Simulating Low-Volume, High-Risk Emergencies:

Lessons from the Trenches in Obstetric and Pediatric Nursing

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Disclosures

I have no real or perceived conflict of interest that relates to this presentation. Any use of brand names is not in any way meant to be an endorsement of a specific product, but to merely illustrate a point of emphasis.

Learning Objectives

1. Describe the rationale for using simulation in healthcare education
2. Discuss the different types of simulation available to train healthcare providers
3. Identify low-volume, high-risk obstetric and pediatric patient events that may be candidates for training using mannequin simulation
4. Observe and evaluate an acute pediatric (and obstetric) event using mannequin-based simulation.

A Little About Me

- BS in Respiratory Therapy
- Neonatal RT
- MS in Education (focus in adult learning and multimedia for internet based design)
- Certified Healthcare Simulation Educator
- Manager of “all things plastic”

A Little About my Center

- ~10,000 square feet
- Service JHH and JHU SOM (+++)
- ~100,000 learner contact hours
- Perform all facets of simulation
- Directly intervene with providers when patient safety issues arise

One Minute Reflection

- What did you hope to get out of today's workshop?
- Knowledge, skills, attitudes?
- GOAL (how will you be different?)

- Email jstickl1@jhmi.edu

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Now…

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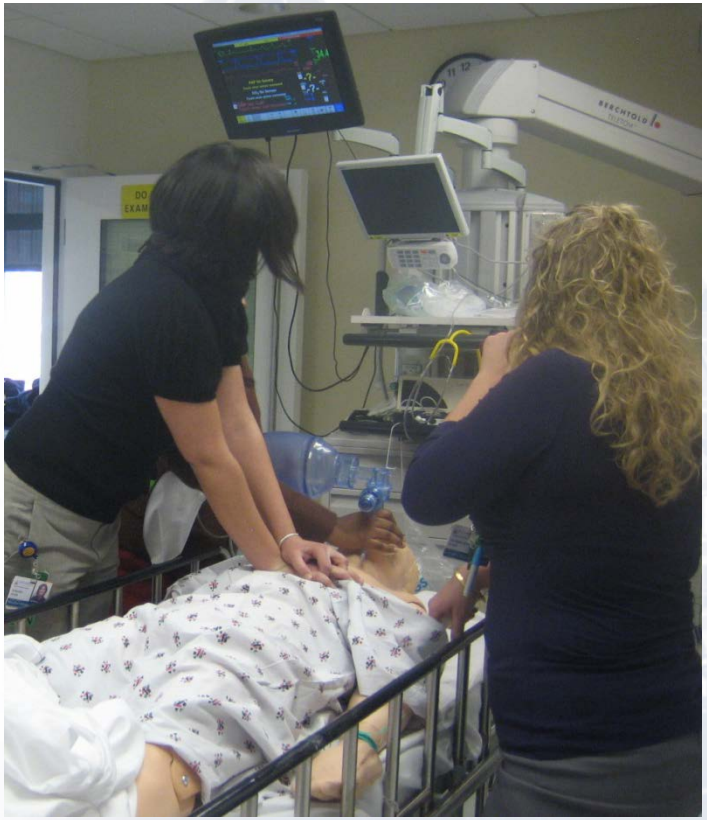
What is Simulation?

- An imitation of some real thing
  - A process, a technique, an environment, etc
- "See one, do one, …."
  - Allows healthcare providers to "Practice on Plastic First"
  - Gives them "Permission to Fail"



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Role of Simulation in Healthcare

Surgery

- Fundamentals of Laparoscopic Surgery (FLS). Simulation = “final exam”

Anesthesia

- Maintenance of Certification for Anesthsiologists (MOCA) = simulation component

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Role of Simulation in Healthcare

Joint Commission

- Using simulation-based training to improve patient safety
  - Team training
  - Curriculum design
  - Outcomes driven

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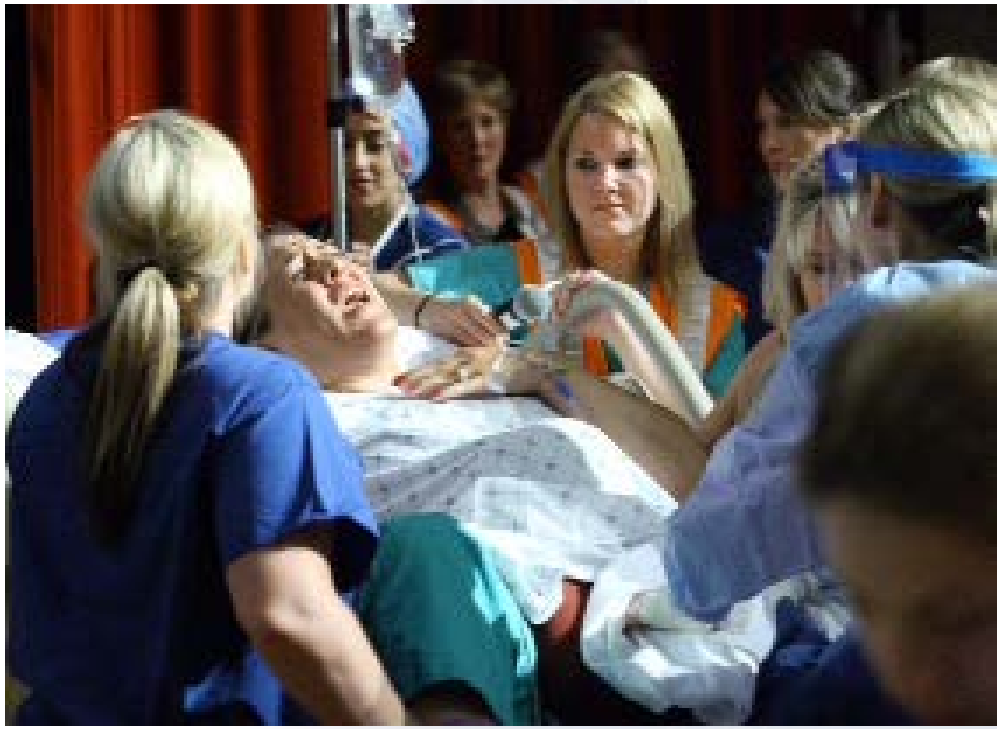
Role of Simulation in Healthcare

