Simulation as a Tool to Identify Latent Safety Threats: A MaineHealth Regional Project

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OBJECTIVES

- Discuss the benefit of insitu simulation and HFMEA to identify Latent Safety Threats (LSTs)
- Describe how to calculate a score using HFMEA
- Discuss LST trends identified thru MOMS
- Identify low fidelity simulation opportunities that may be applied in obstetric education
- Share one hospital's experience with the MOMS program

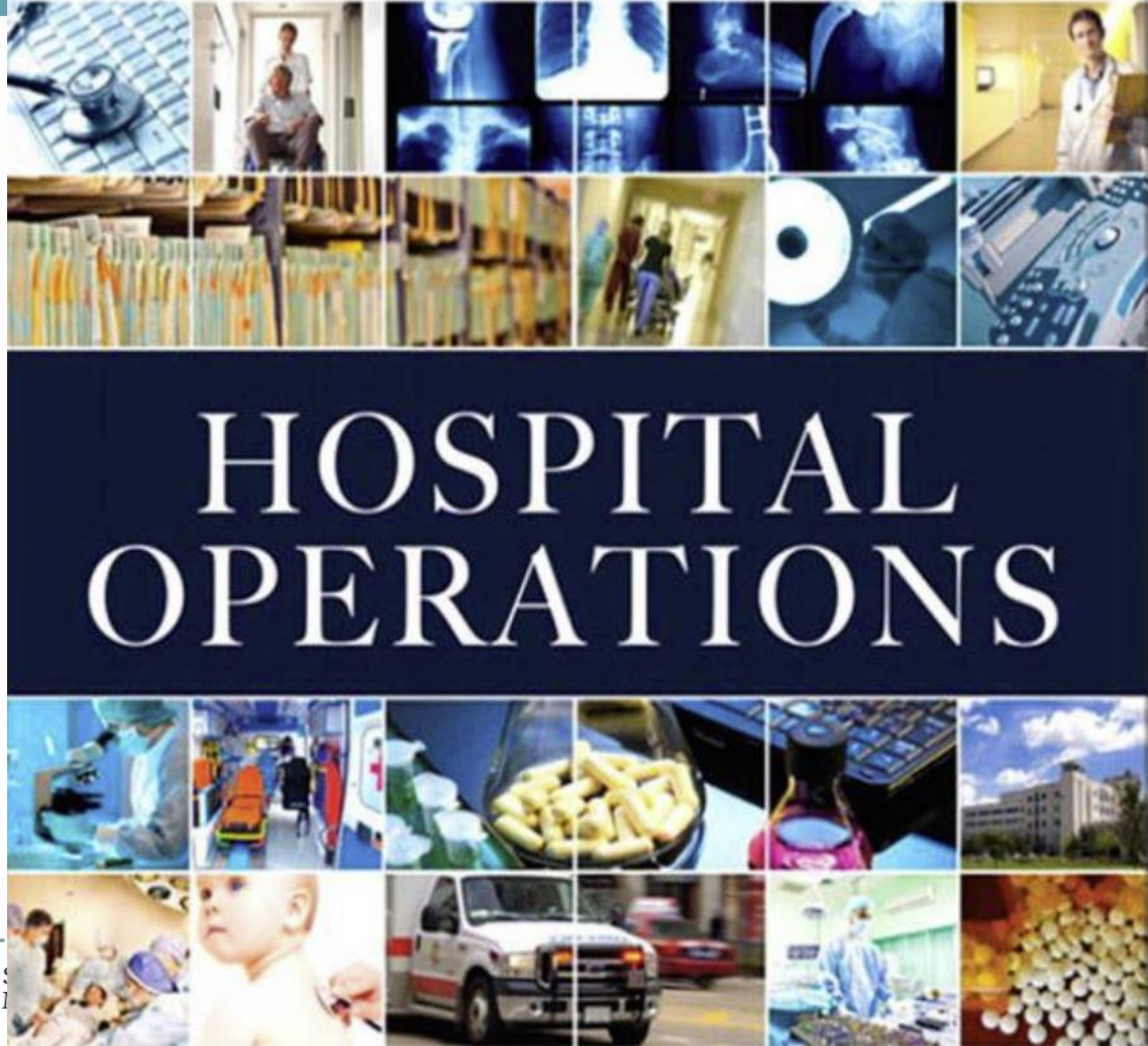
UNIFICATION

"The right care, at the right time, in the right place"

Patient Safety

and

affordability



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Tufts
UNIVERSITY

Interprofessional Development and Performance

Enhance Institutional Relationships and

Optimize Well-Coordinated Care

Disseminate and Align best practices

Maine Medical Center
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Engagement and Retention

Mission

Deliver robust interprofessional training and systems testing to help our MaineHealth birthing hospitals be the safest in the nation.

