

2018 Orlando SUN Conference

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Using Interprofessional Simulation to Improve Patient Safety in Hospitals

Orlando Simulation User Network
October 10, 2018



Ivette Motola, MD, MPH, FACEP
Associate Professor of Emergency Medicine
Assistant Director, Gordon Center for Research in Medical Education
University of Miami Miller School of Medicine

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What is your primary professional role?

- A. Educator/Faculty
- B. Clinician
- C. Administrator
- D. Sim Technician/Operations
- E. Researcher
- F. Other

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Where are you based for your primary job function?

- A. Simulation Center
- B. Hospital/Clinic
- C. Health Professions School
- D. Industry
- E. Other

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Learning Objectives

- Discuss the incidence and prevalence of medical errors in our healthcare systems.
- Explain how simulation in general, and in-situ simulation specifically, can be used to improve patient safety.
- Identify the learning outcomes that can be taught utilizing in-situ simulation.
- Describe an example of a hospital-based quality improvement program using simulation.
- Discuss the benefits and challenges of in-situ simulation.

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Patient Safety



A cartoon showing two men in hospital beds. The man on the left is reading a newspaper and says, "IT SAYS HERE THAT THE RATE OF MEDICAL ERRORS IS STUNNINGLY HIGH." The man on the right replies, "THAT EXPLAINS MY HISTERECTOMY." The cartoon is signed "WES WILK" at the bottom right.

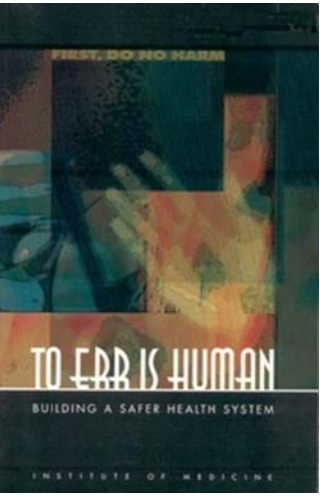
In its simplest form, patient safety is freedom from accidental injury while receiving healthcare services.

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Institute of Medicine 1999

- 44,000-98,000 annual deaths as result of errors
- Medication errors are the leading cause followed by surgical mistakes and complications
- Approx 7% of hospitalized patients experience a serious medication error



The cover of the report "TO ERR IS HUMAN: BUILDING A SAFER HEALTH SYSTEM" by the INSTITUTE OF MEDICINE. It features a stylized illustration of a hand holding a syringe against a dark background with the text "FIRST, DO NO HARM" at the top.

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Johns Hopkins 2016

- Approx. 250,000 annual deaths due to medical error in the US
- 3rd leading cause of death after heart disease and cancer
- It is all of our responsibilities to reduce medical errors and improve patient safety!
- Simulation can help.

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Have you been involved in or witnessed a medical error?

- As a provider, a patient, a family member?
- Was it preventable?
- Could improved teamwork, communication, systems and/or a culture of safety have helped?

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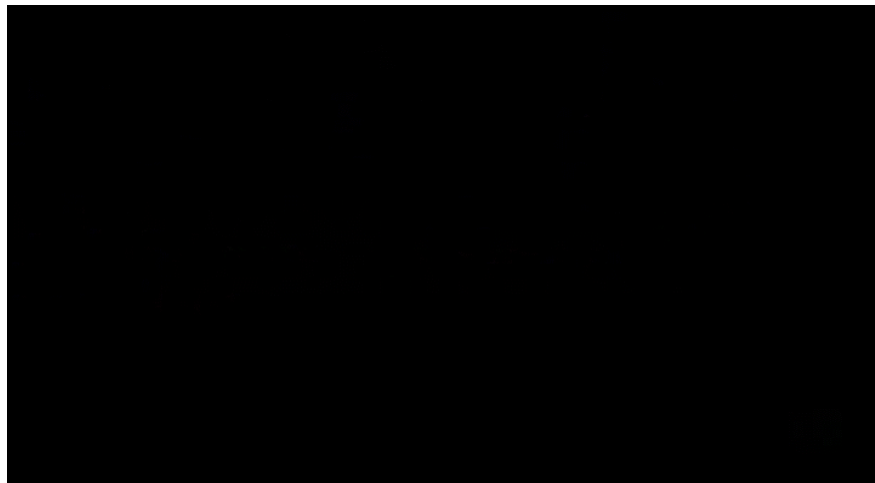
Background