Joint Commission Sentinel Event Alert 30 (OB emergencies):

- conduct clinical drills to help staff prepare for when [low volume, high risk] events occur
- conduct debriefings to evaluate team performance and identify areas for improvement



http://www.jointcommission.org/assets/1/18/SEA_30.PDF

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Role of Simulation in Healthcare

Clinical Observation, Simulation

Written exams

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Role of Simulation in Healthcare

Agency for Healthcare Research and Quality (AHRQ)

- Interested in funding a diverse set of projects that develop, test and evaluate various simulation approaches for the purpose of improving the safe delivery of health care

http://www.ahrq.gov/qual/simulproj.htm

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Role of Simulation in Healthcare

AHRQ and Department of Defense Patient Safety Program

- Team STEPPS
  - Teamwork system training
  - Simulation as part of the process
  - Ready-to-use materials and curriculum
  - FREE!!

http://teamstepps.ahrq.gov/

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Why use simulation?

- Educational TOOL
- To be effective it must
  - Be built upon underlying theory
  - Use pre-planned, structured exercises
  - Assess performance
  - Provide feedback

Why use Simulation?

- Minimizing Risk to Patients
  - harm to patients as a byproduct of training or lack of experience is justified only after maximizing approaches that do not put patients at risk
  - allows trainees to more often have their first encounters with real patients when they are at higher levels of technical and clinical proficiency

Ziv A, Wolpe PR, Small SD, Glick S. Simulation based medication education: An ethical imperative. Simulation in Healthcare. 2006; 1(4): 252-256.

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Success Story: JHU Transition to the Wards

- 3 weeks
- 2nd year medical school students
- Immediately prior to first clerkship
- Goal: To prepare students to make the transition from classroom to clinical
- *Very* heavy in simulation

Success Story: JHU Transition to the Wards

What skills should we reasonably expect med students can perform while waiting for a “real doctor” to arrive?

- BLS
- ABC OMI
- Recognize:
  - Dead vs. Alive
  - Respiratory distress
  - ↓ or Δ in LOC

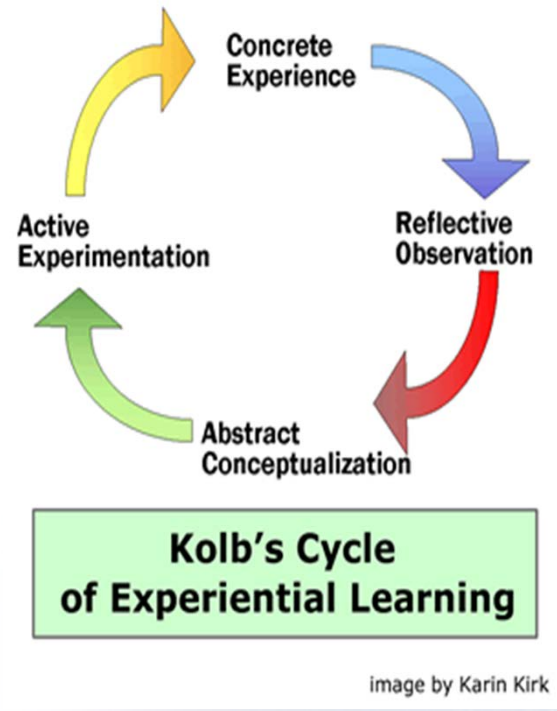
Why Simulation?

Deliberate Practice

- repeat a skill until it is done successfully (usually impossible on real patients)
- Vince Lombardi, “Perfect practice makes perfect”
- “Practice makes ~~Perfect~~ Permanent”

Ericsson A, Krampe RT, Tesch-Romer C. Deliberate practice in the acquisition of expert performance. Psychological Review. 1993; 100(3): 363-406.

Experiential Learning



Smith, M.K. David A. Kolb on experiential learning. Retrieved May 1, 2009 from http://www.infed.org/biblio/b-explrn.htm

