**Topic Collection: Training and Workforce Development**

An educated workforce is a foundational component of a prepared workforce, and a prepared workforce is critical to all-hazards disaster response. The resources in this Topic Collection include those that discuss competencies for disaster medicine; experiences with different methods and models for health professional training and workforce development; selected general training resources to support all-hazards preparedness; tools to support training and workforce development; and considerations related to U.S. workforce development, including research on training’s effects on willingness to work during a disaster. Please access the rest of ASPR TRACIE’s Topic Collections for more hazard-specific training information listed under the “Education and Training” category.

Each resource in this Topic Collection is placed into one or more of the following categories (click on the category name to be taken directly to that set of resources). Resources marked with an asterisk (*) appear in more than one category.

**Must Reads**
- Capabilities, Competencies, and Certifications
- Sample Curricula/Development Process Resources
- Training Methods and Models
- Training Methods and Models: Group Activity
- Training Methods and Models: Simulation
- Training Methods and Models: Virtual
- Willingness to Work and Other Workforce Considerations
- Agencies and Organizations

**Must Reads**


The authors provide a brief review of the literature related to adequate disaster staffing, and share the methodology and results of their study that assessed the ability and willingness of healthcare personnel to report to work during a disaster. They note that healthcare personnel experience multiple barriers affecting ability and willingness to report to work during a disaster (responsibility for children being the most significant), and offer strategies for addressing these barriers. Differences between clinical and non-clinical staff responses were observed.

The authors present recommendations for ensuring a trained workforce, even when faced with resource constraints, by focusing training on learning required to improve performance, and ensuring multiple paths to learning. They note the value of informal learning opportunities outside of the classroom setting, and how such learning is less resource intensive than formal learning sessions.


This model provides the core knowledge, skills, and abilities necessary for a student to demonstrate upon completing a master’s degree or graduate certificate in public health preparedness and response. Version 1.1 includes five domains and 22 competencies and is recommended for use by graduate-level faculty at ASPH-member Schools of Public Health, and other accredited public health programs.


This issue brief discusses how recent disasters have highlighted gaps, lack of training, and resource constraints related to disaster preparedness for nurses. The author notes that nurses want, and need, access to more training, and acknowledges the challenges to preparedness presented by declining funding and lack of regular engagement of nurses in exercises and training.


The authors surveyed 1,234 healthcare workers from the 2 hospitals affected by the Joplin Tornado in 2011 to assess number reporting to work, willingness to work, personal disaster preparedness, and childcare responsibilities following the disaster. The vast majority of respondents reported to work the week after the tornado, and most indicated they would have used childcare at their hospital if it was provided.


This hour-long webinar includes discussion of the management of multiple critically ill patients during a disaster or pandemic, and the importance of collaboration among frontline clinicians, hospital administrators, professional societies, and public health or government officials. Key lessons learned for improving emergency preparedness from the recent Ebola outbreak are presented.

The authors randomized nursing students into 1 of 2 groups: one group received online disaster training only, and the other participated in online training, as well as a virtual reality simulation. The authors concluded that virtual reality simulation “is an instructional method that reinforces learning and improves learning retention.”


The George Washington University Institute for Crisis, Disaster, and Risk Management has supported this on-line Emergency Management Academy for the Veterans Health Administration (VHA) since 2004. This webpage includes links to multiple products developed for use by the VHA and other healthcare organizations seeking to improve or expand their emergency management program.


This article reviews the lessons learned from Texas A & M’s “Disaster Day” training for health professional students across seven disciplines, started in 2008 by the College of Nursing. The authors note the value of the interprofessional educational opportunity this event provides, and discuss how it has “enhanced student knowledge of roles and responsibilities and appears to increase collaborative efforts with other disciplines.”


This report describes selected aspects of the health professions workforce at the federal, state, and local levels who would respond to a catastrophic domestic natural disaster (a theoretical earthquake scenario was used). It includes recommendations regarding double counting of responders; volunteer failure to respond; an aging medical workforce; human capital development (e.g., cross-training among professionals); supporting professionals so they may respond; and readiness.