Ripley
Medical
Office
Building
Maine Medical Center
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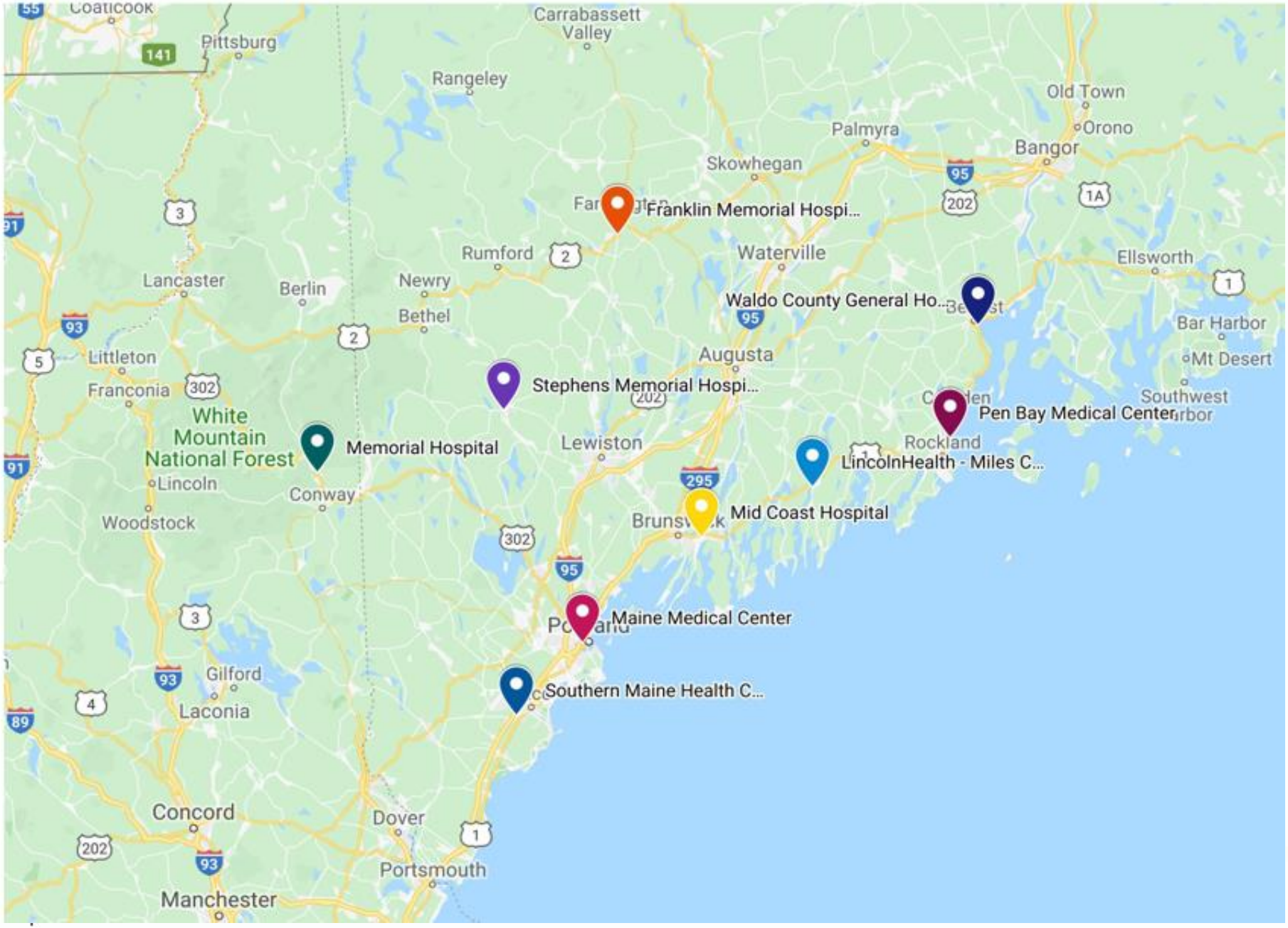
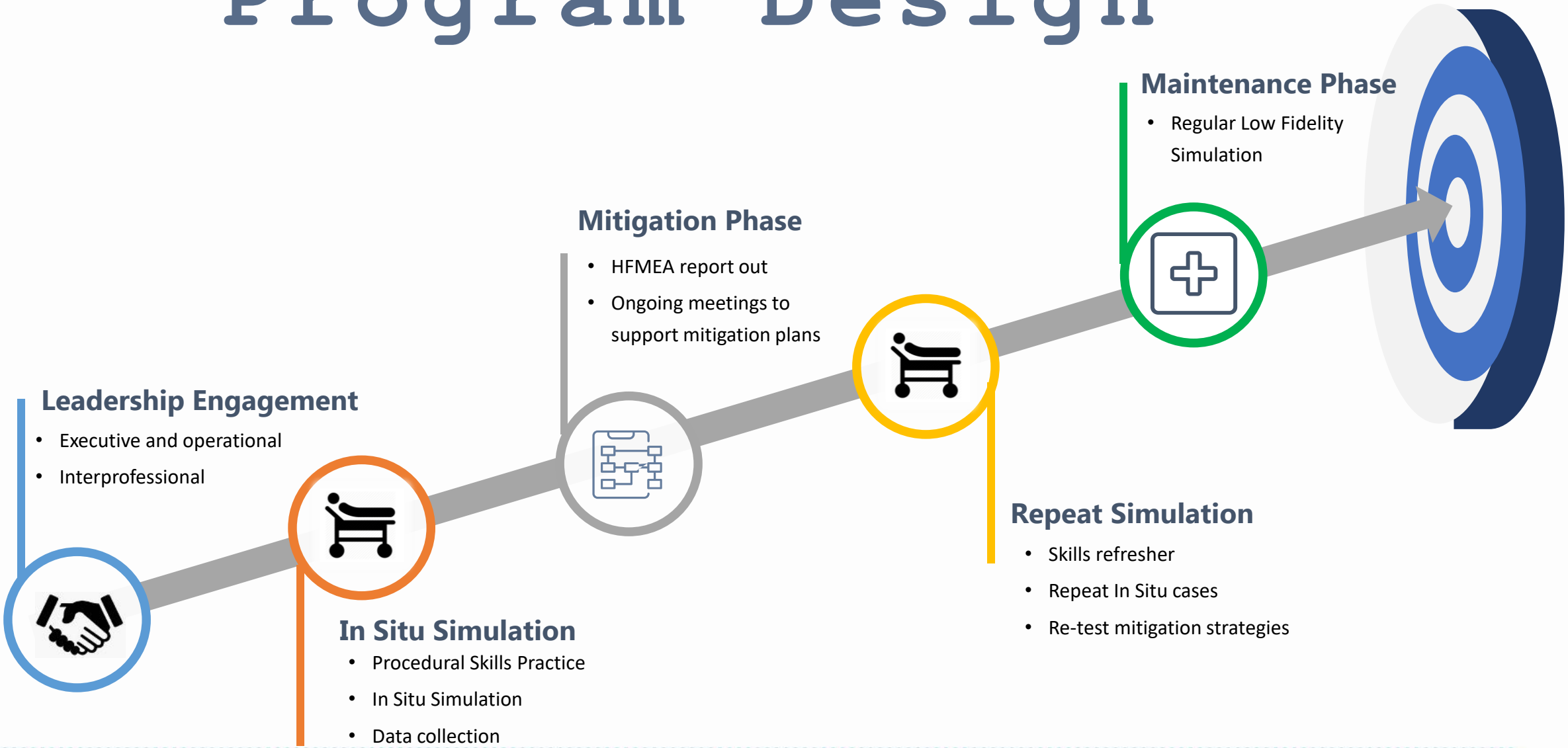
simulation.mmc.org

