What is driving the use of Clinical Simulation?
What is Simulation

- Simulation is described as a **strategy** – not a **technology** – to mirror, anticipate, or amplify real situations with guided experiences in a fully interactive way.
- A simulator replicates a task environment with **sufficient realism** to serve a desired purpose.

Agency for Healthcare Research & Quality (AHRQ)

Average Learning Retention Rates

<table>
<thead>
<tr>
<th>Method</th>
<th>Retention Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Others</td>
<td>90%</td>
</tr>
<tr>
<td>Practice By Doing</td>
<td>75%</td>
</tr>
<tr>
<td>Discussion Group</td>
<td>50%</td>
</tr>
<tr>
<td>Demonstration</td>
<td>30%</td>
</tr>
<tr>
<td>Audio Visual</td>
<td>20%</td>
</tr>
<tr>
<td>Reading</td>
<td>10%</td>
</tr>
<tr>
<td>Lecture</td>
<td>5%</td>
</tr>
</tbody>
</table>

National Training Laboratories, Bethel, Maine

Simulation enhances learner motivation or “need to know” through experiential learning

- “The adult learner enters the training environment with a deep need to be self-directing.”
- High fidelity team simulation combined with reflective debriefing teaches learners to monitor and question their mental models & practice behaviors.
- Vivid experiences in simulation stimulate the “need to know” that motivates adult learners.

Simulation Assessment

- Crisis Management
- Flexibility
- Use Factual Knowledge
- Critical Thinking
- Team Interaction
- Activity Level
- Respond Speed

- Communication Skills
- Planning
- Strategy
- Initiative
- Multiple Decisions
- Integration
- Collaboration

The Shifting Paradigm for Medical Education Training

**Old Paradigm**
- Didactic Lecture
- See One
- Do One
- Silo Training
- Practice on patients
- Learn from your errors on patients

**New Paradigm**
- Self-Directed Learning
- Practice to pre-defined standards of competency using simulators
- Learn from your errors on simulated patients
- Team Training
- Practice Safe Medicine

IOM

The majority of medical errors resulted from **healthcare system failures** rather than from individual providers substandard performance recommendation to implement **organizational safety systems** by delivering safe practice and **establishing interdisciplinary team-training programs**
Simulation & Team Training

**IOM Principle 3**
Train in teams those who are expected to work in teams

**IOM Principle 5**
Train for patient safety and include team training using simulations wherever possible.

Risk Management Considerations: Hazards in Medicine

"Most serious medical errors are committed by competent, caring people doing what other competent, caring people would do."
- Donald M. Berwick, MD, MPP

- Not just about the people, it is about the design:
  - System, medical devices, procedures, polices
  - Human Factors: safeguard in the design
    "making it difficult for people to do the wrong thing"
Overt Threats

Factors that increase the likelihood of an error being committed:

- Environmental
- Team
- Organizational
- Patient Related
- Individual

RL Helmreich, Ph.D.

Health Care

It's not for lack of intent or determination that we're not highly reliable...

How Safe are we? How Do We Compare?

- DANGEROUS (>1/1000)
- REGULATED (1/10000) to (1/1000)
- ULTRA-SAFE (<1/100K)

Number of encounters for each fatality

Lucien Leape ACS
Risk Management Considerations:

- Cases you don’t want to live through again
- Risk Prevention
- Unexpected Events
- Damages
  - General
  - Repeat Cases
- Patient Satisfaction
- Disclosure

Motivation of Plaintiffs/Patients
- “I don’t want this to happen to someone else.”

Alternative Dispute Resolution Options
- Non-momentary components

Variation between care provided and
- Policies and procedures
- Guidelines
- Standard of Care
What are the advantages of clinical simulation in the Hospital Setting?

- Realistic Learning Experience
  - Medical issues
  - Legal issues
  - Patient relation issues
  - Ethical issues
- Identification of Potential System Failures

- Repair System Failures
- Test New Systems
- Team Simulation
- Employee Satisfaction and Retention
- Patient Satisfaction
- Debriefing
- Risk Reduction
- $$$$ Savings

Team Training

“Training multidisciplinary teams using simulation is an effective strategy for reducing surgical errors counts”

Helmreich & Merritt, 1998

“Simulation-based training in team coordination process has been found to be an effective tool for improving team coordination process in high performance teams in the Navy”

Cannon-Bowers & Salas, 1998

Team Training

“Organizations should conduct team training in prenatal to teach staff to work together and communicate more effectively.”

JCAHO Sentinel Alert - July 2004

“Simulation-based team training in obstetrical emergency is associated with a significant reduction in low five-minute APGAR scores and prenatal asphyxia and neonatal hypoxic-ischaemic encephalopathy.”

Draycott T, et al., BJOG 2006
Why Teamwork?