- SBE often occurs separate from the clinical context in simulation centers, termed “off-site simulation”
- In the simulation lab, we work hard to recreate the clinical environment
- Although we can do individual and team training, we cannot recreate all of the complexity of the clinical/hospital setting


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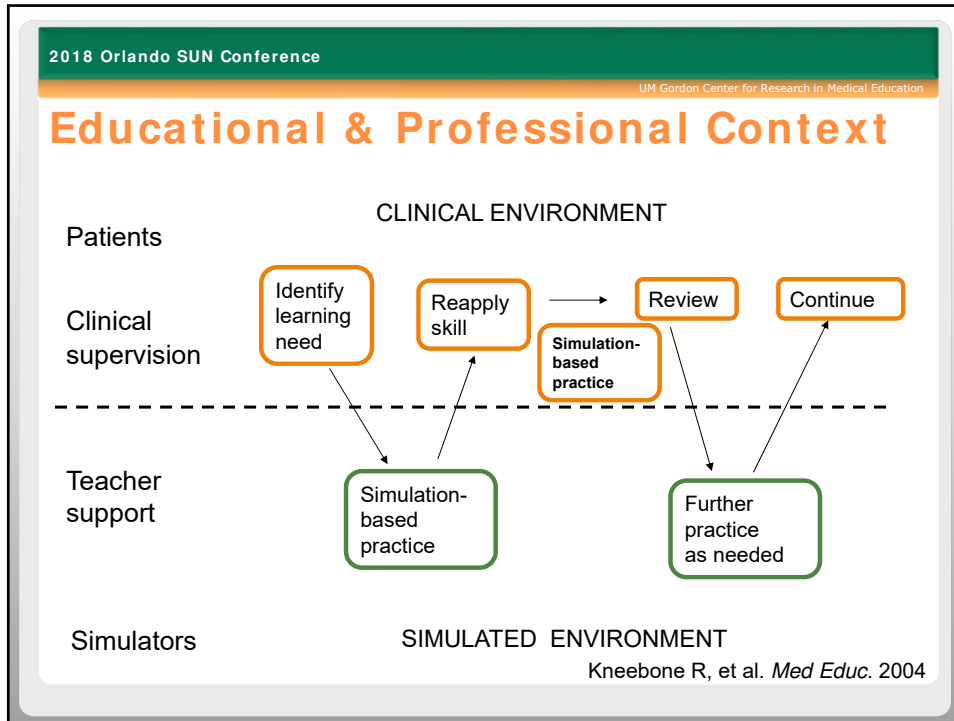
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Recreating Environments



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Feature	# (%)	Comments
Feedback	51 (47%)	<i>Built-in, instructor during/after</i>
Repetitive Practice	43 (39%)	<i>↓ Learning curve</i>
Integration	27 (25%)	<i>Component of full curriculum</i>
Varying Difficulty	15 (14%)	<i>Learners challenged to improve</i>
Adaptive Learning	11 (10%)	<i>Multiple learning styles</i>
Clinical Variation	11 (10%)	<i>↑ Variety / # of patients</i>
Controlled Environment	10 (9%)	<i>Safe / mistake forgiving</i>
Individualized Learning	10 (9%)	<i>Active participation</i>
Outcomes Defined	7 (6%)	<i>Outcomes drive simulator use</i>
Validity of Simulator	4 (3%)	<i>Simulates real life</i>