MaineHealth Hospitals

- Maine Medical Center
- Stephens Memorial Hospital
- Waldo County General Hospital
- Southern Maine Health Care
- Memorial Hospital
- Franklin Memorial Hospital
- LincolnHealth - Miles Campus & Hospital
- Pen Bay Medical Center
- Mid Coast Hospital



Program Design



OVERALL PROGRAM GOALS

- Improved patient oriented metrics in relation to post-partum hemorrhage, severe hypertension/pre-eclampsia, shoulder dystocia
- Improved clinician confidence
- Improved adherence to standardized checklists
- Systems testing to help meet Joint Commission Standard
- Support MH Anthem QHIP initiative

WHAT DOES THE DAY LOOK LIKE?

Time	Topic	Leader(s)
07:00-07:45	Welcome and overview of the day What do you want to get out of today	Participants
07:45-09:15	Skills Stations	OB & Simulation Teams
09:15-09:45	Break and Simulation Orientation	Participants
09:45-11:45	Simulation Scenarios	OB & Simulation Teams
11:45-12:00	Wrap Up-Evaluations-Reiterate Points in debrief	All
12:00-13:00	Break	All
13:00 – 13:45	Welcome and Overview of the day What do you want to get out of the day	Participants
1345:15:15	Skills Stations	OB & Simulation teams
15:15-15:45	Break and Simulation Orientation	Participants
15:45-17:45	Simulation Scenarios	OB & Simulation Teams
17:45-18:00	Wrap Up-Evaluations-Reiterate Points in debrief	All