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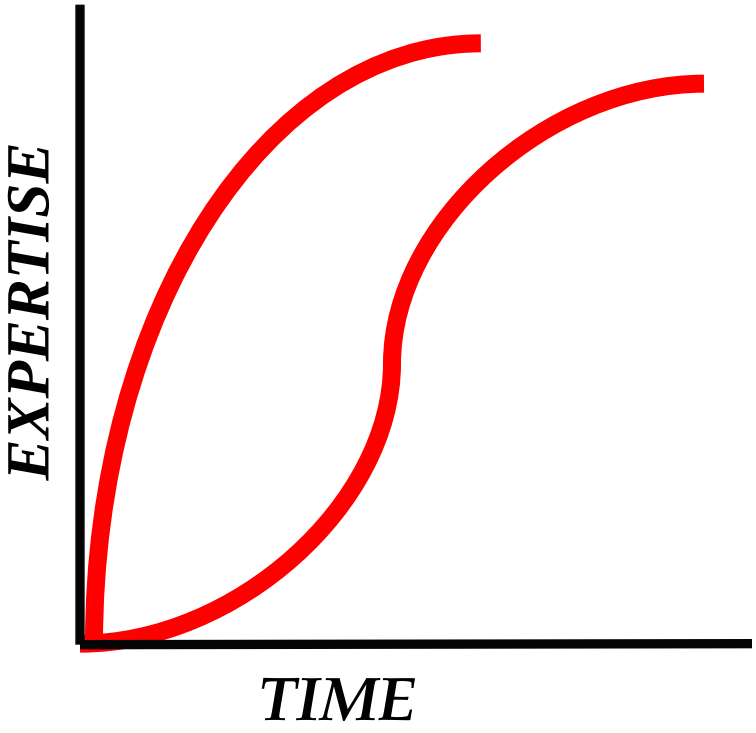
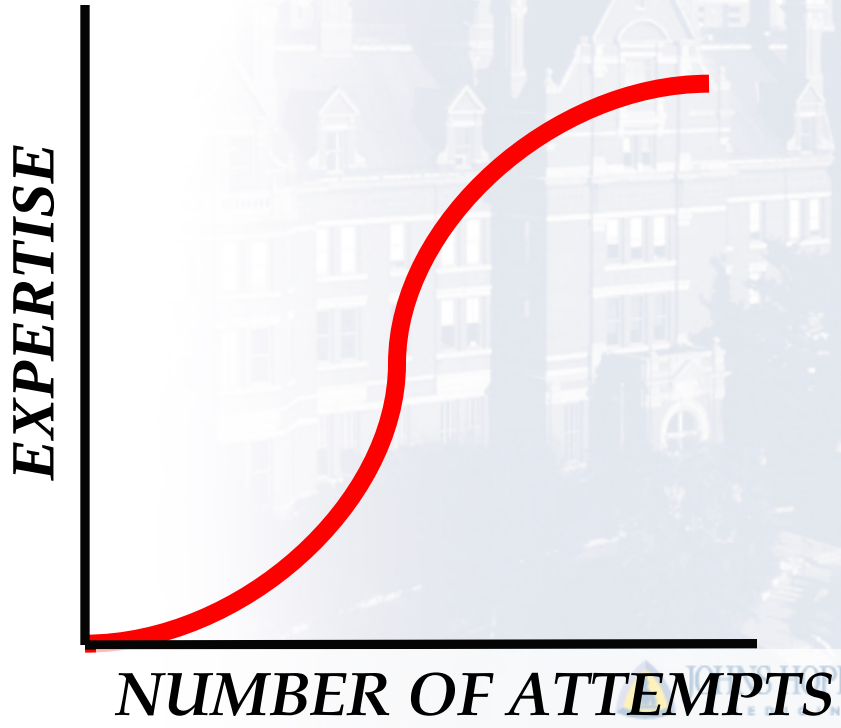
Why Simulation?

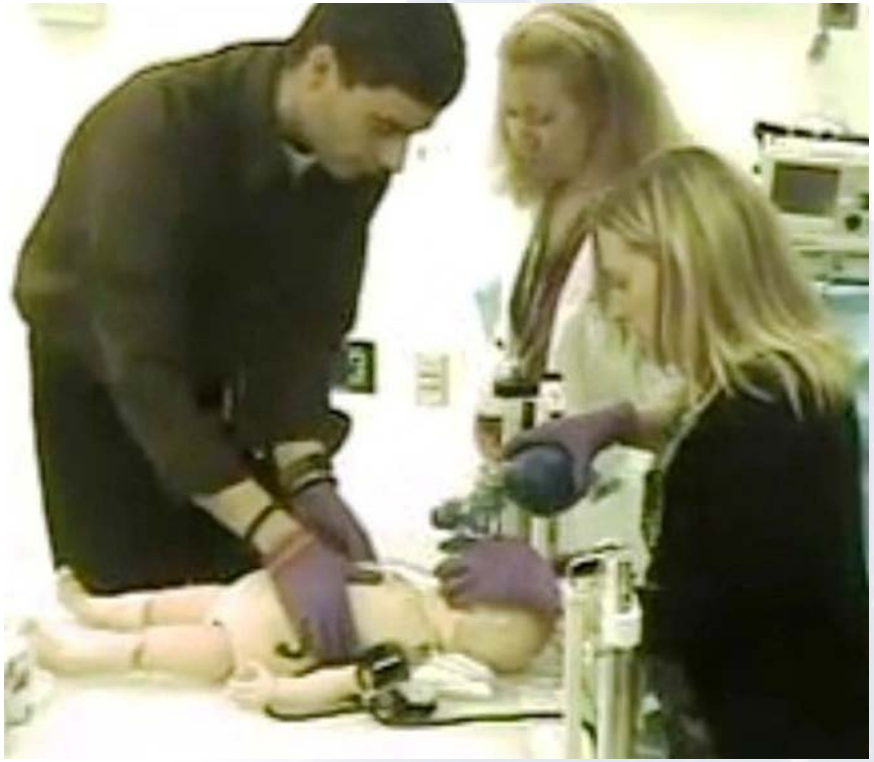
- Shorten/Steepen the learning curve
  - A graph that depicts rate of learning
  - graph of progress in the mastery of a skill against time ...





