

Securing the Second Front: Achieving First Receiver Safety and Security through Competency-based Tools

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Abbreviations:

CHPTER: The Center for Health Professional Training and Emergency Response
EPT: emergency preparedness training
NGO: nongovernmental organization
PPE: personal protective equipment

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Abstract

Introduction: Limited research has focused on the safety and security of First Responders and Receivers, including clinicians, hospital workers, public safety officials, community volunteers, and other lay personnel, during public health emergencies. These providers are, in some cases, at greater peril during large-scale disasters due to their lack of training and inadequate resources to handle major influxes of patients. Exemplified in the 1995 Tokyo sarin gas attacks and the 2008 Wenchuan earthquakes, lack of training results in poor outcomes for both patients and First Receivers.

Objective: The improvement of knowledge and comfort level of First Receivers preparing for a medical disaster via an affordable, repeatable emergency preparedness training (EPT) curriculum.

Methods: A 5-hour EPT curriculum was developed including nine learning objectives, 18 competencies, and 34 performance objectives. Following brief didactic and small group sessions, interprofessional teams of four to six trainees were observed in a large patient simulator designed to recreate environmentally challenging (ie, flood evacuation), multi-patient scenarios using a novel technique developed to utilize trainees as actors. Trained observers assessed successful completion of 16 individual and 18 team performance objectives. Prior to training, team members completed a 24-question knowledge assessment, a demographic survey, and a comfort level self-assessment. Following training, trainees repeated the 24 questions, self-assessment, and course assessment.

Results: One hundred ninety-five participants completed the course between November 2012 and August 2013. One hundred ninety-one (98.5%), 150 (76.9%), and 66 (33.8%) participants completed the pretest, post-test, and course assessment, respectively. The mean (SD) percentage of correct answers between the pretest and post-test increased from 46.3 (13.4) to 75.3 (12.2), $P < .0001$. Thirty-eight participants (19.5%) reported more than three hours of disaster EPT each year while 157 participants (80.5%) reported three hours or less of yearly EPT. Sixty-six (100%) reported the course relevant to care providers and 61 (92.4%) highly recommended the course. Comfort level increased from 37.0/100 ($n = 192$) before training to 76.3/100 ($n = 145$) after training.

Conclusion: The Center for Health Professional Training and Emergency Response's (CHPTER's) 5-hour EPT curriculum for patient care providers recreates simultaneous multi-actor disasters, measures EPT performance, and improves trainee knowledge and comfort level to save patient and provider lives during a disaster, via an affordable, repeatable EPT curriculum. A larger-scale study, or preferably a multi-center trial, is needed to further study the impact of this curriculum and its potential to enhance the safety and security of the "Second Front."

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Introduction

Limited research has focused on the safety and security of First Responders during public health emergencies. Even less research has focused on the safety of patient care providers who are not forward-deployed at the disaster scene. These so called "Second Front" providers, or First Receivers, can include clinicians, hospital workers, mental health providers, public safety officials, community volunteers, trainees, and administrative or other lay personnel.

First Receivers are, in some cases, at greater peril during large-scale disasters due to their lack of training and inadequate resources to handle a major influx of patients. During the 1995 Tokyo sarin gas attack, more than 80% of patients bypassed First Responders and reported directly to hospitals, where staff and patients were exposed to sarin gas due to inadequate decontamination, personal protective equipment (PPE), and training.^{1,2} During the 2008 Wenchuan earthquake, local hospitals were challenged with many “walking wounded” patients compromising normal health care operations.³

In a prior study, a competency-based emergency preparedness training (EPT) course for First Receivers was developed utilizing multi-patient scenarios, hired patient actors, and a high-fidelity simulation lab.⁴ A critique of the curriculum was the difficulty of reproducibility in communities lacking simulation technology. In response, a novel 5-hour EPT curriculum was developed in 2012 utilizing existing EPT learning objectives and competencies. However, training was held in a school gymnasium instead of a simulation lab. The objective of this project was to measure First Receiver performance during chaotic, multi-patient simulated medical disasters and improve EPT knowledge and comfort level without the need for high-fidelity training equipment, hired actors, or advanced facilities. The study was approved by a university-based Institutional Review Board (IRB).