This webpage contains an annotated bibliography of white papers, grey literature, and publications related to disaster health competencies, categorized as per Walsh et al., 2014. Resources chosen for inclusion define specific competencies for learning in
disaster health; are directed toward a health or health-related profession; and are written in English.


This webpage includes a list of the 11 core competencies for disaster health, along with links to resources to support each of the competencies.


This presentation discusses research conducted to identify influences of perceived threat and efficacy on willingness to respond in public health emergencies. Emergency-specific patterns of response willingness are reviewed, and recommendation for improving response willingness are provided.


This book provides recommendations and best practices for incorporating disaster preparedness into nursing curricula, and includes information on leadership and interprofessional education. The recommended strategies may be applicable to training programs for other health professional disciplines.


The authors reviewed over 100 reports, articles, documents, and analyses related to whether or not responders would be willing to report to work during a disaster. They summarize the research, and present conclusions pertaining to role conflict, role strain and role abandonment.


This 70-page document describes the four capabilities that healthcare coalitions and individual healthcare facilities need to prepare for, respond to, and recover from emergencies. The capabilities are: foundation for healthcare and medical readiness; healthcare and medical response coordination; continuity of healthcare service delivery; and medical surge. Capability 1, Objective 4 covers training and preparing the healthcare and medical workforce.
This webpage lists resources for disaster-related competencies for healthcare providers, public health professionals, and disaster volunteers.


The authors reviewed published literature on healthcare workers’ willingness to work during a disaster or public health emergency to identify related motivation factors. One key finding from their review was that healthcare workers are more likely to come to work if they understand their anticipated response role, and feel prepared to carry it out. The authors recommend frequent training of health care workers in disaster response, as well as the integration of such information into health professional educational curricula.

Capabilities, Competencies, and Certifications


This subspecialty, with biannual opportunities for qualified Emergency Medical Services (EMS) physicians to take the certification exam, subsumes disaster management and mass gathering medicine, as well as daily clinical operations of EMS agencies, content from the national incident management system (NIMS), clinical EMS, concepts in pediatric, bariatric and geriatric prehospital care, and EMS administration. The final opportunity to take the exam without completing an accredited fellowship will be in 2019.


This model provides the core knowledge, skills, and abilities necessary for a student to demonstrate upon completing a master’s degree or graduate certificate in public health preparedness and response. Version 1.1 includes five domains and 22 competencies and is recommended for use by graduate-level faculty at ASPH-member Schools of Public Health, and other accredited public health programs.


The authors developed a set of competencies under 10 domains to define the skills and knowledge necessary to respond to chemical, biological, radiological and nuclear (CBRN) emergencies. They created a training program based upon these competencies,
and note that a blended training approach may allow clinicians the opportunity to participate in the same trainings, even in different time zones and locations.


This webpage includes links to package models and templates that can help teams prepare for and respond to a variety of hazards.


After completing this ICS 100.HCb course, students will be familiar with Incident Command System applications for healthcare/hospitals, including organizational elements, positions and responsibilities, facilities and functions, and planning.


This course builds on the IS-100.HC (Introduction to the Incident Command System for Healthcare/Hospitals) course. It should be completed by hospital personnel that would have a direct role in emergency preparedness, incident management, and/or emergency response during an incident.


This report defines core competencies for hospital personnel at the awareness level, mid-level, and advanced level, and provides guidance for determining which staff members should be in each level. Applying these competencies will assist hospitals in the development, implementation, coordination, and evaluation of disaster preparedness and response training programs.


The authors discuss peer-reviewed studies to “identify existing competency sets for disaster management and humanitarian assistance that would serve as guidance for the development of a common disaster curriculum.”


The George Washington University Institute for Crisis, Disaster, and Risk Management has supported this on-line Emergency Management Academy for the Veterans Health
Administration (VHA) since 2004. This webpage includes links to multiple products developed for use by the VHA and other healthcare organizations seeking to improve or expand their emergency management program.


The Board establishes certification and re-certification requirements for the CHEP, and this webpage includes links to information on the various certifications offered, fees, scheduling, and frequently asked questions.