IP SKILLS STATIONS

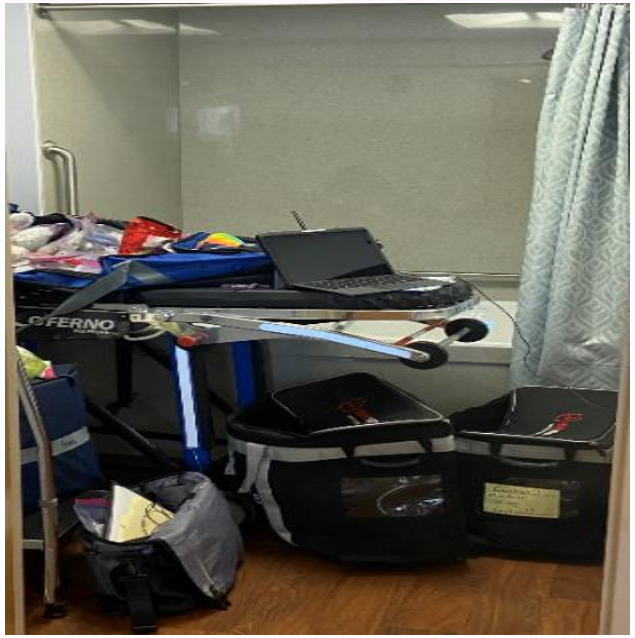
Bakri Balloon Insertion

QBL vs EBL

Medication Administration

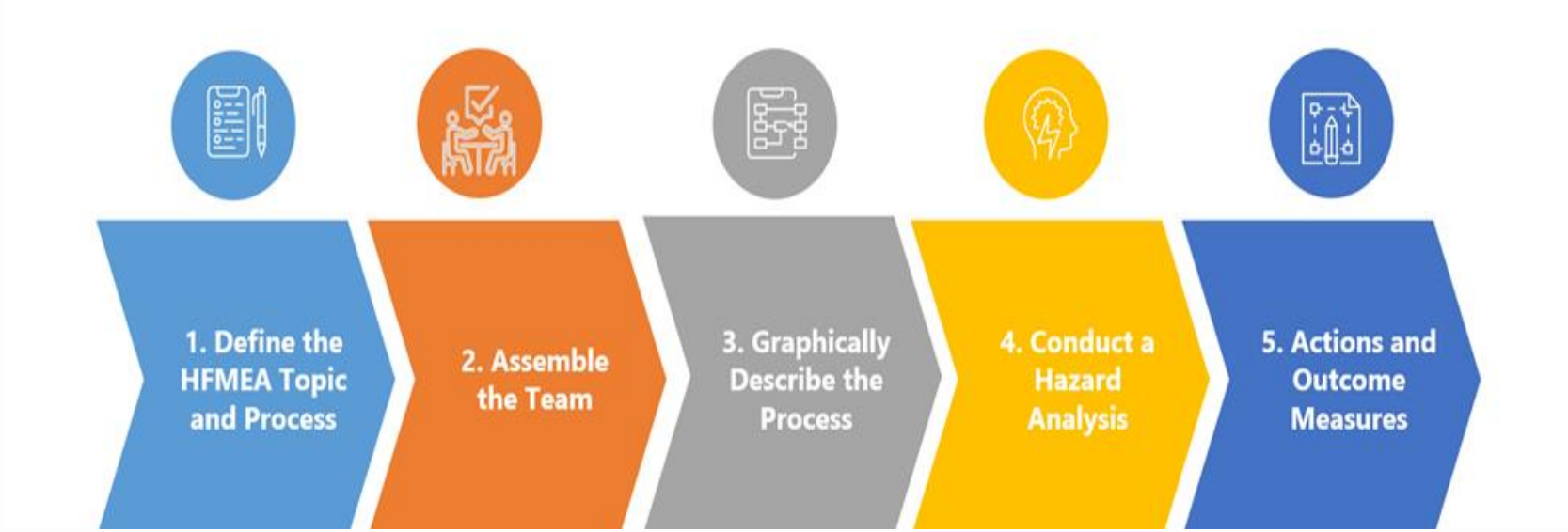
Shoulder Dystocia

SCENARIOS & DEBRIEF



- Scenarios
  - Eclampsia
  - Shoulder Dystocia
  - PPH
- Structured Debrief
  - Scenario review & standards of care
  - Teams, roles, tasks and communication
  - Systems that support the case

HEALTHCARE FAILURE MODE AND EFFECT ANALYSIS (HFMEA)



VA National Center for Patient Safety. “The Basics of Healthcare Failure Mode and Effect Analysis” https://www.patientsafety.va.gov

HEALTH CARE FAILURE MODE EFFECTS ANALYSIS

DEFINITIONS - PROBABILITY

Frequent (4)	Occasional (3)	Uncommon (2)	Remote (1)
Likely to occur *immediately or within a short period*	Probably will occur *may happen several times in 1 to 2 years*	Possible to occur *may happen sometime in 2 to 5 years*	Unlikely to occur *may happen sometime in 5 to 30 years*

DEFINITIONS - SEVERITY

	Impact on Patient	Impact on Staff
Catastrophic (4) *Failure would cause death or injury*	Injury resulting in escalation in level of care, permanent disability, death or surgical procedure	Injury resulting in permanent loss of function, requiring hospitalization, permanent or prolonged loss of ability to perform current duties
Major (3) *Failure causes high degree of dissatisfaction*	Non-life threatening delay in care or injury requiring medical attention without escalation in level of care, permanent disability, or death	Injury requiring medical attention, resulting in temporary loss of function or missed work time
Moderate (2) *Failure overcome with process improvement, minor performance loss exists*	Significant negative impact on patient/family experience; varies from stated goals for patient/family experience	Reliability a source of work-related stress and anxiety for staff, introduces inefficiency that impacts frequently performed tasks
Minor (1) *Failure not noticeable to patient and would not affect delivery of the service*	No significant negative impact on patient/family experience	Minor nuisance that is not a significant source of stress or anxiety for the majority of staff who encounter the problem

HEALTH CARE FAILURE MODE EFFECTS ANALYSIS

HAZARD SCORES

Probability	Severity of Effect			
	Catastrophic (4)	Major (3)	Moderate (2)	Minor (1)
Frequent (4)	16	12	8	4
Occasional (3)	12	9	6	3
Uncommon (2)	8	6	4	2
Remote (1)	4	3	2	1

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A Simulation Systems Testing Program using HFMEA Methodology Can Effectively Identify and Mitigate Latent Safety Threats for a New On-Site Helipad

Jeffrey Holmes MD [1, 2], Micheline Chipman [2], Tracie Barbour [2], Christopher DiLisio [2], Olivia Morejon [1, 2, 3], Erin Graydon-Baker [1, 2, 3], Leah Mallory MD [2, 3]

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https://doi.org/10.1016/j.jcjq.2021.09.013

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ABSTRACT

Background

Fundamental changes in critical systems within hospitals present safety risks. Some threats can be identified prospectively, others are only uncovered once the system goes live. Simulation and healthcare failure mode and effects analysis (HFMEA) can be used together to prospectively test a system without endangering patients.