Methods

Community-based Approach

The Center for Health Professional Training and Emergency Response (CHPTER) serves as a regional collaborative of emergency preparedness stakeholders. The Center for Health Professional Training and Emergency Response's mission is to develop state of the art, performance-based EPT curricula utilizing existing EPT resources of hospital, public health, private, governmental, and nongovernmental organization (NGO) coalitions.⁵ The Center for Health Professional Training and Emergency Response's goal is to consolidate and improve existing EPT resources and ensure that patient care providers—defined broadly as any provider that may care for a patient during a disaster—are prepared to save lives and remain safe during a disaster.

Novel Curriculum Development

Starting in 2009, CHPTER developed a competency-based curriculum for care providers using a chaotic, multi-patient environment. A curriculum task force established nine learning objectives, 18 competencies, and 34 performance objectives. A full listing of learning objectives, competencies, and performance objectives has been previously published.⁶⁻⁹ Following brief didactic and small group sessions, interprofessional teams of four to six trainees were observed in a large university-based simulator designed to recreate environmentally challenging, multi-patient scenarios using high-fidelity human simulators and professional patient actors. Successful completion of 16 individual and 18 team performance objectives was assessed by trained observers. Prior to training, team members completed a 24-question knowledge assessment, a demographic survey, and a comfort level self-assessment.

The self-assessment was scored on a 0-100 analog scale with 0 = “poor” and 100 = “excellent.” Following training, trainees repeated the 24-question knowledge assessment, self-assessment, and a course assessment.

In 2011, a new course was developed utilizing existing learning objectives, competencies, and performance objectives. The course goal was to measure First Receiver performance during chaotic, multi-patient simulated medical disasters and improve EPT knowledge and comfort level without the need for high-fidelity training equipment, hired actors, or facilities. Didactic and small group sessions for the 5-hour class remained the same. During the simulated disaster event (held in a school gymnasium or two large classrooms), a novel technique was developed to utilize trainees as actors. Instead of one scenario, two medical disasters were administered at the same time in separate rooms by trained instructors.

Prior to the simulated disaster, instructors randomly assigned trainees into teams of four to six trainees. Each team was then randomly assigned a letter (A, B, C, D) and a number (1 or 2). After randomization, the teams gathered at their corresponding designation on the training map (Teams A1, B1, A2, B2, C1, C2, D1 and D2; Figure 1).

After a short briefing about the nature of the disaster scenario and an opportunity to don protective and triage equipment, teams A1 and A2 responded to Scenarios 2 and 1, respectively. During the A team response, teams for B, C, and D served as patients in the scenario opposite to their assignment. Team members serving as actors were given cards explaining their roles and were briefed by an instructor. Scenarios 1 and 2 each had at least 20 patient roles, designated 1-20 (S1, 1-20 – S2, 1-20; Figure 1).