The authors surveyed participants at an Emergency Medical Services conference and asked them to describe key characteristics of successful disaster/mass casualty first responders and leaders. They advocate further research into how well these characteristics correlate with successful disaster response, and recommend that they be incorporated into competency sets and trainings to support workforce development.


The authors surveyed medical, nursing, and dental students to evaluate knowledge, comfort, perceived competency, and motivation related to disaster response. Results showed that respondents’ knowledge was greater than their perceived competency, and that they were motivated to undergo additional training and respond to disasters. The authors contend that health professional students can get most of their disaster education through the existing (and slightly modified) curricula, and the addition of a few focused subjects delivered through “novel educational approaches.”

Medical Reserve Corps. (2015). **MRC Volunteer Core Competencies**.

These competencies are based on the Competencies for Disaster Medicine and Public Health and are organized into four learning paths: volunteer preparedness, volunteer response, volunteer leadership, and volunteer support for community resilience.


This webpage contains an annotated bibliography of white papers, grey literature, and publications related to disaster health competencies, categorized as per Walsh et al., 2014. Resources chosen for inclusion define specific competencies for learning in
disaster health; are directed toward a health or health-related profession; and are written in English.


This webpage includes a list of the 11 core competencies for disaster health, along with links to resources to support each of the competencies.


The authors surveyed 10 Canadian Disaster Medical Assistance Team (DMAT) Members to define the nontechnical core competencies for disaster response, which were categorized under austere skills, interpersonal skills, and cognitive skills. The importance of specific nontechnical core competencies to interprofessional collaboration is also discussed.


Tactical emergency medical support (TEMS) is a critical component of pre-hospital mass casualty care in high-threat environments (e.g., mass shootings and terrorist attacks). This article discusses refinements of previously developed core competencies for TEMS, with the goal of national standardization of training based on these competencies, and their broader use in all hazards planning.


This document lists the core competencies under eight domains and three staff-related tier levels. Also included are links to resources and tools.


The authors explain how the field of public health emergency management has changed in recent years to adapt to infectious disease outbreaks, natural disasters, industrial and environmental catastrophes, and conflict.


The authors provide suggestions for standardizing and aligning the building blocks of disaster health competency models. They encourage competency developers to consider
content in at least 4 key areas: disaster-type domain, systems domain, clinical domain, and public health domain.


The authors identify a set of core competencies and performance objectives based on the knowledge, skills, and attitudes required by disaster medical professionals to ensure they can treat disaster survivors.


The authors review nursing and interprofessional disaster competencies and development of a new interprofessional disaster certification, and provide an overview of a standardized, competency-based interprofessional curriculum for disaster education.


This document describes the four capabilities that healthcare coalitions and individual healthcare facilities need to prepare for, respond to, and recover from emergencies. The capabilities are: foundation for healthcare and medical readiness; healthcare and medical response coordination; continuity of healthcare service delivery; and medical surge. Objectives and activities related to healthcare worker training and resilience are included.


This webpage lists resources for disaster-related competencies for healthcare providers, public health professionals, and disaster volunteers.


This article describes training standards (11 competencies and 36 sub-competencies) to ensure workforce competency in disaster medicine and public health. These standards were developed by an expert working group convened in 2010 by the American Medical Association Center for Public Health Preparedness and Disaster Response to review and begin to integrate previous work on core competencies.

The authors propose modifications to the 2012 learning framework put forth in the article, *Core Competencies for Disaster Medicine and Public Health*, to address discrepancies identified when they tried to fit 35 existing competency sets into the framework. The article includes a list of the 35 competency sets reviewed.


This document provides the background and rationale for the development of the International Council of Nurses Disaster Nursing Competencies, and describes the framework for these competencies, which consists of 10 domains.


This is the final report from a study consisting of a 6-workshop series conducted to clarify the federal disaster medicine and public health education and training products that existed at the time the study was conducted; identify needs and explore strategies to fill education and training gaps; and synthesize long-term expectations of competencies.