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<h2>Situated or In-Situ Simulation</h2> <ul style="list-style-type: none"> ISS describes simulation-based activities that take place in the actual context in which clinical care is being provided <p>“In situ training takes simulation into the workplace. It allows teams to test their effectiveness in a controlled manner, to train for rare events and to interrogate departmental and hospital processes in real time and in real locations. It may also allow teams to uncover latent safety threats in their work environment.” -Spurr et al. 2016</p> 	



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Situated Learning

00:05:52: Monitor arrives on
00:06:52: 50% HC affects of
00:07:00: HR 78 BP = 154 83 100 P4P
00:07:00: O2 sCO2, 34 mmHg T blood
37.2 °C aTc, 18

00:07:05: Heart rate = 80
00:07:08: Radial pulse check Pulse
Strength normal
00:07:12: Compressions started
00:07:12: BP = 154 83
00:07:25: Ventilation rate 17
00:07:45: Ventilation rate 5

00:08:00: HR 78 BP = 154 83 100 P4P
P4P O2 sCO2, 34 mmHg T
blood 37.2 °C aTc, 18

00:08:04: Compressions stopped
00:08:27: HBP measured BP = 154(83)
00:09:20: Radial pulse check Pulse
Strength normal
00:09:55: HR 79 BP = 154 83 100 P4P
P4P O2 sCO2, 34 mmHg T
blood 37.2 °C aTc, 18

00:10:05: HR 77 BP = 154 83 100 P4P

Learning is a function of the activity, context, and social culture in which it occurs

← Classroom **SIMULATION** Real-world →

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Does your hospital/ clinical organization currently incorporate simulation?

- A. Yes, we have a robust program
- B. Yes, but it could be optimized
- C. No, but we are considering implementing
- D. No, and there are no current plans to do so

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Example




Video Courtesy of WISER

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What Can be Taught?

- Team Training
- Individual skills
- Equipment
- Processes
- Systems
- Orientation to new spaces



In situ simulation: detection of safety threats and teamwork training in a high risk emergency department

Mary D. Patterson,^{1,2} Gary Lee Gao,^{1,2*} Richard A. Finkbeiner,² Thomas L. Brennan,¹ Robert L. Shroyer¹

Portable Advanced Medical Simulation for New Emergency Department Testing and Orientation

Leo Kodjaryan, MD, Mary J. Shugrin, MD, Andrew Sacco, MD, Robert Wainwright, MD, Robert M. Bono III, RN, Jennifer Dunbar, RN, MSN, Ronald Sciamacca, RN, Kelly Karpik, RN, BSN, Gregory Jay, MD, PhD

Using simulation to orient code blue teams to a new hospital facility.


Villamiana, EA¹, Pileggi, JF, Webber-Janeck, H, Coker, N, Rajab, MH, Sibbitt, S, Ogden, PE, Musick, K, Bronwing, JL, Hays-Grudo, J

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In-Situ Simulation for Testing

- Assess learners
- Assess systems
- Testing new equipment, spaces or processes



Simulation to assess the safety of new healthcare teams and new facilities.

Geis, G¹, Pro, B, Pendergrass, TL, Moyer, MR, Patterson, MR

In situ simulation as a quality improvement initiative

Phani Kiran Yajamanyam,¹ Dalbir Sohi²

Color-coded prefilled medication syringes decrease time to delivery and dosing errors in simulated prehospital pediatric resuscitations: A randomized crossover trial^{1,2}


Allen D. Stevens^{1,2}, Caleb Hernandez¹, Seth Jones¹, Maria E. Moreira^{1,2}, Jason R. Blumen¹, Emily Hopkins^{1,2}, Margaret Sande¹, Katherine Bakes^{1,2}, Jason S. Huskoon^{1,2,*}

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Who Can be Taught?