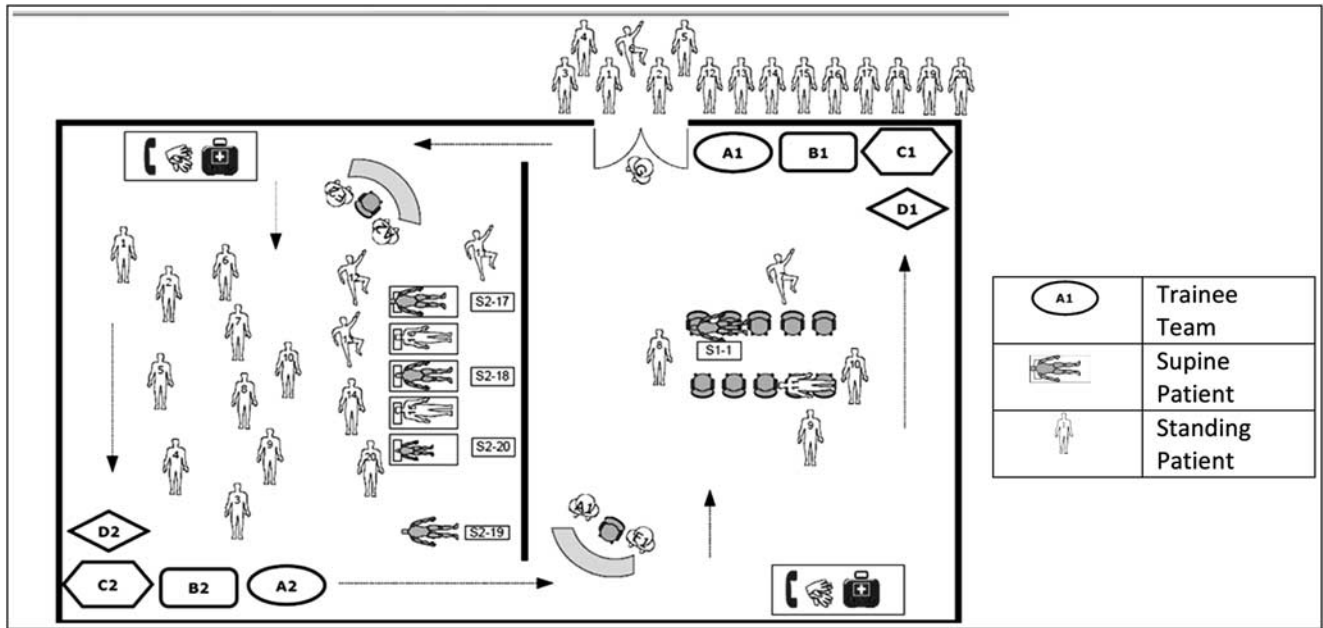
At the end of each four to six minute scenario, patients recorded whether teams successfully completed performance objectives (for example, successfully triaged patient S2-17) by checking boxes on the back of their cards. Once all of the performance data were collected, including team performance assessments from CHPTER instructors, teams moved counter clockwise to their next stations (Figure 1) (ie, teams A1 and A2 became patients and Teams B1 and B2 became care providers). All briefings to teams were the same. While Scenarios 1 and 2 differed in storyline—one was a flood emergency, the other possible infectious disease exposure—both scenarios involved multiple patients presenting at one time in austere environments. Overall competencies and learning objectives for the scenarios were the same.

Results

One hundred ninety-five participants completed the course between November 2012 and August 2013. One hundred ninety-one (98.5%), 150 (76.9%), and 66 (33.8%) participants completed the pretest, post-test, and course assessments, respectively. The mean (SD) percentage of correct answers between the pretest and post-test increased from 46.3 (13.4) to 75.3 (12.2), $P < .0001$ (Figure 2). Thirty-eight participants (19.5%) reported more than three hours of disaster EPT each year while 157 participants (80.5%) reported three hours or less of yearly EPT. Sixty-six (100%) reported the course relevant to care providers and 61 (92.4%) highly recommended the course. Respondents' overall comfort level (assessed on a 1-100 scale with 1 = “poor” and 100 = “excellent”) improved from a mean (SD) of 37.7 (24.3) to a mean (SD) of 74.6 (17.0) ($P < .0001$).

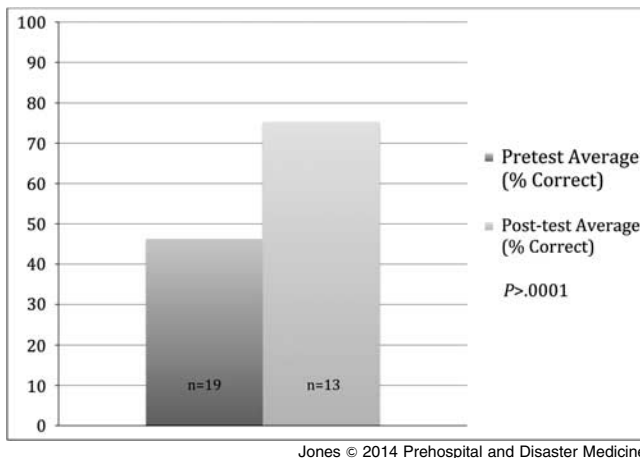
Discussion

Humanitarian response systems and organizations must be fully prepared to respond to disasters. While some welcomed attention has focused on the security and safety of First Responders serving



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Figure 1. Creating Chaos: Training Room Layout



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Figure 2. Comparison of Pretest and Post-test Assessment Averages

during disaster events (fire, police, military personnel, Emergency Medical Services, and hazmat), the perils of patient surge and the associated risks to First Receivers (clinicians, hospital workers, mental health providers, public safety officials, community volunteers, trainees, and administrative or other lay personnel) are commonly overlooked.¹⁰⁻³¹

