New Hospital Preparedness
Integrating Simulation-based Testing and Training

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Manager, kidSTAR

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Clinical Educator, CCU
Objectives

• Describe how simulation can be used to test new systems.
• Describe benefits of immersive learning to orient to new environments.
• Propose barriers to simulation based-testing and methods to overcome them.
“There are no financial interests or other relationships with manufacturers of commercial products, suppliers of commercial services, or commercial supporters. This presentation does not involve the unlabeled use of a product or product under investigational use.”

There is no commercial support.”
What is kidSTAR

• kidSTAR is an:
  – Inter-professional
  – Multidisciplinary group

• Primary goal: improve the quality and safety of care for our patients

• How: high-quality educational approaches
Our program

- Roots - 2001
- Formally - 2006
- Exponentially in the last three years
- Focus on:
  - simulation-based education
  - faculty and staff development
Our faculty

- Current kidSTAR bio:
  - 10 faculty and staff
  - 300 simulations AY
    - Residents
    - Medical Students
    - Fellows
    - In-situ Simulations in various care areas
  - Active within our institution
  - Active partners with Northwestern
  - Local, national and international scope of instruction
Challenge

How do you go from a 9 floor building to a 23 story facility?
Challenge

- Provide effective and efficient orientation to the new hospital
- Test systems prior to day one
- Collect feedback prior to the move and post move
- Remedy issues found
- Train multi-disciplines in their job role (new or existing) for the facility they will be working in

<table>
<thead>
<tr>
<th>Location</th>
<th>CMH Beds</th>
<th>Lurie Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>2 trauma</td>
<td>4 trauma</td>
</tr>
<tr>
<td>PICU</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>CCU</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>OR/Procedural</td>
<td>one floor</td>
<td>three floors</td>
</tr>
</tbody>
</table>
Our goals

Partnering with key groups to:

– Test systems and workflows before opening
  • to uncover and address identified issues
– To incorporate simulated workflow exercises into the hospital orientation experience for clinical providers in key area
  • preparing staff for providing care in new hospital
– Evaluate the impact of these interventions on providers
  • offer a model for other new care areas or processes
So where do you begin?
# SWOT Analysis

<table>
<thead>
<tr>
<th><strong>S</strong></th>
<th><strong>W</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>E</strong> Existing strong program</td>
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<tr>
<td>- 8 vested faculty members</td>
<td></td>
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<tr>
<td>- Previous experience</td>
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<tr>
<td>- Build Capacity</td>
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<tr>
<td><strong>T</strong> Structure to draw from</td>
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<tr>
<td>- Simulators</td>
<td></td>
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<tr>
<td>- Cases</td>
<td></td>
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<td>- Debriefing skills</td>
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<tr>
<td><strong>O</strong> Operationalizing simulation</td>
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<tr>
<td>- Low fidelity vs. High Fidelity</td>
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<tr>
<td>- Standardized patients</td>
<td></td>
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<tr>
<td>- Other immersive learning tools</td>
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</tbody>
</table>

| **O** Cross disciplines |
| **W** Build capacity |
| **O** Base work for future projects |
| - Code simulations |
| - Orientation for new staff |
| - Process development |

| **S** Large amount of real estate to cover |
| - 9 to 23 floors |
| - increase in public areas |
| - increase in clinical areas |
| - compact to spread out |
| **W** Operationalizing simulation |
| - Low fidelity vs. High Fidelity |
| - Standardized patients |
| - Other immersive learning tools |

| **O** Staff Engagement |
| - Why does this matter to me? |
| - Am I being evaluated? |
| - Orientation overload |
| **T** Time constraints with the move |
| - NATO/G-8 |
| - IDPH site visits |

Wednesday, March 27, 13
Strengths

• **Existing strong program**
  – 8 vested faculty members
  – Previous experience
  – Build Capacity

• **Structure to draw from**
  – Simulators
  – Cases
  – Debriefing skills

• **Operationalizing simulation**
  – Low fidelity vs. High Fidelity
  – Standardized patients
  – Other immersive learning tools
Weaknesses

• Large amount of real estate to cover
  – 9 to 23 floors
  – increase in public areas
  – increase in clinical areas
  – compact to spread out

• Faculty demands
  – Building capacity
  – Partnering with Clinical Educators
  – reducing academic work loads
Opportunities

- Cross Disciplines
- Build Capacity
- Basis for future projects
  - Code simulations
  - Orientation for new staff
  - Process development
Threats

• **Staff Engagement**
  – Why does this matter to me?
  – Am I being evaluated?
  – Orientation overload

• **Time constraints with the move**
  – NATO/G-8
  – IDPH site visits
Based on other work....

