical rotations
 - "Have my students improved in suggesting mechanical ventilator changes based on clinical findings, such as arterial blood gas, chest radiograph, peak airway pressures, flow-volume loops, and other requested data?"

What kind of simulators are out there?

- Partial task trainer
- Integrated Clinical Simulators
 - Low fidelity
 - High fidelity
 - Instructor-driven
 - Computer-driven
- Computer-assisted simulation
- Virtual reality simulation
- Standardized Patient (SP)
- Hybrid simulation

Simulation Terminology

- Fidelity = real, true-to-life

Partial Task Trainer

(\$)

- Allows learners to practice one specific task
 - ABG wrist/arm
 - Intubation head
- Focus is on the psychomotor skill in isolation
- Doesn't incorporate much "patient" feedback
- Can allow instructors to "check off" a skill prior to performing on a real person

Integrated Clinical Simulators (\$-\$\$\$\$)

- Low Fidelity-BLS Manikin



Integrated Clinical Simulators (\$-\$\$\$\$)

- Mid-fidelity-MegaCode Kid, ResusciAnne trainer



Integrated Clinical Simulators (\$-\$\$\$\$)

- High Fidelity-
 - METI (HPS, iStan, PediaSIM, BabySIM)
 - Laerdal simulators (SimMan, SimBaby, SimNewB)
 - Guamard (Noelle, Hal, Susie)



Computer Assisted Simulation (\$-\$\$)

- Think NBRC clinical simulations...
- Laerdal Microsim for ACLS



Virtual Reality Simulation (\$\$\$\$)

- Bronchoscopy
- IV therapy



Standardized Patients and Confederates (\$-\$\$)

- Standardized Patient:
 - Actors playing the part of the patient
 - Used in medical student training to teach communication skills as well as pt exam skills

Standardized Patients and Confederates (\$-\$\$)

- **Confederate:**
 - individual other than the patient who is scripted in a simulation to provide realism, additional challenges, or additional information for the learner (<http://www.ahsimcenter.umn.edu/ProjectDevelopment/SimulationTerms/index.htm>)
 - Someone working for the facilitator, given a role, script, or job in the simulation
 - Often used in psychology studies

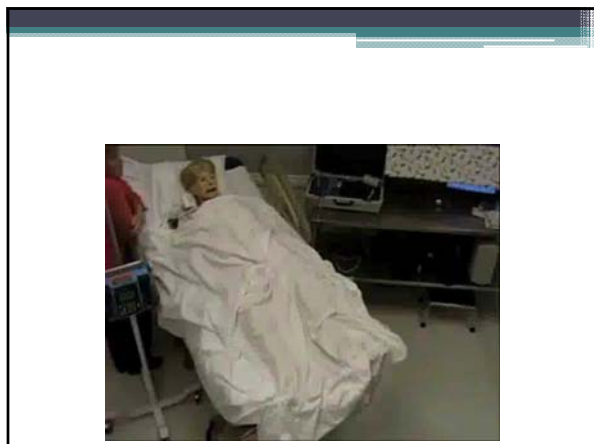
Hybrid Simulation (\$-\$\$\$\$)

- Using one or more types of simulation in tandem
 - Pt monitor simulator with low fidelity manikin
 - ABG wrist with standardized patient



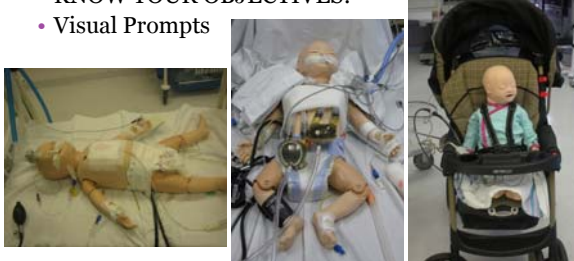
Everyday objects to enhance simulation fidelity

- Use a baby monitor or 2 way radio for manikin voice (with manikins who don't speak)
- Can also use wireless microphone and speaker set