**Sample Curricula/Development Process Resources**


This document outlines a disaster medicine curriculum for emergency medicine residents. Topics covered include: Common Challenges in Response to Disaster; Management of Medical Response in Disaster; Key Operational Capabilities; Special Populations; and Critical Medical Knowledge (by hazard type). The curriculum also includes an hour-long tabletop exercise.


This hour-long webinar includes discussion of the management of multiple critically ill patients during a disaster or pandemic, and the importance of collaboration among frontline clinicians, hospital administrators, professional societies, and public health or government officials. Key lessons learned for improving emergency preparedness from the recent Ebola outbreak are presented.
DeAtley, C. (2010). Effective Leadership During a Crisis. Creighton University and University of Nebraska, Center for Preparedness Education.

This presentation discusses best practices for leadership during a crisis, including characteristics of effective leaders, obstacles to effective leadership, and tools to support leadership.


This webpage offers training videos on a variety of topics related to preparedness. Content is searchable by disaster cycle phase and topic area/setting.


This document provides information to support an all-hazards training for clinical and non-clinical hospital staff.

George Washington University, School of Nursing. (2007). Nurses on the Front Line: Preparing for Emergencies and Disasters. (Registration required.)

This interactive 6-hour course was created as part of the National Nurse Emergency Preparedness Initiative to provide emergency preparedness training for nurses working in various setting. It uses scenario-based learning to demonstrate the application of theory, and practice.


The George Washington University Institute for Crisis, Disaster, and Risk Management has supported this on-line Emergency Management Academy for the Veterans Health Administration (VHA) since 2004. This webpage includes links to multiple products developed for use by the VHA and other healthcare organizations seeking to improve or expand their emergency management program.


The authors describe the process behind the development of the curriculum. They also include the “King County Pediatric Critical Care Triage Algorithm” and a related worksheet, all developed based on a Centers for Disease Control modeling tool that estimates pediatric critical care needs during a pandemic.

This course discusses the psychological factors involved with first responder decision making during emergency response situations. It includes practice-based scenarios to illustrate the key factors that contribute to the ability to make good decisions on scene.


This webpage provides links to course materials to train individuals responsible for leading responses to emergencies or disaster with public health implications. Course content includes: the importance of leadership skills; critical interpersonal communication skills; how to build a reliable team; and how to manage an Incident Management Team.


This webpage provides links to a series of peer-reviewed disaster health curriculum recommendations designed by subject matter experts for educators and trainers working with health professionals. There are recommended curricula for the pediatric population; disaster behavioral health; the geriatric population; and public health law in disasters.


This book provides recommendations and best practices for incorporating disaster preparedness into nursing curricula, and includes information on leadership and interprofessional education. The recommended strategies may be applicable to training programs for other health professional disciplines.

University of Washington, Northwest Center for Public Health Practice. (2008). Workforce Resiliency. (Registration required.)

Each 45-minute module in this 3-part series of trainings discusses individual and organizational resiliency in the face of stress, emergencies, and disasters.


This document contains tables that represent a visualization of the association between the CMS Emergency Preparedness Final Rule Conditions of Participation and existing regulatory and accreditation standards, including those for training and testing of healthcare facility staff (p. 3).
Training Methods and Models


The authors present recommendations for ensuring a trained workforce, even when faced with resource constraints, by focusing training on learning required to improve performance, and ensuring multiple paths to learning. They note the value of informal learning opportunities outside of the classroom setting, and how such learning is less resource intensive than formal learning sessions.


The authors describe findings from a survey of prehospital healthcare providers to determine mass casualty event (MCE) training knowledge retention, self-assessed levels of preparedness for MCEs, and preferred educational formats. Nearly a quarter of those surveyed reported no training in the past year and respondents felt least prepared for a radiological/nuclear event.


The authors used a strictly didactic format to train pediatric and emergency medicine residents in pediatric disaster medicine, and measured knowledge gained and retained by comparing pre-test results to results from an immediate course post-test, and a post-test given 2 months after the training occurred. Participants showed improvement in from baseline in both post-test scores, and the majority indicated a preference for experiential learning, such as drills and other operations-based exercises, instead of further classroom training.


