Simulation
What can smart people learn from dummies?
Ambulatory Surgical Facilities
November, 2015

- Inclusion of specific simulators does not imply endorsement

Could this happen at your facility?
- Who should respond? Who should stay away?
- Where will the fire department arrive?
- Where are the gas cut-off valves?
To create a simulation

Goal
Repeat: to practice, or to modify

Simulator

Simulation

Debriefing

Goals of simulation

• To improve

  1. Individuals
     Knowledge, technical and non-technical skills
  2. Teams
     Knowledge, technical and non-technical skills
  3. Systems

High technology manikins

• Breathe, chest wall motion, normal and abnormal breath sounds
• Palpable pulses
• Reactive pupils
• Can be defibrillated
• Vital signs displayed on monitor in real time
• Respond to interventions
Biologic tissue
- Pig larynges
  - Cricothyrotomy
- Pig feet
  - Simple suturing
  - Local flaps
- Cadavers

Virtual reality (screen-based) simulators
- Endoscopic
- Laparoscopic
- Otologic and Sinus

Robotic simulators
Humans!

Debriefing:
Essential component of learning from simulation

Examples of simulation applications

| Individuals | Knowledge | Technical skills: procedures | Non-technical skills: providing information, expressing concerns |
Individuals

- Example: intubation
- Repetition with varied models helps reinforce commonalities

“Just-in-time; Just-in-place”

- Central line “Dress Rehearsal”
- “train to excellence”
Examples of simulation applications

1. Individuals
   - Knowledge: providing information, expressing concerns
   - Technical skills: procedures

2. Teams
   - Knowledge: coordinating roles in resuscitation
   - Technical skills: communication, collaboration

**Teams**

Communicate, coordinate, manage (or avert)

- Example: trauma
- Manage the team as well as the patient

**Does simulation make a difference?**

- Growing body of evidence demonstrating effectiveness
  - Fried MP et al. Otolaryng Head Neck. 2010;
  - McGaghie WC et al. Acad Med. 2011;
  - Cook DA. Med Educ. 2014;
- Simulation supports early acquisition of complex skills; improves procedural skills, surgeon confidence, patient care practices and outcomes, as well as providing collateral benefits such as transfer of skills and knowledge to other trainees, and reduced healthcare costs
  - McLaughlin S et al. Acad Emerg Med. 2008;
  - Cohen ER et al. Simul healthc. 2010;
  - Schloitz AK et al. Simul healthc. 2013;
Does simulation make a difference?

- Specific skills relevant to otolaryngology have been demonstrated to be transferrable from simulation to procedures on actual patients ("in vivo")
  - Fried MP et al. Otolaryng Head Neck. 2010;
- Residents trained on an endoscopic sinus surgery simulator, when compared to controls, showed decreased completion time, increased confidence and fewer technical errors on basic surgical tasks done on patients
  - Fried MP et al Otolaryng Head Neck. 2010

Examples of simulation applications

1. Individuals
   - Knowledge
   - Technical skills: procedures
   - Non-technical skills: providing information, expressing concerns

2. Teams
   - Knowledge
   - Technical skills: coordinating roles in resuscitation
   - Non-technical skills: communication, collaboration

3. Systems
   - Processes, equipment, environment, information technology, staffing

Employees must wash hands
Transitions in Care

- Transport from the helipad to the Emergency Department

Investigate serious events or incidents

- Re-enacted a medication error using actual equipment:
  - Dose double-check protocol not well understood
  - The infusion pump “stuttered” (duplicated a keystroke), delivering 22.3 mg, rather than 2.3 mg, of a medication.

Intentional probes during planning, before opening new/renovated units

- Simulate patient admissions
  - Confusing room numbers were rearranged
  - Location of certain equipment was optimized
Intentional probes
during planning, before opening new/renovated units

- Simulations included:
  - Equipment failure
  - Medical crisis

- Results
  - Clarified transport processes
  - Clarified medication management
  - Standardized information given to, and announced by, dispatchers

Simulation to improve systems

- To err is human
  - To err is human: building a safer health system.
    Institute of Medicine 1999

- To err is human, don’t forget
  - Pat Croskerry, CMAJ March 2010

The search for a human in the path of a failure is bound to succeed.
If not directly at the sharp end – as a ‘human error’ or unsafe act – one can usually be found a few steps back.
The assumption that humans have failed therefore always vindicates itself.
It’s not bad people it’s bad systems.
Lucian Leape. NPSF conference April 30 2015

To better is human

To blame is human. The fix is to engineer
Holden RJ. People or systems? To blame is human. The fix is to engineer. Prof Saf 2009

3 Refine equipment and processes
• Computer placement in patient care rooms affected caregiver traffic patterns
  – Changed computer locations
• Practiced replacing medication infusion pumps during active use
  – Revised protocol to manage “dirty” pumps

Healthcare is a complex adaptive system
• Constant evolution
  – Fluid, dynamic
• Networks of agents who constantly act and react
• Control is dispersed and decentralized
• Environment is not in equilibrium

Charles Vincent, Patient Safety, also referencing Holland, Mann, Plisk, Greenhalgh Dekker, Drift into Failure, referencing Von Bertalanffy
Safety is not inherent in systems

- The systems themselves are contradictions between multiple goals that people must pursue simultaneously. People have to create safety.

Attributed to Dekker 2002 and Hollnagel & Woods 2005, by Holden RJ. People or systems? To blame is human. The fix is to engineer. Prof Saf 2009

Preventing errors and improving safety for patients require a system approach in order to modify the conditions that contribute to errors.

- People working in health care are among the most educated and dedicated work force in any industry.
- The problem is not bad people, the problem is that the system needs to be made safer.

IOM. To Err is Human. 2000

In situ simulation

In theory there’s no difference between theory and practice.

In practice there is.

Yogi Berra (1925-2015)
Simulation to improve systems: real teams, real settings

- Example: manage post-partum hemorrhage
- Iterative improvement of protocols, processes; test and improve before implementing
Resilience

- refers to a property of organizations, as well as individuals, which have the "ability to recognize, and adapt to handle unanticipated perturbations ...[which] demand a shift of processes, strategies, and coordination.


4 Essential capabilities of Resilience

1. Monitor: know what to look for
2. Respond: know what to do, be capable of doing it
3. Learn: know what has happened
4. Anticipate: find out, know what to expect

Monitor: know what to look for
Respond: know what to do, be capable of doing it

Learn: know what has happened

Anticipate: find out; know what to expect

Simpao et al, Anesthesiology 2014
There’s rules to riding a horse

But the horse won’t necessarily know ‘em

-Texas Bix Bender

Simulation can be used to support the emergence of resilience

• Direct learning, improved teamwork and environment result in decreased cognitive load, improved adaptive capacity, and increased margin for maneuver

Simulation is adaptable

• Simulation can be used to replicate almost any part of a process or system
In situ simulation can help us improve Work as Done

Questions?