Using Simulation To Prepare For Opening Of The Pavilion For Women

At Texas Children’s Hospital, in addition to the care and safety of our patients, we also view the safety of everyone visiting and working in our hospital to be a top priority. That’s why before opening outpatient services at the Pavilion for Women, we conducted realistic, emergency response simulation sessions to give our team valuable hands-on response experience in our new facility.

Testing and Orientation

Leo Kobayashi, MD, Marc J. Shapiro, MD, Andrew Sucov, MD, Robert Woolard, MD, Robert M. Boss III, RN, Jennifer Dunbar, RN, MSN, Ronald Sciamacco, RN, Kelly Karpik, RN, BSN, Gregory Jay, MD, PhD

Using In situ Simulation to Evaluate Operational Readiness of a Children’s Hospital-Based Obstetrical Unit

Kathleen Ventre, MD, James Barry, MD, Deborah Davis, RNC-OB, MS, Veronica Baiamonte, Allen Wentworth, RRT, MEd, FAARC, Michele Pietras, RN, MSN, MBA, Liza Coughlin, BA, and Gwyn Barley, PhD

1Critical Care Medicine, Children’s Hospital Colorado, Aurora, CO, USA; 2Critical Care, Maternal Fetal Nursing, Children’s Hospital Colorado, Aurora, CO, USA; 3Program Office, Children’s Hospital Colorado, Aurora, CO, USA; 4Center for Advancing Professional Excellence, University of Colorado, Aurora, CO, USA; 5Pediatrics, University of Colorado, Denver, CO, USA; 6Women and Newborn Nursing, University of Colorado Anschutz, CO US; Work, Education, and Lifelong Learning Simulation (WELLS) Center, University of Colorado, Aurora, CO, USA

Objectives: Prompt and successful cardiopulmonary resuscitation during a sudden cardiac arrest can be hindered by multiple variables, ie, ineffective communication, stress, lack of training, and an unfamiliar environment, such as a new hospital facility. The main objective of the study was to use high-fidelity simulations to orient Code Blue Teams (CBTs) to critical events in a new hospital facility. A secondary objective was to elucidate factors that may have contributed to responses by debriefing teams.

Methods: Mock Code Blue exercises using high-fidelity simulation were implemented in real workplace settings to orient CBTs to critical events. We measured arrival time of first responder, crash cart to code site, first six CBT responders, first chest compressions, and first electrical shock. After each mock code, participants were debriefed to assess any barriers to effective response and decision making.

Results: Twelve mock codes were conducted at different locations of the new facility. Sixty-nine percent of the participants reported that the training was beneficial. The median time of arrival of the first responders was 42 seconds and the first CBT member was 66 seconds. The median time to initiation of chest compressions was 80 seconds, crash cart arrival was 68 seconds, and first electrical shock was 341 seconds. An additional outcome of the study was the identification of facility and systems issues that could result in nonoptimal response to sudden cardiac arrest. Simulation can be effectively used to orient CBTs and identify potential issues and areas for improvement in a new hospital facility.

(Sim Healthcare 3:209-216, 2008)

Key Words: Resuscitation, Simulation, Code Blue, Cardiac arrest, New hospital facility, Critical event.

but on a grander scale.....
In Preparation......