Paramedics and emergency medical technicians at four training sites showed sustained improvement in primary triage decisions in three different simulations: a school shooting scenario, a multiple family house fire, and a school bus rollover. Participants completed a first simulation with debriefing, and then returned to perform a second simulation two weeks later, showing 10% improvement in triage accuracy. The improvement was sustained six months after the initial training, as demonstrated by completing a third simulation.

Nurses participated in a combination of online and onsite training, followed by an exercise, as part of an interprofessional disaster training program. Pre-and post-training test results, as well as exercise evaluation, showed a significant increase in knowledge measured in the areas of triage, re-triage, surge response, and sheltering.


The authors conducted a literature review to identify training opportunities for healthcare providers in the United States, and found that most were focused on emergency management, and not clinical care delivery. They state a need for a course for non-disaster trained emergency medicine physicians and trainees that is available online and incorporates a mix of educational modalities to prepare providers for acute disaster response.


This article describes a 5-hour emergency preparedness training targeted to interprofessional teams of first receivers that incorporated didactic and small group trainings, followed by practice in a large patient simulator designed to recreate “environmentally challenging (i.e., flood evacuation), multi-patient scenarios using a novel technique developed to utilize trainees as actors.” The training was evaluated by trained observers, and participants completed pre-tests, post-tests, and self-assessments of comfort level with disaster preparedness. Results showed significant improvement in knowledge and comfort level among all participants.


The authors describe a project to design, and then test the effectiveness and acceptability of disaster preparedness training curricula with thought leaders from across 4 states. From this experience, they recommend that “preparedness training for community-based practitioners needs to be concise and professionally relevant,” and “integrated into existing healthcare professions education programs and continuing education offerings.”

The authors discuss “current challenges and opportunities for the expansion of evidence-based education and training opportunities for health care workforce disaster readiness.” Challenges include the lack of evidence-based training programs for health professionals.


This report describes selected aspects of the health professions workforce at the federal, state, and local levels who would respond to a catastrophic domestic natural disaster (a theoretical earthquake scenario was used). It includes recommendations regarding double counting of responders; volunteer failure to respond; an aging medical workforce; human capital development (e.g., cross-training among professionals); supporting professionals so they may respond; and readiness.


This article identifies five key characteristics of an effective, interprofessional team in a high-risk, high-pressure situation: training persistence, a wide range of clinical expertise, joint problem solving and creativity, a commitment to learning, and courage.


The authors conducted a workforce assessment of 398 patient care providers in South and North Carolina to determine their emergency preparedness training needs and preferences. They found that providers felt better prepared than 10 years prior, but still desired additional training. Primary obstacles to training were found to be time and financial constraints, and that most employers do not require it. Survey responses suggest that developing short (<1 day) courses that combine performance assessments with a scenario-based environment could be valuable for increasing preparedness.


The evaluation of the Centers for Public Health Preparedness Program found positive growth in development of new training products, training members of the public health workforce, and expansion of partnerships between accredited schools of public health and state and local public health departments.

A semi-structured interview was conducted with a sample of leaders of 9 well-established preparedness-focused health care coalitions (HCCs) to determine education and training needs, challenges, and promising practices. Training topics identified as priorities included chemical, biological, radiological, nuclear, and explosives (CBRNE), and mass-casualty incidents. The authors note that “an online resource repository would help reduce the burden on individual coalitions by eliminating the need to continually develop learning opportunities.”

Training Methods and Models: Group Activity


The authors developed a novel training model for using mass-casualty incident (MCI) scenarios that trained hospital and prehospital staff together during a 1-day training that included pre- and post-tests, 2 hour-long functional exercises, and 4 distinct, hour-long didactic instructional periods. Improvements were observed in post-test scores for all disciplines, and the authors advocate that disaster training be provided “with all disciplines represented to eliminate training ‘silos,’ to allow for discussion of overlapping jurisdictional or organizational responsibilities, and to facilitate team building.”


The authors discuss how they used 6 specific exercises as part of a ‘Disaster Olympix’ to train staff to respond to pediatric disaster victims.