Success Story: First “Few” Minutes

- All in-unit hospital providers
- 2 hour course
- What should every member of the hospital staff be able to provide to a patient who is pulseless, while waiting for the arrest team to arrive?



Success Story: First "Few" Minutes

- Start CC within 10 sec of pulselessness
- Defibrillate within 180 seconds
- Minimize "no flow fraction"
- Exquisite CPR
- Effective BMV
- Delineate roles within first 90 seconds
  - LEADER

Why Simulation?

- Shared experience
  - Clinical rotations are not consistent
  - Simulation = equal playing field
  - Patients are unpredictable
- Demonstrate something new to a person or group
- Augment/replace clinical experiences that aren't guaranteed to all students prior to graduation

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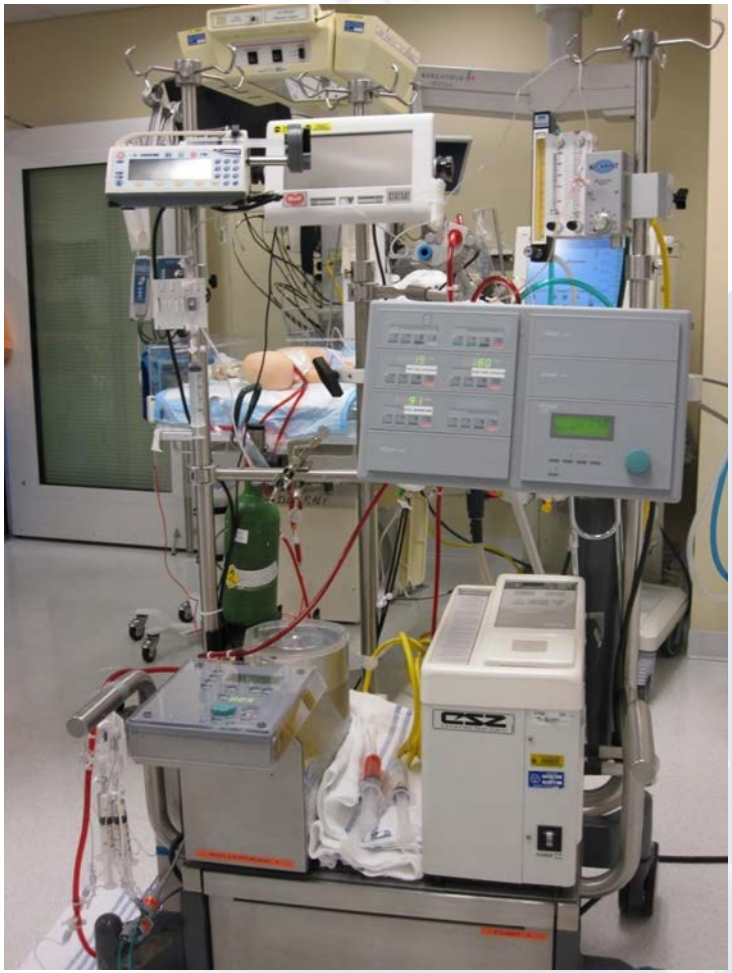
Success Story: PICU ECMO Team Training

- Interdisciplinary Team
- Work together to simulate complications of a patient on extracorporeal membrane oxygenation (ECMO)



Success Story:
PICU ECMO Team Training

- Need to defibrillate on ECMO
- Changing ECMO circuit parts
- Cardiac arrest on ECMO
- Decannulation

What things should designers consider to make simulation successful?

- Fidelity, not technology
- Critical Reflection (DEBRIEF)
- Orientation
- Ground Rules
- Critical Assumptions

Fidelity

- Fidelity = Realism
  - Environmental
  - Physical/physiologic
  - Psychological

Fidelity

Why “Suspend Disbelief”?

- Adrenaline
  - Little = improved memory
  - Too much = emotion vs. cognition
- Amygdala hijacking
  - emotional responses
  - immediate and overwhelming
  - out of measure with the actual stimulus because it has triggered a much more significant emotional threat

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Critical Reflection

- DEBRIEF
- Beyond the scope of this presentation
- a group meeting to review the impressions and reactions that participants experience during or following a critical incident

Critical Reflection

- Allows students to reflect on their performance (and team)
- What was done well and WHY
- What was not done well and WHY
- CHANGE PRACTICE

Orientation

- Introduction
- Facility
- Manikin
- Equipment
- Video capture (release)