Everyday objects to enhance simulation fidelity

- KNOW YOUR OBJECTIVES!
- Visual Prompts



Everyday objects to enhance simulation fidelity

- Washable Finger Paints (Crayola)
 - Simulate body fluids
- Glycerin gel
 - Easily wipes from manikin skin
- Play make-up (washable)
 - bruising, cyanosis, erythema, urticaria, etc



Free (or almost free) options for simulation

- Use SimMan software to simulate a patient monitor for person or a trainer you already have (<http://www.laerdal.com/doc/7320252/SimMan.html#/dl>)
- Manipulate based on:
 - Pt assessment
 - Decision-making
 - Psychomotor skills



Extended Desktop Feature

Free (or almost free) options for simulation

- Connect with central supply chain at hospital or local home care company to have expired equipment donated to your simulation lab
- Connect with hospital pharmacy to obtain expired medications for use in simulation lab

Free (or almost free) optic simulation

- Work with vendors to “borrow” equipment rather than purchasing one for your equipment lab (may need to coordinate with several local programs or RT departments to make more appealing to vendors)



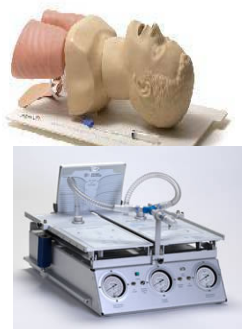
Maximize available simulation resources

- “Connect” your ABG arm to a real person to increase the realism of your ABG stick scenario



Maximize available simulation resources

- Use a lung simulator with another manikin (e.g.- intubation head) to increase the realism of manikin’s pulmonary mechanics



Maximize available simulation resources

- Physician volunteers from teaching hospitals
 - Content expert for simulation curriculum development
 - Simulation facilitator to boost his/her CV.



Maximize available resources

- Don't have time for every student to go through each simulation individually?
 - Demo video... students assess quality of care and "debrief" participants



Maximize available simulation resources

- Training Video



Maximize available simulation resources

- Ventilator Management-METI
 - premade scenarios will need manipulation to relay accurate feedback to MV
 - PLAY FIRST! Make required manikin lung settings in advance
 - Incorporate clinical feedback and vent graphics for staff to "get it" (full patient feedback)

Thanks:
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Maximize available simulation resources

- Ventilator Management-Laerdal
 - Improving SimMan's lungs...



Improve the longevity of your trainers /manikins

- Get to know your simulation sales rep.

Improve the longevity of your trainers /manikins

- Permanent IV, Chest Tube, etc
- Don't use your most expensive trainers for your most damaging skills
 - Intubation (esp. infant)
 - IV placement

Improve the longevity of your trainers /manikins

- Goo Gone- adhesive remover
- WD 40-degreaser
- 10% Benzoyl Peroxide Acne Medicine-remove stubborn stains on manikin skin (ie-pen marks)

Improve the longevity of your trainers /manikins

- Baby powder- decrease friction, improve auscultation
- Sterile/Sterile Distilled water-discourage mold growth
- Ivory Dish Soap-lubricant
- Saran Wrap-skin protectant

Opportunities for collaboration

- Rent space at a local comprehensive simulation center
(Need help finding one? See: <http://www.ssih.org/SSIH/SSIH/Resources/SimCenterDirectory/Default.aspx>.)

Opportunities for collaboration

- Pay in “time shared”-Nursing school’s sim lab, offer to teach something for RN students or play the RT in a simulation
- Develop interdisciplinary simulations

Simulation Resources

AARC Simulation Roundtable

- Objectives:
 1. Guide future formalized training for respiratory care practitioners using patient simulation
 2. Aid the AARC in bringing formalized recommendations to the Simulation Alliance Task Force regarding the simulation needs of the respiratory community
 3. Promote a forum for asking questions regarding simulation curriculum development and utilization, and the sharing of simulation ideas, lessons learned, and curriculum
 4. Provide a place to collaboration for multi-centered simulation research and training for respiratory care practitioners.

Low Cost Options for turning low-fidelity to “high-fidelity”