- Medical Observation Unit - fall of 2010
- Collaboration with future key partners
  - simulated “day-in-the-life” workflow test
  - debriefed with the participants
  - Information gathered led to changes prior to opening

Participants valued the experience
Viewpoint of a participant

2010 Training for the opening of the Medical Observation Unit
Lessons Learned from MOU

• Based on simulations
  – Multiple systems issues identified
  – Processes revised based on work flow

• Based on feedback
  – Care of patients was enhanced
  – Staff satisfaction was increased

• Operationally
  – Common goal
    • Faculty
    • Simulations
    • Debriefings
  – Collection of feedback
    • Tracking systems issues
    • Follow up on issues
Fruits of our labor

• Framework for new hospital
  – Faculty Development
  – Develop simple cases focused on systems testing
  – Collection of data
  – Feedback and follow up

• Developed relationships with other disciplines
  – Clinical and Organizational Development
  – Physicians and Nurses
  – Respiratory Therapy
  – Safety and Quality
PLANNING

DESIGN

ENGAGEMENT

IMPLEMENTATION

Systems Testing  DWO  Pre-operational
The Design

• Build Capacity (18 months)
  – Identifying our co-facilitators
  – Common understanding of our goals

• Identify critical areas (12 months)
  – Worked with Safety and Quality
  – Directors and Educators identified

• Develop relevant cases (6 months)
  – Based on
    • current concerns
    • new processes
  – Interprofessional

• Scheduling (4 months)
Faculty Development

- SHaPE course
- Partnered with COD
- Within kidSTAR

- What is Simulation?
- How do you develop scenarios?
- How do you debrief?
- Applied that knowledge
  - Developing a scenario
  - Running a Sim
  - Debriefing that Sim

Simulation in Health Professions Education (SHaPE)
August 20-22, 2012
November 13-15, 2012

Click here to register

Course Directors
Susan Eller, RN, MSN
Walter Eppich, MD, MEd
Needs Assessment

• Identified
  – current clinical and non-clinical areas
  – change in clinical and non-clinical areas

• Reviewed
  – Current facility process
    • Code responses
    • Trauma activations
    • Day Surgery flow
    • New clinic area patient flow
  – Other changes with new facility
    • OR/procedure on 3 floors
    • A new CCU

• Partnered
  – MORO
  – COD
Identified our Limitations

- Cost efficient
  - No increase in resources
  - On unit time for staff
- Budgeted two hours per unit
Built a

 Partners

– MORO: Diana Halfer, RN
– Clinical and Organizational Development: Barbara Keating, RN
– Safety and Quality: Ed Ogata, MD, Michaeleen Green
– Code Team: Eric Wald, MD

 Educators

– Molly Lappe (CCU)
– Christine Pytel & Cindy George (OR)
– Maureen McCarthy-Knowles (PICU)
– Marima Karastanovic (Imaging)
– Mary Lynn Rae (Hem/Onc)
– Carol VanProoyen (PACU)
So how do you develop scenarios in a hospital you have never been in?
Engagement with Critical Areas

Focus:

- PICU
- ED
- OR
- Transport team
- CCU
- PACU
- Preoperative Services
- Medical Imaging
Layouts of each floor were used in the meetings
Approach

End Product - we integrated simulations into the Department Workflow Orientation

- Unit layout
- Monitor orientation
- Get Well Network
- Break

- Bed orientation
- Lunch
- MYR competencies
- Work flow
Systems Testing

• Run through of scenarios
  – What can we fix now, before we educate the masses?
  – Do these processes on paper work in real time?
  – Are there other areas we should be concerned about?

• Piloting
  – Are things operational?
  – What is and what isn’t available to test

• Reality
  – Many things we needed to complete orientation was not available
  – Plan B
Simulation Line-Up

• Pre-move simulation sessions
  – Systems testing (pilots)
  – Departmental Work Flow simulations
  – Pre-Operational simulations

• Post move review
  – Follow up on issues discovered
  – Education to faculty and staff

• Post move follow up
  – Areas to reinforce orientation
  – New hire
  – New faculty
Types of simulations

- **High fidelity**
  - PICU
  - ED
- **Low fidelity**
  - OR
  - Procedure
  - CCU
- **Standardized patients**
  - Public areas
  - Medical Imaging
- **Immersive learning**
  - ED
  - CCU

All followed by a focused learner led debriefing.
Case Scenarios

• High Risk Low Frequency
  – VTach Arrest
  – Resp Distress

• Patient Flow
  – ICU to Procedural Suite
  – ED to OR
  – Floor to ICU

• Confederates
  – Parent
  – Standardized Patient

• Immersive learning
  – Triage Scenarios
  – Scavenger Hunts
Systems Testing

In key clinical areas:

- Pediatric Intensive Care Unit (PICU)
- Cardiac Care Unit (CCU)
- Emergency Department (ED)
- Transport Team
- Operating Room (OR)
- Surgical Service

What issues can we fix now before we orient the masses?
What looks good on paper or in planning doesn’t always work out in practice.
Staff Assist and Code Blue buttons often difficult to access

Design often did not facilitate patient care
Placement of emergency equipment often in hard to reach areas.
Signage

- Ambulatory Infusion Center
  1831 – 1847
  Centro de Infusión ambulatoria
- Conference Room 18-362
  Sala de conferencias
- Ambulatory Apheresis Stem Cell Unit
  1821 – 1830
  Unidad ambulatoria de apheresis y célula madre
- Check-Out
  Registro de salida
- Outpatient Center
  Centro para pacientes externos

- Rooms 2101 – 2124
- Rooms 2125 – 2148
- Offices 21-111 – 21-128
- Conference Room 21-104
- Staff & Service Elevators
- Staff Lounge
- Lactation Room
- Tower Elevators
Signage

- Emergency Exit and Stairway Signage had to meet CFD standards.
- Wasn’t the Children’s way
- At times confusing
This is where you learn to be flexible
Follow up and re-organize

- Issues that could be fixed fed back to the move center.
- Issues that could not be fixed led to:
  - Change in workflow
  - Change in orientation
  - Temporary workarounds until they could be fixed.
- DWOs were altered based on:
  - Findings from the systems testing
    - More time
    - Less time
    - Change focus of simulations
  - Inaccessibility to areas/functions.
DWO

- Monday - Saturday
- Accommodated all shifts
- Often at similar times/overlapping
- Three to four scenarios
  - 10 min scenarios
  - 15 to 20 min debriefing
  - closing debriefing on overall experience
- Follow up
  - with educators
  - with safety and quality
Iterative Development & Implementation

• Flexible
  – Discussion with stakeholders
  – Constantly re-thinking the plan

• Practical
  – Recognize that we could not anticipate what would be ready when we arrived
  – Be prepared for Plan B

• Persistent
  – Didn’t allow barriers to result in mass cancellations or to lose momentum
  – Regardless of the limitations some form of simulation was carried out
Pre-Operational Simulations

• Based on
  – Feedback from staff in DWO
  – Inability to test some systems prior
  – Different learners

• Staffed and operational facility two weeks prior to day one
  – Clinics and imaging required a code team
  – Additional staff from other departments

• Focus -
  – Codes
  – NEAR responses
  – Individualized
    • Trauma/OR
    • Cardiac Surgery
Pre-operational

- Two week period
- Monday through Friday (0800 to 1700)
- Multiple disciplines
  - Anesthesia
  - PICU Fellow/RT
  - TT RN
  - Security
- Every Hour
  - Code/NEAR response simulation
  - Plus/Delta debriefing
  - Summary at end of day
Summary of Identified Issues

• Barriers to accessing all areas of the hospital
  – security processes in place
  – badges improperly coded
  – lack of education on layout of hospital
  – unclear processes

• Access to emergency equipment
  – Location of code/staff assist
  – Code Cart location
  – Where the alert sounds

• Able to adjust processes based on real time case
## End Product

<table>
<thead>
<tr>
<th>Areas</th>
<th>Simulation Hours</th>
<th>Participants</th>
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<tbody>
<tr>
<td>ED</td>
<td>48</td>
<td>110</td>
</tr>
<tr>
<td>TT</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>PICU</td>
<td>50</td>
<td>112</td>
</tr>
<tr>
<td>CCU</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>OR</td>
<td>30</td>
<td>86</td>
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<tr>
<td>PACU</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td>Surgery</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Code Team</td>
<td>38</td>
<td>24</td>
</tr>
</tbody>
</table>

514 Faculty and Staff one or more of the sessions over 258 hours in two months.
http://www.chicagotribune.com/videogallery/70196034/News/A-simulated-emergency-at-Lurie-Children's-Hospital#
Individualizing Simulation in the Cardiac Care Unit

