Event-based Simulations to Train High-Risk Procedures

R. Fernandez, MD

Disclosure

- Funding and support for this project has been provided by the State of Washington, Department of Labor & Industries, Safety & Health Investment Projects

Overview

- What is simulation?
- What are some basic simulation design principles?
- Helpful tips for simulation curriculum implementation
- Take home materials

What is Simulation?

- Any technology or process that recreates the contextual (clinical) background
Standardized Patients

- Communication
- Family interaction
- Physical exam interaction
- Need for a "moving" patient

Standardized Patients

- Painful procedures
- Abnormal exam findings
Task Trainers

- Practicing a specific task
- Can combine with other modalities

Task Trainers

- Full patient care experience
- Patient – caregiver communication
Full-body Mannequins

- Resuscitations
- Care of an ill patient
- Painful procedures
- Teamwork
- Multi-unit care

Full-body Mannequins

- Patient-provider communication
- Non-verbal skills
- Certain physical exam findings

Virtual Reality
Virtual Reality
- “Immersive”
- Can incorporate multiple people
- Potential for “distributed” learning

Virtual Reality
- Hands-on procedures
- Technical expertise to develop
- Subtle communication

Advantages of Simulation-based Training
- Practice routine events under non-routine conditions

Advantages of Simulation-based Training
- Practice non-routine clinical events
Advantages of Simulation-based Training

- Deliberate
- Allows opportunity for feedback

Advantages of Simulation

- Simulation provides a standardized setting for training and assessment
- Understand barriers to implementation of protocols / therapies
- Evaluate equipment and environmental factors

Impact Different Levels

- Individual
- Team
- Unit
- System

Care of the EVD Patient

- Unique issues
  - Personal protective equipment
  - Highly infectious agent
  - Critically ill
  - Teamwork
- Clinical unknowns
• To be effective, simulation design and implementation must follow some basic design principals.

**Prep Work**
- Identify the Problem
- Focused Needs Assessment
- Define Participants
- Define Objectives
- At a high level, what are you trying to study / understand / explain / evaluate / improve?
- Define the targeted need or needs
- Who will participate in the simulation
  - Who will be part of the lab? Who will need a post-sim report
- Define the objectives for the specific simulation you are designing
- What will be the challenges of working in high level PPE?
- Identify high risk processes associated with linen changes in an Ebola patient
- Frontline nurses E/Ebola care team Risk management
- Evaluate the process of linen change in a patient with copious watery diarrhea while wearing PPE

**Process Overview**

<table>
<thead>
<tr>
<th>Preparatory</th>
<th>Simulation Design</th>
<th>Implementation</th>
<th>Post-Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the Problem</td>
<td>Choose a Sim Strategy</td>
<td>Test the sim</td>
<td>Debrief</td>
</tr>
<tr>
<td>Focused Needs Assessment</td>
<td>Describe the Scenario</td>
<td>What do you need?</td>
<td>Who do you need?</td>
</tr>
<tr>
<td>Define Participants</td>
<td>Identify Events and Triggers</td>
<td>Who do you need?</td>
<td>What process will you use?</td>
</tr>
<tr>
<td>Define Objectives</td>
<td>Determine data collection plan</td>
<td>When will you do this?</td>
<td>How will you provide feedback to the individual/team</td>
</tr>
<tr>
<td>How will the sim be used?</td>
<td>What is the clinical impact?</td>
<td>How will you provide feedback to the unit/system</td>
<td></td>
</tr>
</tbody>
</table>

**Build Your Team**
- Frontline providers
- Leadership
- Simulation expertise
- Assessment expertise
- Safety/quality science expertise
Define Objectives

- What do you want to train, measure, or understand?
- **BE SPECIFIC.**
  - What is the process?
  - Who is involved?
  - What conditions are present?
  - What skills / behaviors do you want to elicit?

Simulation Design

A 23 year old female 2 days into her hospitalization for EVD has increasing watery diarrhea. She is alert and oriented, but overall feels weak. Her vital signs have been stable and reflect ongoing dehydration, with a HR of 110. The patient has 2 IVs, and a foley catheter, and is receiving replacement fluid through one IV.

The team needs to change her linens. She can cooperate and assist with rolling but is too weak to stand safely. She continues to have active diarrhea during the first half of the changing process. Her vital signs if checked do not change during the process.

The simulation ends with clean-up after the linen change.

Simulation Design

- Choose a Sim Strategy
  - What technology or modality is the best fit for your objectives

- Describe the Scenario
  - Describe in a few sentences the overall scenario you wish to create

- Identify Events and Triggers
  - Break the simulation into discreet events and determine how those events will be triggered

- Determine data collection plan
  - How will you collect and use information about this simulation?

Determine Your Simulation Technology

- Look at your objectives
- Consider what components need to be most “realistic”
- What are your available resources?
  - Don’t forget the cost of time!
Event-based Simulation Design

• **Event** = substantive task with a clear beginning and ending
• **Trigger** = standardized, scenario-specific indicators embedded in the scenario, designed to force a transition between events

---

**Hygienic Care Simulation**

Behaviors

- Gather linens
- Arrange waste receptacles
- Ensure adequate disinfectant
- Execute pre-brief
- Roll patient
- Position devices/tubes
- Remove head/foot
- Release fitted sheet
- Prepare new linens
- Create barrier on floor
- Discuss fecal management system
- Revisit Event 2
- Ensure supplies duplicated on other side
- Gross contamination check
- Repeat Event 2
- Remove all materials
- Bleach floor
- Clean bedding

*OBSERVABLE*
Event-based Simulation Design

- The design and sequencing of events and triggers should depend upon the objectives and realistic progression of the scenario.
- Length of events and timing of triggers can be varied.

Triage of a Possible EVD Patient

- Assessment
  - Event-based simulation design helps determine when specific behaviors should occur.
  - Measures can be linked with a specific event / time window.
Data Collection

- Video / Audio
- Metrics (measurement tool)
  - Patient Care metrics
  - Teamwork metrics
- Direct observation
- Participant comments
Implementation

- Test the sim: Dry run; Walk-through; technology test
- What do you need? List of supplies
- Who do you need? Instructors / technicians / participants
- When will you do this? Time of day / Day of week
- What is the clinical impact? Staff / Space / Equipment

Debriefing

- Deliberate
- Allows opportunity for feedback

Post-Simulation

- Review the simulation
- Elicit participant experiences
- Provide feedback
- Who do you need if analyzing a process? Debriefing
- Process mapping, FMEA, etc

Thank you

Sponsor
- Washington State Department of Labor & Industries

Collaborators
- Sarah Wolz, MS
- Nancy Simcox, MS
- Scott (John) Meschke PhD, JD
- Bryan Kim, BA

Simulation Participants
- Douglas Franzen, MD
- Andrew McCoy, MD
- Erin Emmantraul, RN
- Dayna Morgan, RN, MN
- Robin Collier, RN, MN
- Brandi Ward, BA