The lack of EPT for providers targeted by large numbers of patients who circumvent First Responders—aka the “Second Front” of the disaster—poses significant risks to both patients and providers. Following Hurricane Katrina (2005, USA), a handful of personnel were confronted with thousands of patients, several of whom died prior to the arrival of expert medical team support.³² In South Carolina (USA), only 38% of community nurses have disaster training largely due to lack of funding and/or the inability of employees to take time off to attend training. This has led to failing grades on national report cards for emergency

preparedness and negatively impacted moderate scale medical disasters such as the 2005 chlorine spill near Graniteville, South Carolina.³³⁻³⁵

Providing EPT for First Receivers is a crucial, yet difficult task to accomplish. Health care professionals often cope with busy schedules and many health care organizations do not require or support EPT services financially. Organizations responsible for hospital accreditation in the US, for example, do not mandate EPT training for all hospital personnel. As a result, employees must pay for their own training or take an unpaid day off from work to access training. Another complication is that performance-based EPT can be expensive, often requiring equipment and facilities not available in more remote areas or less-affluent health care systems.

The EPT curriculum presented here is concise (five hours), competency-based, affordable, and easily duplicated. Prevalidated performance objectives, competencies, and learning objectives were met without high-fidelity simulation technology or hired actors. A loud and chaotic medical disaster was simulated and duplicated over and over, with the help of trainees who served as both actors and patients (but not in the same scenario, to preserve the element of surprise). The only equipment necessary for completion of the course included triage tape, paper, and inexpensive PPE (plastic gowns, mask, and gloves).

The project successfully measured First Receiver performance during chaotic, multi-patient simulated medical disasters. Initial results of pre and post-test cognitive assessments show that interprofessional teams of novice and experienced patient care providers were able to work together to mitigate simulated disasters in an austere environment. Trainee EPT knowledge and comfort level improved without the need for high-fidelity training equipment, hired actors, or facilities. Despite the inherent difficulties of data collection outside the controlled environment of a Simulation Center, individual and team performance objective data were collected (results from the performance data will be submitted in a separate publication).

Additionally, trainees highly recommended the course for other providers, suggesting that they found the course to be an enjoyable and worthwhile experience.

In an era of declining health care budgets but increasing awareness that public facilities (hospitals, clinics, schools, airports, etc.) are at increasing peril during disasters, it is unfortunate that more research has not focused on interprofessional teams serving on the "Second Front." International and domestic events have shown that poorly-trained First Receivers are more likely to care for large numbers of patients during moderate or large-scale disasters. The novel curriculum reported here may help hospitals, governments, communities, volunteer groups, businesses, and other public humanitarian systems prepare for patient surge by providing timely, affordable EPT relevant to both First Receivers and First Responders.

Limitations

The project's goal—to improve the knowledge and comfort level of First Receivers preparing for a medical disaster via an affordable, repeatable EPT curriculum—was accomplished with a limited number of trainees (N = 195). Using a school gymnasium and replacing hired patient actors with trainees saved thousands of (US) dollars, but performance assessment may have been artificially impacted by assessor bias and/or sensitization. These biases were

minimized via blinding trainees to the scenarios they were assigned to and by providing trainees clear directions regarding their patient roles. A larger-scale study, or preferably a multi-center trial, is needed to further study the impact of this curriculum and its potential to protect provider and patient lives.

Conclusion

The Center for Health Professional Training and Emergency Response's 5-hour EPT curriculum for patient care providers recreates simultaneous multi-actor disasters, measures EPT performance, and improves trainee knowledge and comfort level to save patient and provider lives during a disaster. Affordable competency-based EPT tools were used without the need for a simulation lab or high-fidelity training equipment. Interprofessional teams of novice and experienced First Receivers were able to successfully mitigate disaster scenes and highly recommended the course. A larger-scale study, or preferably a multi-center trial, is needed to further study the impact of this curriculum and its potential to enhance the safety and security of the "Second Front."

Supplementary materials

To view supplementary material for this article, please visit <http://dx.doi.org/10.1017/S1049023X14001058>

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