The authors discuss the development of a program developed by an academic-practice partnership. Senior leadership and frontline clinicians were trained via simulation, workshop, and online modules.

The authors describe their experience with a pilot study that leveraged medical students’ participation in a local disaster exercise and mass gathering event to enhance the emergency preparedness training that were provided through lectures, simulations, and asynchronous learning materials.

Scott, L., Swartzentruber, D., Davis, C., et al. (2014). Competency in Chaos: Lifesaving Performance of Care Providers Utilizing a Competency-Based, Multi-Actor Emergency Preparedness Training Curriculum. Prehospital and Disaster Medicine. 28(4):322-33. The authors provide a detailed description of an 8-hour interprofessional emergency preparedness training that incorporated an online pre-test, two post-tests, course assessment, didactic and small group content, and a 6-minute clinical casualty scenario using high-fidelity and low-fidelity simulators and live actors. Knowledge, comfort level, and emergency preparedness skills increased for both experienced providers, and medical students that participated in this multi-modality course.

Scott, L., Carson, D., Greenwell, I.B. (2010). Disaster 101: A Novel Approach to Disaster Medicine Training for Health Professionals. The Journal of Emergency Medicine. 39(2). 220–226. Medical students participated in a 90-minute didactic training scenario and 2, 40-minute training exercises (a hazardous material scene and a surprise mass casualty incident (MCI) scenario with 100 life-sized mannequins) added to an existing medical school curriculum. Pre- and post-tests were administered to assess student perceptions and disaster medicine knowledge. Post-test scores improved by 54%; students participating in the MCI drill correctly tagged 94% of the victims in approximately 10 minutes; and participants rated the course very favorably.

Training Methods and Models: Simulation

Bank, I. and Khalil, E. (2016). Are Pediatric Emergency Physicians More Knowledgeable and Confident to Respond to a Pediatric Disaster After an Experiential Learning Experience? (Abstract only.) Prehospital and Disaster Medicine. 31(5):551-556. Pediatric emergency medicine physicians, and critical care and pediatric surgery residents, participated in a simulation-based workshop to increase their knowledge and confidence to respond to a disaster involving children. Program evaluations indicated an increase in physicians’ perceived preparedness for pediatric disaster response; this confidence persisted 6 months post-training.

as part of a multi-victim school shooting scenario. A group structured debriefing followed the first simulation, and new 10-victim simulation exercises were presented 1 week later, and again 5 months later. Participants demonstrated significant improvement of triage skills during the second simulation, and retained that improvement during the third simulation.


The author describes the successful use of simulation training to prepare healthcare workers to respond to a Sarin exposure incident. Details on the scenario, which reviews the presentation of nerve agent exposure and its management, and includes “a recipe for performing this simulation in a training exercise,” are included.


Physicians, residents, medical students, clerks, and paramedics participated in a study that compared high-fidelity simulators and use of trained actors to test their responses during 8 different scenarios. Participants’ performance was similar for both simulation methods, and all indicated that “the simulators closely mimicked real-life scenarios, accurately represented disease states, and heightened the realism of patient assessment and treatment options during the drill.”


The authors discuss “how online disaster simulation exercises and courses, based upon a unified curriculum, can leverage increased global access to available technologies to be powerful training tools for health professionals to engage in disaster medicine.” They advocate for unified global training standards, and the professionalization of the disaster medicine specialty.


Nursing students in three levels of their undergraduate program received didactic preparation in disaster preparedness and were assigned to five different simulation response teams. The course was determined to be effective at increasing disaster medicine knowledge: 5 of the 8 nursing students assigned to the disaster site correctly triaged 81.2% of the victims; all 8 nursing students assigned to the emergency department correctly reassessed the victims.

This article describes the use of enhanced classroom training that included didactic lectures, simulation using a model of the airport, and video of a prior exercise to train clinicians, paramedics, assistant paramedics, and health attendants and drivers to respond to an airport disaster in a cost-effective and efficient way. The authors note that all groups achieved knowledge gain through the multi-modality, interprofessional training, with the non-medical participants improving the most from pre-test to post-test.


