

*Small Victims and Serious Play:
Simulations and Video Games for
Pediatric Disaster Education*

Mark X. Cicero, MD
Associate Professor of Pediatrics
Director, Pediatric Disaster Preparedness
Section of Pediatric Emergency Medicine
Departments of Emergency Medicine and Pediatrics
Yale University School of Medicine



NAEMSP: Annual Meeting | January 8-13, 2018 | Manchester Grand Hyatt | San Diego, CA

Disclosures

I have no commercial interests to disclose

The PRIDE research network has received funding from:

- Emergency Medical Services for Children
- Agency for Healthcare Research and Quality



Objectives



- Understand the scope, importance, and challenges of pediatric disaster education
- Recall the advantages and limitations of 'live' and screen-based simulation modalities
- Consider means for incorporating disaster simulations and video games into initial and continuing education programs

Types of Disasters

Sudden

- Unexpected
- All victims ill or injured simultaneously
- Examples: tornadoes, school shootings, nerve gas attacks



Delayed

- Incubation period
- Range of times to presentation and degrees of illness/injury
- Examples: pandemic influenza, biological weapons

What Disasters Have In Common

Overwhelm health care resources

- Scale
- Duration
- Preexisting resources

Children are disproportionately harmed

- Physically
- Emotionally
- Family separation
- Poverty



images.ctv.ca/gallery/photo/bus_crash_080409/image3.jpg

Balance of Needs and Resources

- Patients
- Healthcare needs
- Community needs
- Media attention

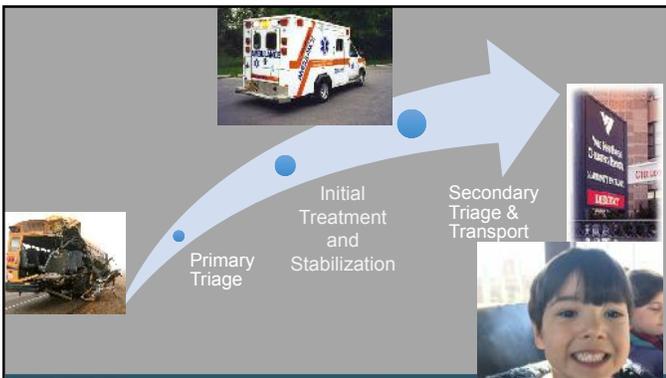


- Personnel
- EMS Resources
- Medical equipment
- Pharmaceuticals
- ORs
- Hospital rooms
- ICU Space

Scope of EMS Pediatric Disaster Education

- Scene Safety
- Mutual aid
- Triage
- Initial Treatment
- Decontamination
- Family reunification and transport
- Alternate care sites
- Interface with:
 - Public health
 - Receiving facilities
 - Police and other authorities





Challenges To EMS Pediatric Disaster Education

- Time
 - Initial training
 - Continuing Education
- Dys-Synchrony of training and practice
 - Uncommon patient group
 - Rare events
- Decay of knowledge, skill, and self-efficacy
- Unclear what methods effective



Curriculum Development: Kern Method

Step 1: General needs assessment

- Current educational practice
- Ideal Approach

Step 2: Needs assessment of targeted learners

- Previous disaster training and experience
- Attitudes about need for disaster education (Likert Scale)
- Self-reported comfort with triage, treatment, preparedness, and disaster mental health

Curriculum Development: Kern Method

Step 3: Goals and Objectives

Step 4: Educational strategies

- Didactic
- Experiential



Step 5: Implementation

Step 6: Evaluation and Feedback

Modified Kirkpatrick Hierarchy: Program Evaluation



Barr, 2000

- Higher level outcomes more difficult to:
 - Measure
 - Establish causation of improvement

Pediatric Disaster Education: Live Simulations

- Advantages
 - Hands on skill practice
 - Debriefing in real time
 - Closest to reality
- Limitations
 - Costly
 - Schedule constraints



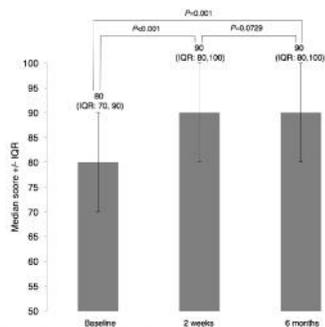
Live Simulations for Improving Triage Accuracy: Study Design

Figure 1. Study Time Flow With Curricular Elements and Evaluations



Live Simulations for Improving Triage Accuracy: Results

- Live simulations yielded a sustained 10% improvement in triage accuracy 6 months after the educational intervention
- The greatest improvements in accuracy were for triage RED and YELLOW patients



Rationale For Using Video Game Education

Mohan et al. BMC Emergency Medicine (2016) 16:44
DOI 10.1186/s12873-016-0108-z

BMC Emergency Medicine

STUDY PROTOCOL Open Access

Testing a videogame intervention to recalibrate physician heuristics in trauma triage: study protocol for a randomized controlled trial