- Entire Healthcare Team:
 - Nurses
 - Physicians
 - Respiratory therapists
 - Pharmacists
 - Trainees at all levels (medical students, residents)
 - Technicians (Radiology,
 - Unit secretary
 - Security



Allows training to include everyone involved in the healthcare system, including those who would not usually come to the simulation center.

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Interprofessional Education

- Students from two or more professions learn with, from and about each other.
- Teamwork and collaboration competencies critical to best patient outcomes and patient safety
- In-situ simulation allows for IPE in the healthcare setting

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Effective IPE

- Enlist support from across your institution
 - Senior leadership, local dept. leaders, learners
- Support your IPE community
 - Faculty development, IPE center/taskforce, help coordinate logistics, activities & evaluation
- Determine your starting point
 - Kotter – “establish a sense of urgency”
- Consider sustainability

Adapted from NLN Guide to Effective Interprofessional Experiences in Nursing Education 2015

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Table 1: Building the Case for IPE

Local Environment Research	Local Financial Data	National Sources to Reference
-Presentation of IPE accreditation requirements for each degree program and department-specific compliance with IPE requirements -Review safety concern reports -Survey a sample of physicians, nurses, pharmacists, other clinical staff, students, and patients on perceptions of patient safety and teamwork behavior -Survey clinical staff and/or student attitudes towards teamwork and patient safety -Observe clinical teams for site-specific collaborative and patient-centered processes -Consult with practitioners, students, and/or faculty for their perspective on collaboration in a certain environment	-Report of local expenditures due to medical errors -Cost-benefit analysis of expenditures due to medical errors as a way to enhance collaborative practice/care and thus prevent medical errors caused by miscommunication -Proposed budget for IPE programming	-Institute of Medicine's 1998 report <i>To Err Is Human: Building a Better Health System</i> -National League for Nursing Commission for Nursing Education Accreditation website at www.nln.org/accreditation-services -Institute of Medicine's 2010 <i>The Future of Nursing: Leading Change, Advancing Health</i> -Interprofessional Education Collaborative Expert Panel's 2011 <i>Core Competencies for Interprofessional Collaborative Practice: Report of an Expert Panel</i> -Joint Commission <i>Perspectives on Patient Safety</i> , Volume 2, Number 9, September 2002

NLN Guide to Effective Interprofessional Experiences in Nursing Education 2015

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IPE Check-in

- Who are the senior leaders and faculty leaders who are interested in or are currently coordinating IPE programming?
- Which professions are your currently including in IPE activities?
- Which would you like to include?
- Who would you have to convince/engage to make this happen?

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How Can In-Situ Simulation be Used for Quality Improvement

- Crisis Resource Management in Teams
- Latent Safety Threats
- Systems Issues
- Rare Procedures
- Assessing Adherence to Guidelines
- Testing New Facilities Prior to Opening
- Disaster Response/Mass Casualty Incident

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CRISIS RESOURCE MANAGEMENT

- Call for Help Early**
 - Call for help early enough to make a difference
 - Err on the side of getting more help
 - Mobilize early personnel with special skills if they may be needed
- Designate Leadership**
 - Establish clear leadership
 - Inform team members who is in charge
 - 'Followers' should be active in asking who is leading
- Anticipate and Plan**
 - Plan & prepare for high workload periods during low workload periods
 - Know where you are likely headed during the crisis and make backup plans early
- Know the Environment**
 - Maintain situational awareness
 - Know how things work and where things are
 - Be aware of strengths and vulnerabilities of environment
- Establish Role Clarity**
 - Determine who will do what
 - Assign areas of responsibility appropriate to knowledge, skills, and training
 - Active followers may offer specific roles
- Use All Available Information**
 - Monitor multiple streams of data and information
 - Check and cross check information
- Distribute the Workload**
 - Assign specific tasks to team members according to their abilities
 - Revise the distribution if there is task overload or failure
- Allocate Attention Wisely**
 - Eliminate or reduce distractions
 - Monitor for task saturation & date overload
 - Avoid getting fixated
 - Recruit others to help w/ monitoring
- Mobilize Resources**
 - Activate all helpful resources including equipment and additional personnel
- Communicate Effectively**
 - Command and request clearly
 - Seek confirmation of request (close the loop)
 - Avoid "this or" statements
 - Foster spirit and atmosphere of open information exchange among all personnel
- Use Cognitive Aids**
 - Be familiar with content, format, and location
 - Support the effective use of cognitive aids