• The Regenstein Cardiac Care Unit is a 36-bed, acuity adaptable unit

• Cardiac Care Unit included the blending of nurses with diverse backgrounds:
  – Neonatal Intensive Care Unit (4)
  – Pediatric/Cardiac Intensive Care Unit (28)
  – Telemetry Unit (22)
  – External New Hires- Experienced (14)
  – External New Hires- New Graduate (7)

• All nurses transitioning to the Cardiac Care Unit completed orientation.
  – Blended learning approach utilizing hands-on activities, on-line learning modules and formal lectures.
Individualizing Simulation in the Cardiac Care Unit

• Initial needs assessment and program implementation did not cover:
  – Situational awareness
  – Working as part of a new team

• The Cardiac Care Unit utilized both low- and high-fidelity simulations during the Department and Workflow Orientations.
  – Three goals
    • Test anticipated workflows.
    • Develop an awareness of location and accessibility of emergency equipment.
    • Facilitate the movement of critically ill patients through the hospital.
Individualizing Simulation in the Cardiac Care Unit

- Unit-wide Systems Testing
  - Admission process of patients from the operating room
  - Availability of STAT medications from pharmacy
  - Code responses on opposite sides of the unit
  - ECMO and ECPR activation within the unit
Post Move Analysis
Lessons Learned

• Building Capacity
  – drain on faculty resources
  – 60 plus hour weeks
  – Multiple sim sessions at same times

• Data collection
  – standardized
  – reportable
  – able to study

• Low vs. High Fidelity

• Separate Simulation time -vs DWO integration

• Be Flexible!!!
Systems issues identified

Pre-Move

• 641 unique issues were identified prior to opening and were categorized
  – 175 equipment issues
  – 136 code alarm functionality problems
  – 174 unexpected barriers to care
  – 156 incorrect signage/way-finding.
Systems issues identified

Post-Move

- 4489 problems were reported to the “Move Center”
- 1724 issues were related to clinical care areas that were the subject of the simulations
Systems issues identified

Thus, this process was effective in the early identification of many potential issues prior to opening, allowing for this knowledge to be communicated to leadership for possible remediation.
What we learned

- Hands-on, integrated experiences were valued by staff and clinical leaders
- Staff linked their successful real-world practice to their opportunity to practice
- Changes that came out of the process had clear practice benefits

We were effective in the early identification of many potential issues prior to opening and able to communicate to leadership for possible remediation.
Participant Feedback

- 791 staff members responded to an online survey 3 months after the move
  - 56% nurses, 21% physicians, 9% APNs
  - broad variety of work locations and years of experience at CMH/LC
  - 89% reported attending a DWO
- 38% reported simulation as part of a DWO
  - 39% of nurses, ~ 23% of physicians
  - 43% reported multidisciplinary simulations
- Only 26% of simulation attendees did not feel that the simulation was helpful and eased their transition to Lurie
- 45% felt the number of simulations was sufficient
- 48% felt the amount of time for simulations was sufficient
What participants took away

Working with the team in the new care area. We are all from different areas and everything was new. Simulations allowed us to practice together and in our new care area.
- CCU Staff

Able to practice care to a patient in our new environment, especially as a team.
- Hem/Onc Staff

Floor 4 and 5 had interesting barriers to care and code response that were discovered and resolved with the simulations.
- Radiology Staff

Understanding how a to run a code in our new department and working with the code team, understanding flow and process.
- PACU staff

Uncovering barriers to providing care during a simulation helped us to better prepare for day one!
- PICU Attending

In a new unfamiliar patient care environment running a code in a patient room was valuable for the team.
- ED Attending
Viewpoint of participants
Future Directions

• Interprofessional unit-based code response - “first five minutes”
• Building on success in creating a safe-learning environment surround sim-based learning
• Ongoing simulations with a broad variety of clinical providers
How Can I Use This?

• New Process Development and Implementation
• New Units
• Restructuring of an Existing Unit
• Development of Response Teams
Simulation + Debriefing

Take Home Message

= increased patient safety + increased staff competency
QUESTIONS?