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Orientation

- Expectations
- Schedule
- Scenario
- Debrief

Ground Rules

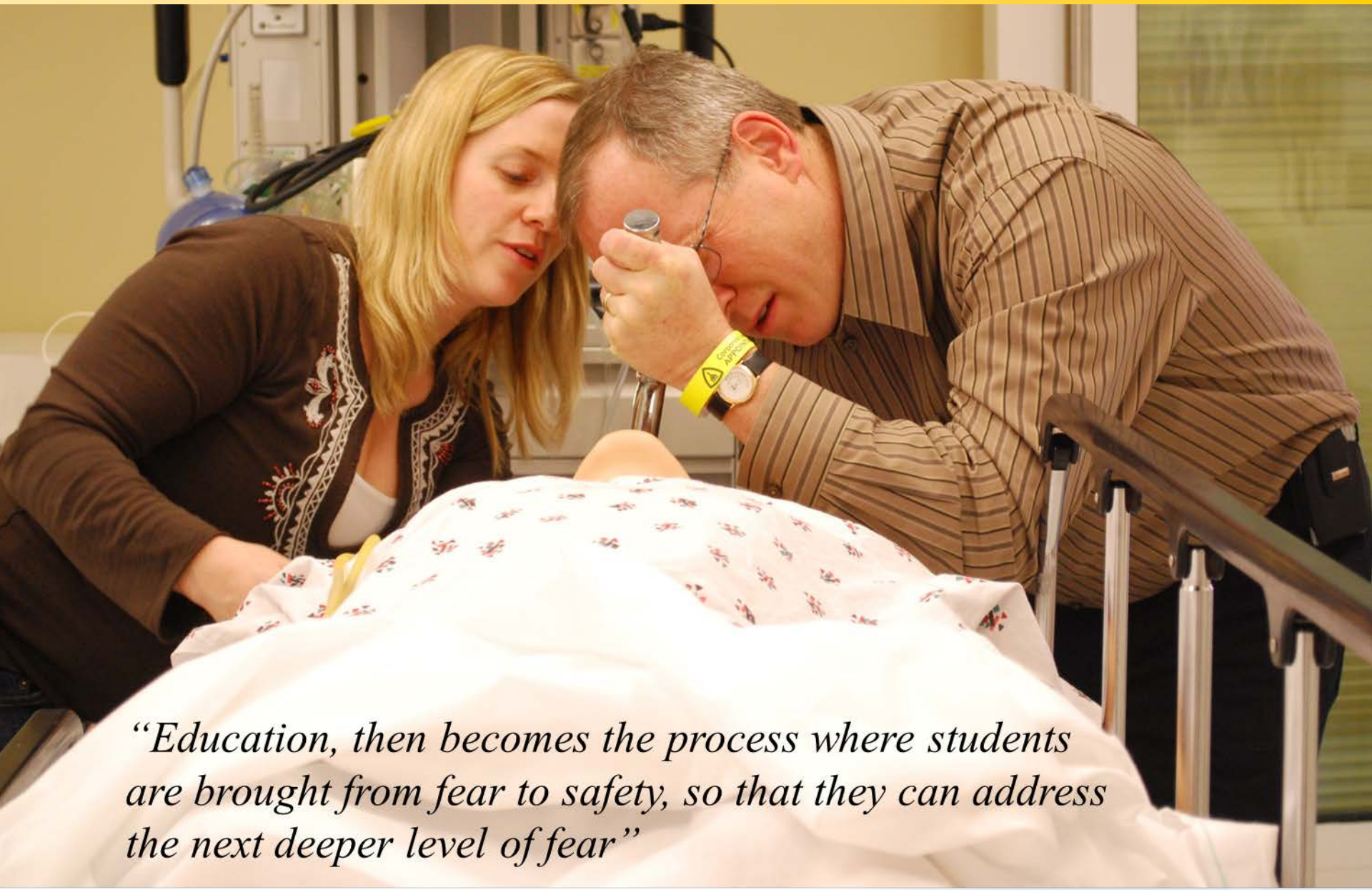
- Confidentiality

Ground Rules

- Safe Environment
  - Permission to Fail
  - Practice on Plastic First
  - Non-judgmental

Ground Rules (Critical Assumptions)

- We will assume…
  - You act with your patient's best interests in mind
  - The way you behave here may not be the same as how you would act clinically, but…
- You agree to…
  - Act comparably to how you would act in your real-life clinical environment
  - Treat this patient as you would any patient you care for
  - Be open to critical reflection from the trainers and your peers during this event
  - Not discuss what happens during the simulation outside of the simulation environment


"Education, then becomes the process where students are brought from fear to safety, so that they can address the next deeper level of fear"

What kind of simulation can I do?

- Loaded Question
- Depends on how you look at it…

What kind of simulation can I do?

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

Dunn WF (Ed). (2004) Simulators in critical care and beyond. Des Plaines, IL: Society of Critical Care Medicine.

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What kind of simulations can I do?

- Instructional
- Diagnostic
- Assessment

What kinds of simulators are out there?

What kind of simulators are 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

Loyd, G.E., Lake, C.L., Greenberg, R.B. (2004). Practical health care simulations. Philadelphia: Elsevier-Mosby.

Partial Task Trainer (PTT) ($)

- Allows learners to practice one specific task
  - IV arm/pad
  - Airway management head
- Focus = psychomotor skill in isolation
- Doesn't incorporate much "patient" feedback
- "check off" a skill prior to performing on a real person

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Integrated Clinical Simulators ($-$$$$)

- Low Fidelity- BLS Manikin

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Integrated Clinical Simulators ($-$$$$)