©2008 Diagram S. Goldhaber-Faust, K. McCowan, K. Hanson, R. Fanning, S. Howard, D. Gaba

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Latent Safety Threats

- “Accidents waiting to happen”
- Evidence: Multidisciplinary in-situ simulation can identify latent safety threats & improve patient safety

Table 2 Examples of latent safety threats and opportunities for improvement identified by in situ simulations

Medication	Equipment	Resource/system
Lack of adenosine on code cart	No LMAs on code cart	Need for ACLS training
Amiodarone requires dilution prior to administration	Cuffed vs uncuffed ETT's availability	Crew resource management training needed
Bedside code cards not standardised	No trauma shears on code cart	Lack of standardised roles
'Look-alike' medications stored adjacent to one another (sodium bicarbonate vs dextrose)	Lack of portable oxygen in non-clinical areas	Lack of knowledge regarding roles
Vecuronium shortage	Lack of portable suction in non-clinical areas	No nurse leader assigned
	Lack of AEDs in same day surgery waiting area	No code cart brought to the code
	Non-standard mode of storage for defibrillators (test cartridge only) This had varied from unit to unit	

ACLS, Advanced Cardiac Life Support; AED, Automated External Defibrillator.

Wheeler DS, et al. BMJ Qual Saf 2013;22:507-514.

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Do you or your organization utilize simulation to address patient safety issues?


- A. Yes
- B. No


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UM Gordon Center Example

First Five Minutes and Rapid Response Team Training + In-Situ Simulation for improving response to emergencies



 Bascom Palmer
Eye Institute
UNIVERSITY OF MIAMI HEALTH SYSTEM

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Background

- Bascom Palmer Eye Institute - #1 Eye Hospital for 17 years - identified a need for training in response to emergencies
- Outpatient and Surgical Center- not many emergencies, but many sick patients of every age (e.g., diabetes, cancer)
- Came to UM Gordon Center for help with training

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Sim Center + In-Situ Training

- We hold annual training for all rapid response team members in the simulation lab using rapid cycle deliberate practice
 - Didactics plus simulation scenarios with debriefing




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In-Situ

- First Five Minutes Training for all nurses
- Quarterly Simulated Critical Care Events/Mock Codes
- For each event clinical management, teamwork and systems are evaluated and debriefed



Sleep Center – Post Sleep Study MI

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Ongoing Process

- Meet with Patient Safety/QI/RRT Committee
- Determine needed areas of focus for simulation scenarios (e.g., hypoglycemia, seizure, MI, malignant hyperthermia, etc.)
- Develop simulation scenarios and checklists
- Conduct training with debriefing
- Report back to hospital with summary, identified latent safety threats and opportunities for systems improvements, and needed training.

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Assessment of Clinical Management

GCRME
BPEI/ABLEH Rapid In Situ Simulated Critical Events

Case 1: Pediatric Asthma → Resp. Arrest Date: _____

Participants: _____

Area: _____

Skill Component	Performs Correctly	Performs Incorrectly	Does Not Perform	Comments
Correct Treatment:				
Pediatric Asthma:				
1. Assess Level of Consciousness, Alert				
2. Airway, Assist Patient/Family, Audible wheezing				
3. Breathing 40-50				
4. Breathing long smooth wheezes				
5. Circulation Pulse 130, BP 96/70				
6. Exposed Patient				
7. Calls for help, security to call 911				
8. Administers High Flow O ₂				
9. Uses Bronch. Taper & determines timing of medications				
10. Administers albuterol inhaler treatment				
11. Administers oral or IV steroids				
12. Places on 10 L/min to give steroids IV				
13. Verbalized need for 2nd albuterol inhaler after first				
14. Reassures patient after interventions				
Respiratory Arrest:				
15. Recognizes patient in respiratory arrest				
16. Begins bag-mask ventilation				