- Reduce clinical errors
- Improve patient outcomes
- Improve process outcomes
- Increase patient satisfaction
- Increase staff satisfaction
- Reduce malpractice claims

Team Work

- An evidence-based teamwork system
- Designed to improve:
  - Quality
  - Safety
  - Efficiency of health care
- Practical and adaptable
- Provides ready-to-use materials for training and ongoing teamwork

Team STEPPS

Team Strategies & Tools to Enhance Performance & Patient Safety

- Initiative based on evidence derived from team performance, leveraging more than 25 years of research in military, aviation, nuclear power, business and industry...to acquire team competencies
Why use Team S T E P P S?

• Goal: Produce highly effective medical teams that optimize the use of:
  information, people and resources to achieve the best clinical outcomes
• Teams of individuals who:
  communicate effectively and back each other up dramatically reduce the consequences of human error
• Team skills are not innate; they must be trained

What makes TeamSTEPPS different?

• Evidence-based and field-tested
• Comprehensive
• Customizable
  • Easy-to-use teamwork tools and strategies
• Publicly available

Lessons from the cockpit: How team training can reduce errors in L&D

Susan Mann, MD. Contemporary Ob/Gyn. January 2006
Lessons from the cockpit: How team training can reduce errors in L&D

**Table 2**
Beth Israel Deaconess Medical Center: Indemnity experience, 38 months pre- and postteam training

<table>
<thead>
<tr>
<th>Claims + suits + observations</th>
<th>No. High severity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP/05/05 - 12/05</td>
<td>20</td>
</tr>
<tr>
<td>IP/05/06 - 11/06</td>
<td>11</td>
</tr>
</tbody>
</table>

Risk Management Foundation of the Harvard Medical School.
*The term observation refers to money paid out for potential claims.

ICU Johns Hopkins Collaborative Runs

- Length of a patient stay cut in half
- Medication errors reduce by 75%
- Nursing turnover down to 2%

TeamSTEPPS

- **Knowledge**
  - Shared Mental Model
- **Attitudes**
  - Mutual Trust
  - Team Orientation
- **Performance**
  - Adaptability
  - Accuracy
  - Productivity
  - Efficiency
  - Safety
Shared Mental Models

Human Factor Goal

Enhance Teamwork
Enhance Communication
Enhance Safety
Bridges a common communication gap.
Differences in Communication styles
Between Doctors and Nurses

• Nurses are trained to be broad, narrative and descriptive
• Not to make diagnosis
• Doctors want the pertinent information they need to make a diagnosis
• Tell me what is the problem, what I need to know to fix it?

SBAR

Complacency

SBAR II

Advocacy and Assertion
Appropriate Assertion

- Speak up if a concern arises
- Challenge the leadership when appropriate
- Provide assistance when needed
- Compensate for others deficiencies
- Takes ownership

CUS

Communication Failures: The leading cause of unanticipated adverse patients outcomes

Reasons people are hesitate to speak up:
- They are not sure what is the correct procedure
- There is an atmosphere where people are uncomfortable speaking up
- Negative previous experience
Debriefing

Debriefing Simulation
The Heart of the Matter

Frame
- Assumptions
- Feelings
- Mental Model
- Knowledge Base
- Situation
- Awareness
- Context

Actions

Results

Obstetrical Simulation

Your Curriculum Objectives should dictate what simulators, what information and what simulation you need

- Team simulation
- Skills are a small percentage of the training
- Process oriented simulation
- Leadership is essential
- Effective communication is a must component
- Education should be universal, pro-active and non-punitve
High Risk Obstetrical Clinical Simulation

Where to Introduce Clinical Simulation

- Orientation
- During new rotations /academic year
- Competency assessment
- Multidisciplinary Team Training
- New policies
- Low frequency/ High risk events
- New facilities

Ruptured Ectopic Pregnancy
Case Narrative

You are asked to evaluate a patient in the Emergency Room with pelvic pain.

Mrs. Susan McAllister is a 25 year-old MWF who was brought to the Emergency Department by ambulance. She was referred by her primary care physician, Dr. Sanchez, in Gatesville, Texas. The Emergency Medicine nurse is concerned about Mrs. McAllister's condition and asks you to evaluate her as soon as possible.

*(While you are assessing the patient and waiting for lab results, Mrs. McAllister becomes unstable and goes into hypovolemic shock. You must now resuscitate the patient before she is transferred to the OR for her surgical procedure.*
Ruptured Ectopic Pregnancy

Learning Objectives

After the exercise, the participants will be able to:

- Recognize that any woman in the reproductive years with amenorrhea and pelvic pain should have a pregnancy test to evaluate the possibility of ectopic pregnancy.
- Understand the roles that Beta HCG and Transvaginal ultrasound play in the diagnosis.
- Recognize that when the patient is hypotensive and volume depleted a ruptured ectopic pregnancy is very likely and surgery is the best treatment option.