- Mid-fidelity-MegaCode Kid, ResusciAnne trainer

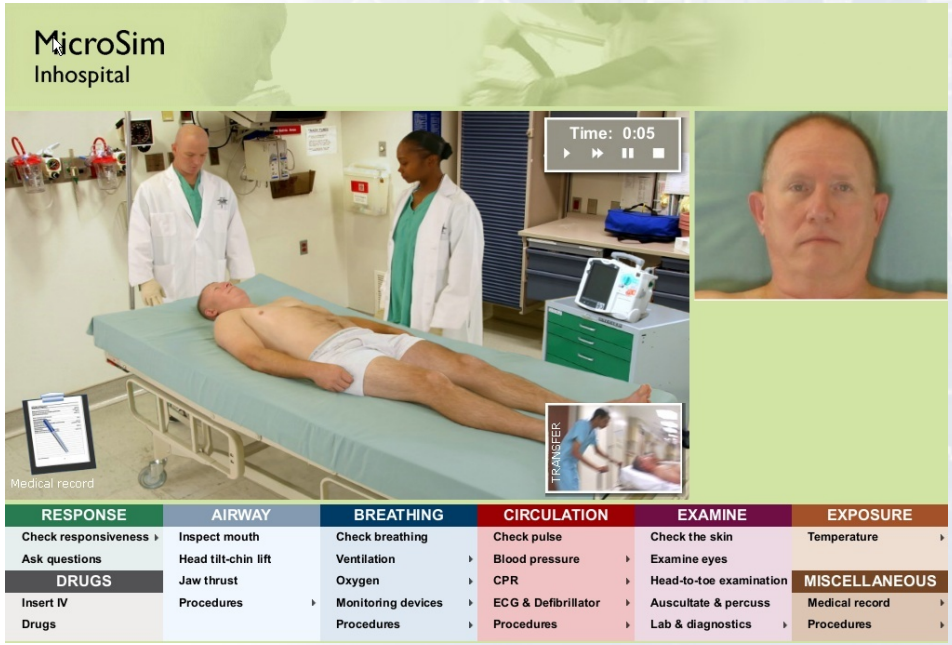
Integrated Clinical Simulators ($-$$$$)

- High Fidelity-

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

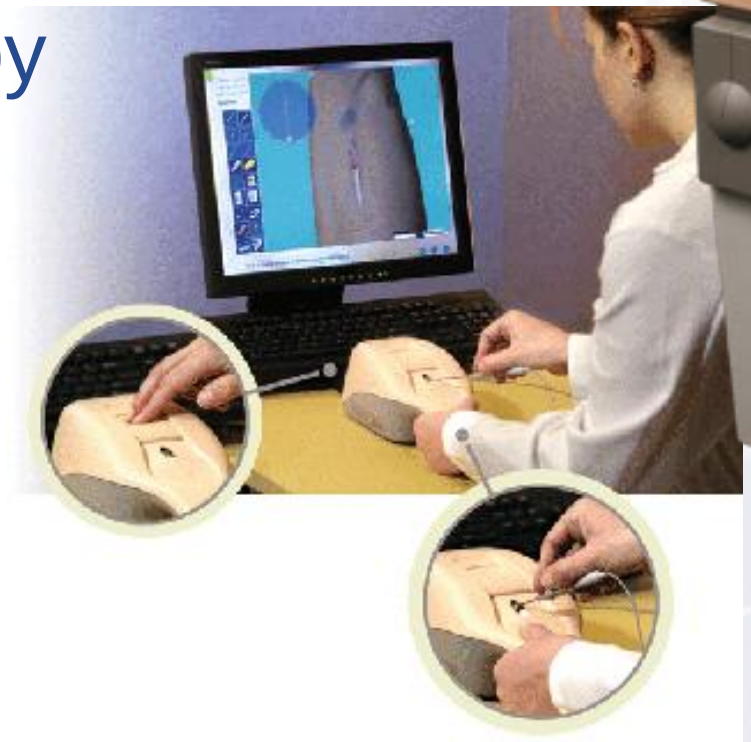
Computer Assisted Simulation ($-$$)

- Laerdal Microsim for ACLS
- Separates patient assessment and decision making from psychomotor skills



Virtual Reality Simulation ($$$$)

- Interventional skills (Endoscopy, athroscopy
- IV therapy



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Standardized Patients and Confederates ($-$$)

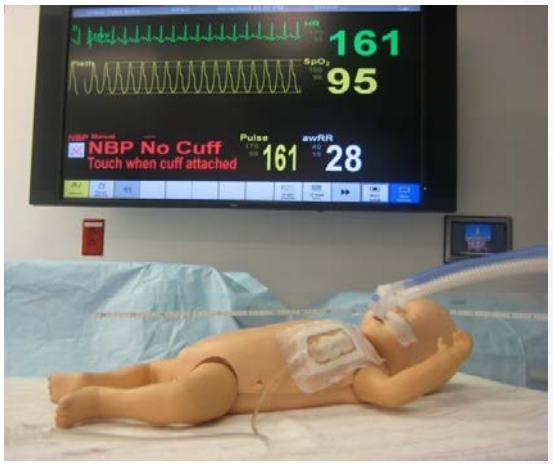
- Standardized Patient:
  - Actors; trained individuals who accurately simulate various patient illnesses in a standardized manner
  - Used in medical student training to teach communication and patient exam skills

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.ahcsimcenter.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
  - PTT with standardized patient



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LOW-VOLUME, HIGH-RISK EVENTS

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Low-Volume, High-Risk Events

- Low Volume = infrequent events
- High Risk = Being particularly subject to potential danger or hazard
- provides a method to improve reliability and safety in high-risk areas

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Low-Volume, High-Risk Events

Low Volume:

- Don’t happen very often, but not particularly risky

High Risk:

- May be a common event, but carries high likelihood for patient harm if done incorrectly

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Why worry about training for these?

- Stakes are high
  - Low volume AND high risk
- Skills Decay over time
- “Use it or lose it”

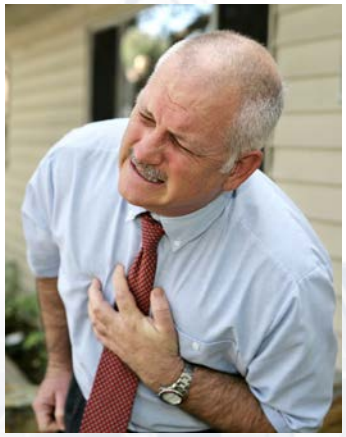
Why Simulation?