Deepika Mohan^{1*}, Matthew R. Rosengart², Baruch Fischhoff³, Derek C. Angus¹, Coreen Farris⁴, Donald M. Yealy⁵, David J. Wallace⁶ and Amber E. Barnato⁶

Rationale For Using Video Game Education

OPEN ACCESS Freely available online

PLOS ONE

Assessing the Validity of Using Serious Game Technology to Analyze Physician Decision Making

Deepika Mohan^{1*}, Derek C. Angus¹, Daniel Ricketts¹, Coreen Farris², Baruch Fischhoff³, Matthew R. Rosengart⁴, Donald M. Yealy⁵, Amber E. Barnato⁶

1 Department of Critical Care Medicine, University of Pittsburgh School of Medicine, Pittsburgh, PA, United States of America, 2 RAND Corporation, Pittsburgh, PA, United States of America, 3 Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh, PA, United States of America, 4 Department of Surgery, University of Pittsburgh School of Medicine, Pittsburgh, PA, United States of America, 5 Department of Emergency Medicine, University of Pittsburgh School of Medicine, Pittsburgh, PA, United States of America, 6 Department of Medicine, University of Pittsburgh School of Medicine, Pittsburgh, PA, United States of America

- Decisions about trauma transfers in a video game correlated with physician practice

60 SECONDS TO SURVIVAL
DISASTER TRIAGE

SCHOOL SHOOTING SCORE: 23,000

HOUSE FIRE PLAY

TORNADO LOCKED

GUIDE Leaderboard Credits



Patient Characteristics in *60 Seconds to Survival*

- Full range of pediatric and adult ages
- Children with special healthcare needs
- Injury types and severity mirror the nodes of the combined START/JumpSTART algorithm (Nadeau, 2017)

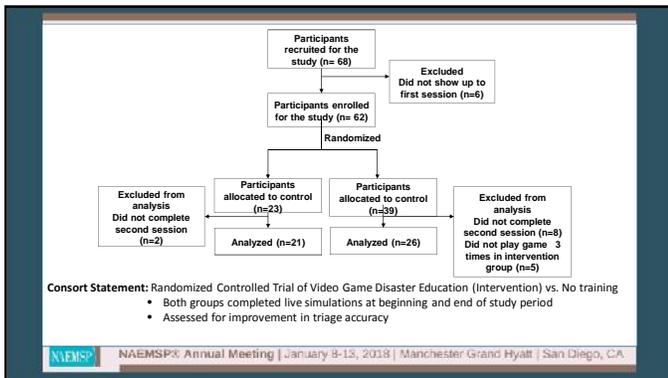
Advantages of Video Game Education

- Victims represented in the game
 - Can depict many patients
 - Children can be portrayed without pediatric standardized patients or manikins
- Educational delivery
 - **Asynchronous learning**
 - Experience is standardized
 - No need for facilitators or instructors
 - Feedback is immediate
- Good match for the learner population

Limitations of Video Game Education

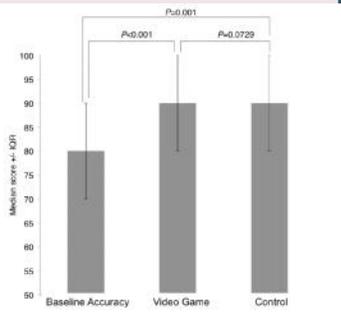


- Lacks realism
 - Emotional connection
 - Distraction
- Debriefing
 - On-screen feedback can bridge the gap
 - Addresses evaluation phase of Kern method
- Expenses
 - Difficult to modify for different triage system



Video Games for Improving Triage Accuracy: Results

- Video game play yielded a 10% improvement in triage accuracy 3 months after study onset
- The improvement was similar to that seen in the live simulation study
- The control group improved similarly



Incorporating Pediatric Disaster Simulations and Video Games Into EMS Education



- Choose the simulation to meet the educational goals
 - Number and kinds of patients
 - Scale: agency, school, community, healthcare system
 - Target change in attitudes, knowledge, practice, or outcomes
 - Evaluation and measurement
- Keep the goal the goal

Incorporating Disasters Into Training

- Needs assessment
 - Hazard vulnerability analysis
 - Reactive
 - Anticipatory (e.g. Ebola)
- Educational intervention
 - Didactic
 - Tabletop
 - Small group
 - Video game
- Evaluation



Incorporating Pediatric Disaster Simulations and Video Games Into EMS Education



- Frequency and duration of intervention
 - Initial learning
 - Re-inoculation
 - Just-in-time training
- Represent children in mass casualty training
 - Triage Tuesdays
 - Incident command system mini-drills
 - Work with schools, daycare centers, religious groups

Conclusion

- Live simulations and video game learning improve EMS pediatric disaster knowledge, skills, and practice
- These methods are useful for maintaining and testing readiness for child disaster victims
- A version of the game is available at: disastertriagegame.org



- Take home points:
 1. Understanding prehospital educational needs, just-in-time training, and need for periodic re-education likely yield best performance in a disaster.
 2. Pediatric disaster preparedness and training *are* training for daily pediatric emergencies.
 3. Matching the educational modality to the educational goals improves uptake and efficiency.