Objective

We combined iterative simulations and HFMEA methodologies to conduct Simulation-based clinical systems testing (SbCST) to detect and mitigate latent

JOURNAL of MAINE MEDICAL CENTER

Patient Transport in the Time of COVID-19: Using Health Care Failure Mode and Effect Analysis with Simulation to Test and Modify a Protocol

John Kwock, *Maine Medical Center* Follow
Jeffrey Holmes, *Maine Medical Center* Follow
Shelly Chipman, *Maine Medical Center* Follow
Erin Siebers, *Maine Medical Center* Follow
Angela Berry, *Maine Medical Center* Follow
Sonja Orff, *Maine Medical Center* Follow
Victoria Boutin, *Maine Medical Center* Follow
Leah Mallory, *Maine Medical Center* Follow

Submission Type
Original Research

Abstract

Introduction: In March 2020, in response to the COVID-19 pandemic, an interprofessional, interdisciplinary team at Maine Medical Center used Healthcare Failure Mode and Effect Analysis (HFMEA) and in situ simulation to rapidly identify and mitigate latent safety threats (LST) in patient transport protocols.

Methods: Following HFMEA steps, stakeholders representing a variety of disciplines assembled to address transport of patients with COVID-19. A process map was created to describe the process. With hazard analysis using table-top simulation followed by in situ simulation, we identified, categorized, and scored LSTs. Mitigation strategies were identified during structured debriefing.

Title: A Simulated neonatal resuscitation program uses healthcare failure mode and effect analysis to identify and categorize latent safety threats across a rural health system

Authors: Leah Mallory, Jeffrey Holmes, Micheline Chipman, Anya Cutler, Samantha Piro, Anna Gilbert, Sarah Gabrielson, Mary Ottolini, Alexa Craig, Alison Zanno, Misty Melendi.

Hypothesis/Research Question: (max 1000 characters per section)

Simulation offers an opportunity for delivery teams to practice neonatal resuscitation and test associated systems of care in rural hospitals with low birth volumes (1). Simulation training improves neonatal resuscitation performance (2) and can test and improve clinical care systems, identifying latent safety threats (LST) prospectively (3). While description of such testing in a single NICU exists (4), there are no publications comparing LST identified across sites. A team of neonatal intensive care unit clinical staff and simulation experts traveled from our tertiary care center to five of our system's rural delivery hospitals. During in-situ neonatal resuscitation training sessions we conducted Healthcare Failure Mode and Effect Analysis (HFMEA) to identify LST. We hypothesize that the majority of the detected LST are common across hospitals while a minority may differ between sites and be institution-dependent. We sought to identify and categorize LST across sites.

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SIMULATION-BASED CLINICAL SYSTEMS SAFETY TESTING

- **Traditional Patient Safety Tools**
  - Root Cause Analysis, Healthcare Failure Mode and Effect Analysis (HFMEA)
- **Simulation**
  - Realistic enactment
  - Insitu probes native teams-care environment & resources
- **Simulation + HFMEA= Synergy**
  - 33% more & higher scored LST's than HFMEA alone*
  - Test proposed solutions

*Neilson et al. Simul Healthc. 2014. PMID: 24492339

LSTs RELATED TO CARE COORDINATION

Category	Latent Safety Threat (LST)	LST Cause	LST Effects	Probability	Severity	Hazard Score	Action Plan	Responsible Dept
Teamwork	Inconsistent announcement of team roles	Impicit assumption of roles/responbilities	Inefficient teamwork and delay in care	4	2	8	**Increase simulation practice and naming the clinical condition**	**MD/RN champions**
Teamwork	Potential miscommunication among team members	Inconsistent use of closed loop communication	Lack of closed loop communication and cross check could lead	4	3	12	**Increase simulation practice and naming the clinical condition**	**MD/RN champions**
Diagnosis and Treatment	Delay in measuring initial blood pressure	Inconsistent team knowledge about BP being taken upon	Inefficiencies and delay in diagnosis and treatment	3	3	9	**Review HTN protocol with care team members**	**RN Champion**
Diagnosis and Treatment	Estimated blood loss	Blood loss was estimated, not	Inefficiencies and delay in diagnosis and	3	3	9	New algorithm in all patient rooms, including	Completed 09/2022
Diagnosis and Treatment	Loss of IV placement/access during seizure	Patient rolled onto side of IV	Inefficiency or delay in care	3	2	6	Review rolling patients away from IV. Reviewed at Staff Meeting	Completed 08/2022
Diagnosis and Treatment	Calcium administration	Calcium not on code cart	Inefficiencies and delay in diagnosis and treatment	3	3	6	New code carts being deployed – opportunity to standardize correct Calcium (and dose). Order set screen shots laminated and place in all patient rooms. Review at	Completed 09/2022
Diagnosis and Treatment	Calcium administration	Calcium cannot be overridden in pyxis if no order placed	Inefficiencies and delay in treatment	2	3	6	Meet with Pharmacy to add to override med options for emergencies. Override ability available	Completed 08/2022
	location	in location					monitor cart. Review with care team members	
Care Coordination	Inconsistent documentation of shoulder dystocia	Inadequate communication between nursing and physician	Missing or inaccurate documentation	2	2	4	**Team huddle prior to documentation to ensure congruent documentation; use**	**MD/RN champions**