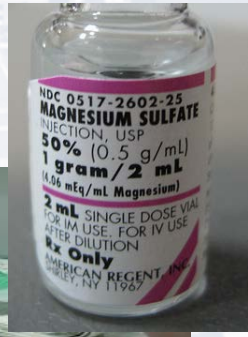
- Realism vs. Unrealism
  - Speed up and Slow Down
- Repetitive Practice
- Range of Difficulty level
- Capture Clinical Variations
- Controlled Environment

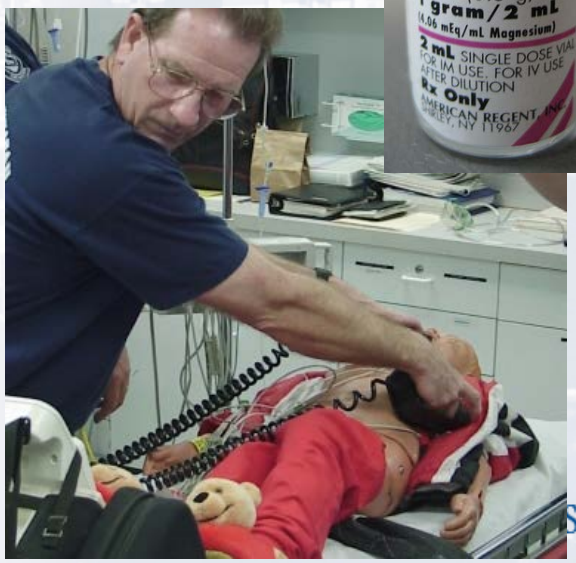
Issenberg, S. B., McGaghie, W.C., Petrusa, E.R., Gordon, D.L., Scalese, R.J. (2005) Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. Medical Teacher, 27(1), 10-28.

Examples from Literature

Specialty	Scenarios
Obstetrics	Eclampsia
Pediatric	BLS/PALS
Emergency Medicine	Trauma
Operating Room	Malignant Hyperthermia
Ambulatory Care	Anaphylaxis and chest pain







Brainstorm

What are some low-volume, high-risk emergencies in your institution that you don’t think all students/staff are prepared to successfully manage?

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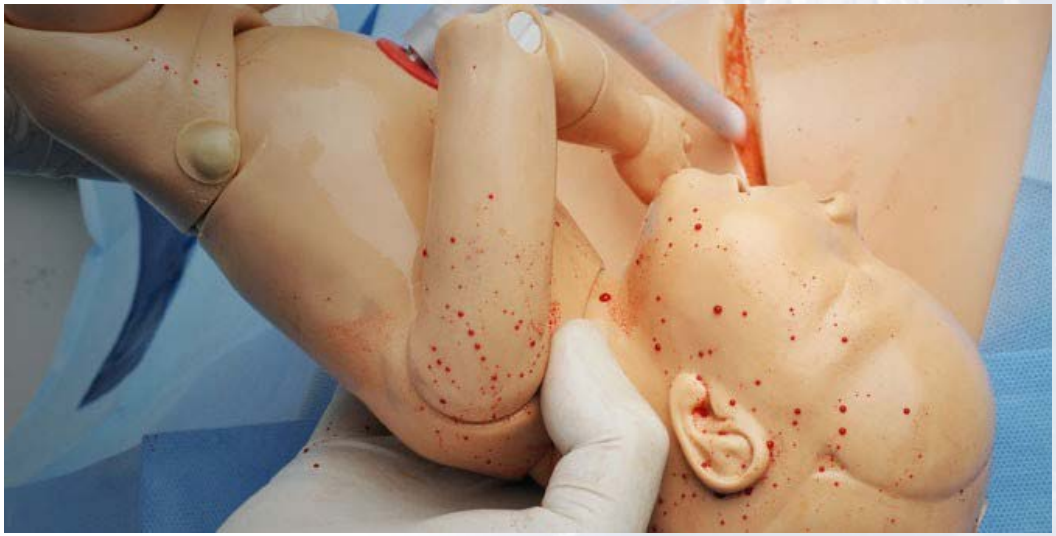
Ideas

Examples

Perimortem cesarean section

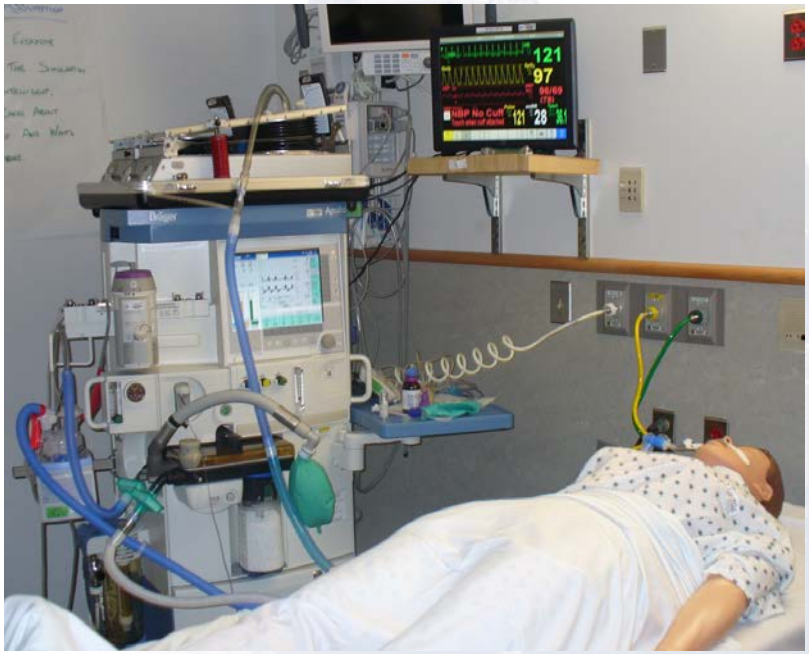
- Time from decision to incision
- Chest compressions for a pregnant woman
- Team leader



Examples

Status Asthmaticus

- Heliox
- Magnesium
- Continuous nebulizer
- BiPAP
- Intubation
- Inhaled anesthetics
- Apollo ventilator



Is it any different?