To address errors observed in the emergency department during disasters, this mixed method pilot project was initiated to evaluate the effect of in situ simulation on providers’ knowledge of how to perform during a disaster, and competency in skills related to those actions, as well as on communication during a disaster. The authors contend that results demonstrate that in situ simulation can improve knowledge and communication during a disaster situation.


A interprofessional curriculum employing simulation as a core teaching strategy was used to train experienced clinicians in preparation for operating a freestanding emergency department. Disaster preparedness training included didactic and scenario-based learning, as well as high-fidelity simulation mannequins and moulaged actors. Two days of onsite simulations at the end of the 10-week training period “revealed latent safety threats, lapses in communication, issues of intake procedure and patient flow, and the persistence of inapt or inapplicable mental models in responding to clinical emergencies.”


This article reviews the lessons learned from Texas A & M’s “Disaster Day” training for health professional students across seven disciplines, started in 2008 by the College of Nursing. The authors note the value of the interprofessional educational opportunity this event provides, and discuss how it has “enhanced student knowledge of roles and responsibilities and appears to increase collaborative efforts with other disciplines.”
The authors developed and tested a 10-hour simulation-focused interprofessional curriculum for health professions students to “(1) test the effectiveness of specific immersive simulations, (2) create reliable assessment tools for emergency response and team communication skills, and (3) assess participants' retention and transfer of skills over time.” They include details of the curriculum and evaluation methodology, as well as results of knowledge tests and qualitative evaluations, conducted immediately after the course, and again 6-12 months post-course.

This article describes a comprehensive, multi-modality approach focused on simulation to teach disaster medicine to emergency medicine residents in a 3-year curriculum that included classroom lectures, tabletop exercises, virtual reality simulation, high-fidelity simulation, hospital disaster drills, and journal club discussion. Participants felt better prepared to respond to disasters after completing this training program.

Internal medicine residents participated in a disaster medicine curriculum that included didactic lectures, supplemental readings, and training with high-fidelity human simulators. Compared with residents who did not receive any training, participants’ knowledge increase was significant, as was their subjective sense of preparedness. However, knowledge gain was not maintained at the 1-year follow-up point, which the authors note suggests the need for ongoing reinforcement of learning.

This article describes in detail the simulation plan for a blast-related mass casualty incident exercise.

Pediatric residents participated in a tabletop simulation that included 3 pediatric earthquake victims. Confidence in treating earthquake victims improved significantly
post-simulation. The authors conclude that tabletop simulations are effective at improving residents’ comfort with responding to rare events.

Training Methods and Models: Virtual


The authors conducted a study to “determine if a fully immersive virtual reality disaster drill is as effective as a comparable live disaster drill using standardized patients in teaching and assessing START triage knowledge and skills for EM residents.” Pre-test results and triage accuracy among the two groups were similar, and results from the post-test, conducted 2 weeks post-training, showed greater knowledge retention among participants in the group that used standardized patients/mannequins. The authors concluded that the 2 training methods were equally effective, and that virtual reality is more cost-effective, and allows for flexibility in disaster scenarios used for training.


The authors describe an online, workplace-based, interprofessional course in surge capacity building in which 72 health and allied staff from five acute care and community health care organizations participated. Surveys were used to assess self-reported improvements in learners' perceptions of their competency, their interprofessional skills, and satisfaction with the different course delivery options (online only; online plus a tabletop exercise; online plus a tabletop exercise and e-simulation). The authors contend that results demonstrate the effectiveness of online learning, particularly with the addition of a tabletop exercise.


The authors demonstrate that playing a web-based screen based simulation (video game) is associated with improvements in pediatric and adult primary triage decisions. The study population included paramedics and EMTs, and prehospital healthcare students.


The authors tested the feasibility and reliability of assessing technical and non-technical disaster medicine skills across 3 multi-agency scenarios (1 pre-hospital and 2 in-hospital)
within a virtual environment. The authors conclude that the results indicate that virtual technologies may be used to improve major incident response training.