LSTs RELATED TO TEAMS AND TREATMENT

Category	Latent Safety Threat (LST)	LST Cause	LST Effects	Probability	Severity	Hazard Score	Action Plan	Responsible Dept
Teamwork	Inconsistent announcement of team roles	Impicit assumption of roles/responbilities	Inefficient teamwork and delay in care	4	2	8	**Increase simulation practice and naming the clinical condition**	**MD/RN champions**
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Maine Obstetric Medical Simulation: Report Out to IP champions +/- Quality representatives

All Teach. All Learn.

- Improving care depends on YOU
- Your involvement is *crucial* for reaching our common goal of ***Improving Obstetric Care***
- We Need Your Help!

OBJECTIVES FOR REPORT OUT

During this meeting we are going to discuss:

1. **Data collection methodology**

2. **Case Review**

3. **Selecting action items for completion within 6 months**

DATA COLLECTION

Methodology

In situ simulations were conducted in your delivery room.
Performance and teamwork checklists were completed.
Health care failure mode effects analysis was performed and latent safety threats were catalogued.

Cases

Severe hypertension/eclampsia
Post-partum hemorrhage
Shoulder dystocia

Skill Stations

Estimated blood loss
Bakri balloon insertion
Medication administration
Shoulder dystocia

Score Components

Performance scores
HFMEA Hazard Scores

Teams

1 team comprised of:
- 1 physician/midwife
- 2-3 nurses
- 1 certified nurse assistant

DETAILED SIMULATION CASE REVIEW

SIMULATION CASE REVIEW

Eclampsia

Case details

G3P2 @ 37 weeks, brought in via EMS for headache. BP 169/100. Patient develops vision abnormality and has 2 minute generalized tonic/clonic seizure.

1. **Patient presents with headache, hypertension, 3+ reflex.**
2. **Two doses antihypertensive required to lower BP.**
3. **Magnesium must be administered.**

Potential Action Items

1. **In service care team on new code cart**
2. **Standardize protocol for ED/prehospital notification of impending OB patient**
3. **Standardize and educate staff on location of algorithms and initial BP**

Performance Checklist	Yes/No
1. Call for OB MD with second severe range BP	YES
2. Timely appropriate dose of antihypertensive therapy ordered/administered	YES
3. Timely appropriate dose of seizure prophylaxis ordered and administered	YES
4. Continuous fetal heart monitoring	YES

Latent Safety Threats	Hazard Score
1. Unfamiliarity with code cart	9
2. Inconsistent care team notification by ED/EMS	9
3. Not all staff aware of algorithm locations	9
4. Delay in measuring initial BP	9

NEXT STEPS

4 items *…to complete in…* **6** months

- We want you to choose **four action items** which in your opinion is the most important for your site to complete.
- We want you to make these action items your priority and we will support you to achieve them in coming **six months**.
- Please feel free to contact us for any assistance or resources you might need for completing these actions.
- We will follow up with you every 2 months to assist in your progress and support any roadblocks that you might face.

COMMON TRENDS

- **Guidelines and/or checklists:**
  - Inconsistent dissemination of information
  - Have them but don't use them
  - Adopted from another organization but may not work for that specific hospital
- **Resource Allocation**
  - How do you get them?
  - Who responds?
  - Medications & supplies challenges
- **Teamwork challenges:**
  - Inconsistent use of a shared mental model
  - Handoffs

ONE HOSPITAL'S EXPERIENCE

- Top 2 LSTs
- How did you mitigate them
- What were the biggest challenges
- Ongoing engagement in this work

CONCLUSIONS AND NEXT STEPS

- Low fidelity simulation
- Continue the MOMS program with the other MaineHealth birthing hospitals
- Identify how to sustain this work long term
- MOMS ROCKS! GO TEAM!