- Focus on learning, *not* assessment
- Teach tips and tricks; not memorization
- Multiple repetitions
- Scaffolding

Designing the Course

CAN'T just teach them *what*, HAVE to teach them *how*

- repetition, muscle memory
- pattern recognition
- scripts
- choreography
- memory prompts – cognitive aids, etc…

Designing the Course

Deliberate Practice (Ericsson 1993)

- Training activities that promote consistent improvements in expert performance domains
- Repetitive performance in a focused domain
- Rigorous skills assessment (specific formative feedback)
- Progressively improved performance in a controlled setting

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Designing the Course

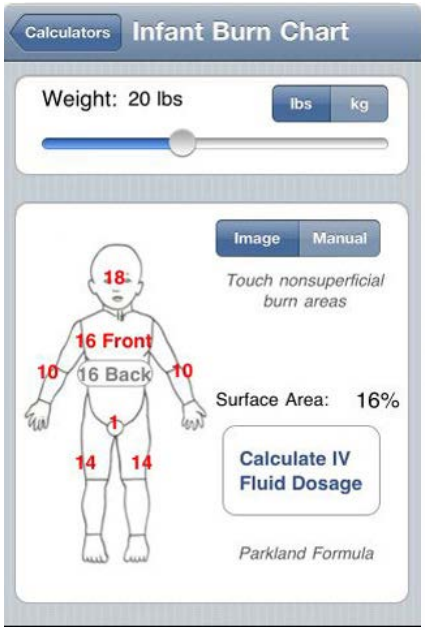
Instructional Scaffolding (Wood, Bruner, Ross 1976)

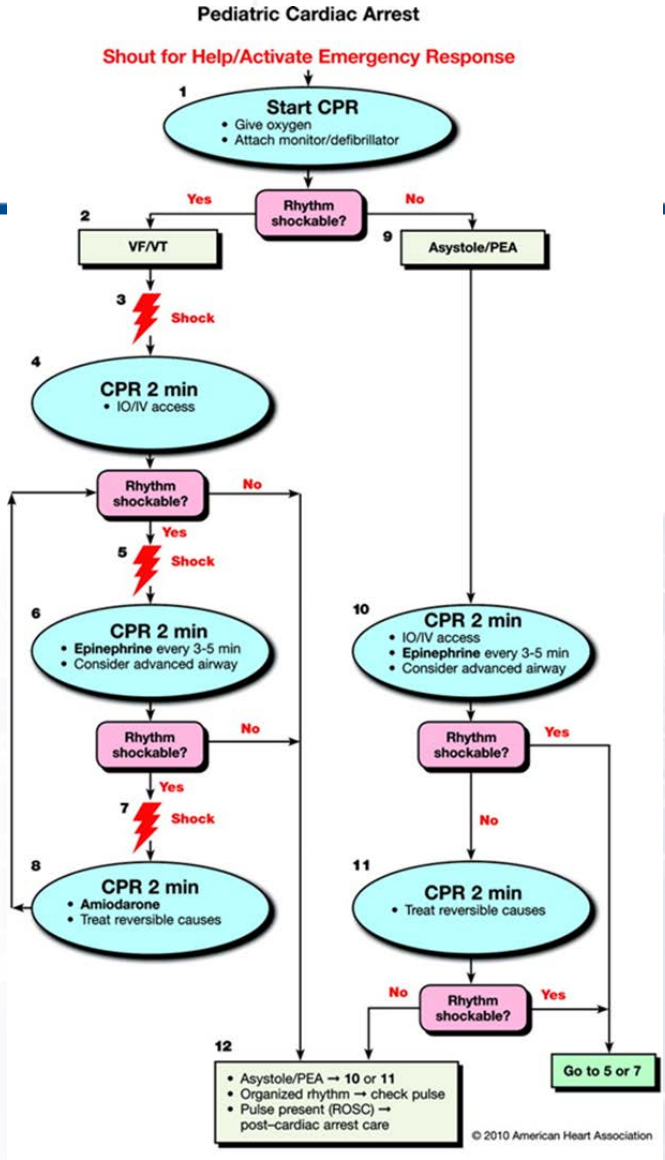
- Assistance offered by an instructor to support learner master a task or concept just beyond learners' current capability
- Allow learners to complete as much of the task as possible, unassisted.
- Errors expected; with feedback and prompting learner is able to achieve goal
- After mastery, scaffolding gradually removed ("Fading"), allowing the student to work independently.

Designing the Course

Scaffolding can include:

- Breaking tasks into smaller parts
- “think alouds”
- Verbal prompts, questioning
- Coaching
- Cue cards
- Modeling
- Algorithms





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OB/NICU Scenario

- 35 year old
- No prenatal care
- Hx of 2 late term fetal losses
- BP Elevated on admission (140s/90s)
- Sister with her (Janis)

Try it

1. Pediatric
   - Team of 4
2. Obstetric
   - Team of 4