Skill Component	Performs Correctly	Performs Incorrectly	Does Not Perform	Comments
17. Suction as needed				
18. Considers advanced airway				
19. Plans advanced airway or continues 20 bag-mask ventilation				
20. Additional Management (circle or write in)				
1. PMS				
2. BPCI Assessment				

Global Rating Scale

1	2	3	4	5
Poor Performance	Needs Improvement	Fulfills Expectations	Well Above Expectations	Truly Rare Top 5%
Unable to conduct an organized assessment and treatment appropriate management	Incomplete response; incomplete components of assessment and management	At expected level for practicing providers	Thorough, accurate, and correct management in a systematic and organized manner	Thorough, accurate, and correct management in a systematic and organized manner (only occurring as an effective team)

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Assessment of Teamwork

UM GCRME
BPEI/ABLEH Simulated Critical Events
September 13, 2018
Assessment of Teamwork

Date: _____ Case: _____ Area: _____

Provide rating using the following scale: 1=Never/Very Poor, 2=sometimes/Acceptable, 3=Always/Excellent

	Rating	N/A	Comments
Coordination/Team Structure			
1. The assembled quickly			
2. Roles/leader were established			
3. The providers had a clear vision of their roles in the team			
4. The team leader was effective (e.g. directed team toward goal, coordinated team members, etc.)			
5. The team members were effective (Carried out duties of role, interacted appropriately with team leader and other team members)			
Situational Awareness/Monitoring			
6. Visually scans environment			
7. Verbalizes adjustments in plan as changes occur			
Communication			
8. Uses closed loop communication			
9. Employs Situation, Background, Assessment, Recommendation			
10. Provides Verbal updates-thinks aloud			
11. Uses names			
12. Communicates with patient/family			
13. Uses appropriate tone of voice			
Cooperation			
14. Requests external resources, if needed			
15. Asks for help from team as needed			
16. Verbally requests team input			
17. Responsive to assertion and ideas			
18. Cross monitors other team members			

University of Massachusetts Lowell School of Medicine, Gordon Center for Research in Medical Education, © 2013-2018

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Systems Evaluation

GCRME
University of Miami, Miller School of Medicine
BPEU/ABLEH Simulated Critical Events

Systems Evaluation

Date: _____ Area: _____ Case: _____

Component	Time	Comments
1. Scenario Start Time		
2. Arrival time of Responders	1.	
	2.	
	3.	
	4.	
	5.	
6.		
3. Crash cart to patient		
4. Cardiac or Respiratory Arrest Recognized		
5. First Chest Compression		
6. First Bag-Mask Ventilation		
7. First Electrical Shock		
8. Time to First Medication		
9. Time RRT/3-7777 Activated		
10. RRT Arrives	1.	
	2.	
	3.	
	4.	
11. 911 Activated		

Notes:


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Tracking of Cases

Location	Cases
1. Sleep Center	1. MI/VFib Arrest
2. MRI - Anaphylaxis	2. Anaphylaxis/ VFib Arrest
3. ED Triage	3. Pediatric Seizure/ Respiratory Arrest
4. OR Holding	4. MI/VFib Arrest
5. Ambulatory Surgery	5. VFib Arrest
1. MRI	1. Stroke (SP)
2. 1st Floor near Optical	2. VFib Arrest
3. 4th Floor Minor OR	3. Adult Seizure (SP)
4. OR Holding	4. Pediatric Bronchospasm/ Resp Arrest
1. ED w/ afterhours RRT	1. MI/VFib Arrest
1. 1st Floor Clinic	1. Hypoglycemia with stroke symptoms (SP)
1. Ambulatory Surgery (6th Floor)	1. Post-op bleeding s/p shoulder surgery
2. 3rd Floor	2. MI/VFib Arrest
1. ED	1. Pediatric Seizure
2. Minor Surgery (4th floor)	2. Pediatric Seizure
1. Sleep Center	1. Hypoglycemic/Stroke Sx
2. OR - Pedi Code	2. Pedi Code
1. Ortho	1. Hypoglycemic/Stroke Sx
2. Ambulatory Surgery (6th Floor)	2. Post Tonsillectomy Hemorrhage
1. ED	1. Hypoglycemic patient with LOC change
2. Ambulatory Surgery (6th Floor)	2. Pediatric Seizure with respiratory compromise
1. OR	1. Malignant Hyperthermia
2. Minor Surgery (4th floor)	2. Pediatric Asthma/ Respiratory Arrest
1. 1st Floor Lobby near Optical, Retina Clinic	1. Hypoglycemic Patient - Unconscious
2. 3rd Floor Pedi ENT Clinic	2. Pediatric Anaphylaxis Unknown Cause

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Emergency Department -
Pediatric Seizure Scenario




Ambulatory Clinic -
Pediatric Respiratory Arrest

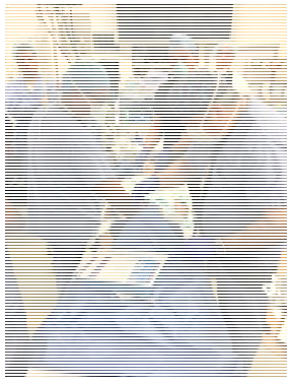
This slide features two photographs of medical simulation scenarios. The left photo shows a male doctor in a white coat and a female nurse in black scrubs performing a procedure on a child lying on a gurney in an emergency department. The right photo shows two male doctors in white coats performing a procedure on a child lying on the floor in an ambulatory clinic setting.

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Setting up for
MI/VFIB scenario in
post-op area



Malignant Hyperthermia
scenario in operating room

This slide features two photographs of medical simulation scenarios. The left photo shows three people in a hospital room; one person is lying in a bed with a monitor attached, while two others stand by the bedside. The right photo shows a surgical team in an operating room, with several people in blue scrubs and masks gathered around a patient on a table.

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Examples of Identified LSTs

- Location and familiarity with crash carts (behind locked doors with limited access)
- Pediatric equipment availability
- Access to benzodiazepines in a timely manner for seizure
- Training needed in BLS and ACLS
- Ability to provide medications and check blood glucose for visitors
- Familiarity of all staff with process for calling RRT and 911

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Outcomes

- Significant Improvement in Patient Outcomes and Safety:
 - Time to response
 - Improvement and update of equipment – e.g. crash carts, access to equipment & medications
 - Process improvements
 - Teamwork/Crisis Resource Management
 - Medical Management
 - Debriefing after real events

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Benefits of In-Situ Sim


- Realism
- Ease of access for busy clinicians
- Incorporates actual equipment, personnel, and systems
- Has multiple uses
 - Training, assessment, systems evaluation, etc.
- Integrates well with simulations in the sim center
- Improves patient safety!

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Challenges

- Space (Clinical, Debriefing)
- Getting Simulators there (if in a sim lab)
- Healthcare providers time – taking time away from patient care – timing important
- Investment and sustainment from organizational leaders



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Your Turn

- Identify the challenges / barriers to implementing or expanding/sustaining your in-situ simulation program.
- How can you overcome them?
- Write a plan to convince your organizational leader

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QUESTIONS



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Acknowledgements

- Laerdal Medical
- Bascom Palmer Leadership and Education Teams
- Dr. Issenberg
- Our amazing team of instructors, sim techs and staff

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Thank You!

Go Forth and Simulate!



Michael S. Gordon Center for Research in Medical Education
University of Miami Miller School of Medicine

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