Ruptured Ectopic Pregnancy

Simulation Parameters

SimMan (woman)

BP 95/60
HR 120 BPM
Rhyth Sinus tachycardia
Sat 98%
Temp 98.6°

Ruptured Ectopic Pregnancy

Expected Actions by Participants

- Identify the emergency of the situation and recognize that the patient has an acute abdomen.
- Obtain appropriate history including risk factors.
- Perform a physical exam including abdominal and pelvic exams.
- IV fluids
- Oxygen
- Beta HCG
- CBC
- Vaginal ultrasound
- Second IV – large bore
- Blood transfusion
- Foley monitor urine output
- Make preparations for surgical intervention
- Manage the hypovolemic shock
- Recognize PEA
Ruptured Ectopic Pregnancy
Debriefing

- Talk about the experience
- Review the Algorithm
- Review contributing factors
- Problem solving abilities
- Patient management
- Resource utilization
- Healthcare provided
- Interpersonal and communication skills
- Comprehensions of Pathophysiology
- Clinical competence
- Leadership skills

Ruptured Ectopic Pregnancy

Shoulder Dystocia
Case Narrative:
You are making rounds on a Saturday morning in Labor & Delivery when a nurse asks you to assist with a vaginal delivery in Room 2.

Mrs. Alicia Morehead is a 30yo MWF G2 P 0-0-1-0 that is currently 41 weeks pregnant. The nurses in L&D were not able to contact her obstetrician. She called him multiple times and he is not returning her pages. The nurse asks you to please render assistance with Mrs. Morehead’s delivery and pulls you into the room; you do not have time to review the record; however, the nurse tells you that Mrs. Morehead had a prolonged second stage of labor and she has been pushing for 2 ½ hours.
Shoulder Dystocia
Case Narrative:

Mrs. Morehead and her husband are upset because her obstetrician is not attending the delivery; they have not established trust with you and question your ability to render assistance.

**(After the infant is delivered, you notice that the right arm appears to be limp or paralyzed. You must now communicate this finding to the mother. Mrs. Morehead is now very concerned and upset, she questions your competency and in a loud voice she lets you know that if obstetrician would have been present, this would never have happened.)

Shoulder Dystocia
Learning Objectives

After this exercise, the participant will be able to:

• Review the antepartum and intrapartum contributing factors to shoulder dystocia.

• Recognize the urgency of this devastating complication.

• Practice the appropriate interventions to reduce the time interval between delivery of the head and delivery of the body.

Shoulder Dystocia
Simulation Parameters

<table>
<thead>
<tr>
<th>Noelle</th>
<th>Corometric monitor and Fetal Sim monitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sim link box and monitor</td>
<td></td>
</tr>
<tr>
<td>-BP: 130/90</td>
<td></td>
</tr>
<tr>
<td>-Rhythm: sinus</td>
<td></td>
</tr>
<tr>
<td>-Arrhythmia: tachycardia</td>
<td></td>
</tr>
<tr>
<td>-Saturation: 98%</td>
<td></td>
</tr>
<tr>
<td>-Pulse: 70</td>
<td></td>
</tr>
<tr>
<td>IV pole take to right arm of Noelle</td>
<td>-Severe variables</td>
</tr>
<tr>
<td></td>
<td>-Contraction every 2-3 minutes</td>
</tr>
<tr>
<td></td>
<td>-Normal baseline</td>
</tr>
<tr>
<td></td>
<td>Oximeter</td>
</tr>
</tbody>
</table>
**Expected Action by Participants**

P-E-R-S-P-I-R-E

- **P**reparation: Identify the obstetrical emergency.
- **E**pisiotomy and extra nurses: Stay informed of time elapsed since delivery of head.
- **R**eassurance: McR Roberts maneuver: remove legs from stirrups and flex knees back onto abdomen.
- **S**uprapubic pressure: Steady traction on the head without torquing the head relative to the neck.
- **P**osterior shoulder: Internal rotation/Woods corkscrew maneuver: ‘Rotate the fetus’ upper shoulder downward and the lower shoulder upward.
- **I**mmediate delivery: Emergency-Zavanelli maneuver – rotate head back into the vagina and deliver the baby immediately by Caesarean section.

**Shoulder Dystocia**

**Debriefing**

- Talk about the experience
- Review the Algorithm
- Review contributing factors
- Problem solving abilities
- Patient management
- Resource utilization
- Healthcare provided
- Interpersonal and communication skills
- Comprehensions of Pathophysiology
- Clinical competence
- Leadership skills

**Complication**
**Challenges: Creating Scenarios**

- To match the learning objectives
- To prioritize the teaching “teachable moment”
- To know limitations
- To standardize & reproduce
- To develop metrics & evaluation tools
- To know that our metrics are met
- To know that we are improving specific knowledge, skills, attitudes and behavioral competencies in our learners

**Challenges: Simulation**

- Buy In from Health Care Providers
  - Medical student
  - Established physician
  - Nursing
  - CEO
  - Others
  - Maintaining a Safe Environment
  - Confidentiality
- Discoverability
- Impact or Interaction with Credentialing and Privileges
- Avoiding a Punitive Environment
- Developing Scenarios
- Research or Publication of Results
- Cost

**Conclusions**

- A large majority of medical errors are related to **teamwork, communication and procedure techniques**, elements that can be improved though use of simulation.

- Various types of simulation techniques can be used to reduce different types of errors and their contributing factors.
Thank You!