This paper describes how a cognitive task analysis, supported by a live demonstration with a think-aloud protocol, was used to collect the rich psychomotor, procedural, and cognitive data necessary for the design of a serious game for donning personal protective equipment to handle patients with a potential highly infectious disease (e.g., Ebola). The paper also presents a process to translate the collected data into meaningful content to support rapid prototyping of the serious game.


The authors randomized nursing students into 1 of 2 groups: one group received online disaster training only, and the other participated in online training, as well as a virtual reality simulation. The authors concluded that virtual reality simulation “is an instructional method that reinforces learning and improves learning retention.”


The authors conducted a literature review of the published evidence from 2005-2012 related to the use of virtual reality for disaster training of healthcare workers. They concluded that too few studies had been done, and that future studies must measure long-term retention of knowledge; ability to respond to different types of disasters; and performance in different tasks, such as triage, decontamination, and transport.


The authors translate research findings related to the use of virtual reality simulation in disaster training into education practice. They discuss practice guidelines, implementation recommendations, and integration to practice and evaluation.


This article describes a small pilot program of training delivered to emergency department staff to prepare for patient surge using a multi-user virtual environment (MUVE). Participants all reported an increase in disaster preparedness knowledge, and
improved team communication, planning, team decision making, and the ability to visualize and reflect on their performance.


Twenty-two experienced physicians and nurses practiced caring for patients exposed to either a nerve toxin or a dirty bomb within a virtual emergency department. Confidence to respond to chemical, biological, radiological, or nuclear/explosive mass casualty incidents increased from 18% pre-training to 86% post-training, and 59% of respondents felt that this was due to the virtual learning platform.


The authors review several applications of virtual reality-based training in the United States, and discuss advantages, and potential drawbacks and challenges associated with virtual reality as a learning platform.


The authors compared accuracy and efficiency of triage by fourth-year medical students using the START method with virtual reality or live simulation of a mass casualty incident. They found no difference in accuracy or speed of triage between the two tools.


The authors studied the feasibility and effectiveness of an interactive, computer-assisted training course designed to build resilience to the stresses of working during a pandemic. They measured confidence in support and training; pandemic-related self-efficacy; coping style; and interpersonal problems, before and after training, and found that the course was associated with improvement in each variable, with the “medium” duration course providing the greatest benefit. The course is free and may be accessed at https://www.msh-healthyminds.com/sv/.

The authors discuss the design and validation of an online hospital that allowed multiple clinicians to respond simultaneously to care for virtual mass casualty patients within limits of the hospital’s available resources. The authors conclude that the “customizability, reproducibility, and recordability combined with the low cost of implementation suggest that this potentially represents a powerful adjunct to existing training methods.”


The authors tested the use of a policy management game in which participants act as incident commanders with the goal of teaching them how to quickly evacuate an emergency site, to minimize the number of fatalities at the incident site, and to decrease patients’ waiting time for treatment. Participants rated the game favorably, and improvement in their skills was observed, although there were differences in performance across the different groups (students, practitioners, and researchers).

**Willingness to Work and Other Workforce Considerations**


The authors provide a brief review of the literature related to adequate disaster staffing, and share the methodology and results of their study that assessed the ability and willingness of healthcare personnel to report to work during a disaster. They note that healthcare personnel experience multiple barriers affecting ability and willingness to report to work during a disaster (responsibility for children being the most significant), and offer strategies for addressing these barriers. Differences between clinical and non-clinical staff responses were observed.


The authors reviewed literature through to 2013 that discussed healthcare workers’ willingness to work during an influenza pandemic, and found that willingness to work ranged from 23.1% to 95.8%, depending on the context. Male gender, physicians and nurses, full-time employment, perceived personal safety, awareness of pandemic risk and clinical knowledge of influenza pandemics, role-specific knowledge, pandemic response training, and confidence in personal skills were statistically significantly associated with increased willingness. Childcare obligations were significantly associated with decreased willingness.

The authors discuss findings of a nationally representative survey of Emergency Medical Services (EMS) providers that indicated that hazard-specific education; an understanding of one’s response role; and confidence in occupational safety positively influence respondents’ willingness to respond during a pandemic. However, the authors note that EMS workers indicated they were less likely to respond if they felt their family was in danger, particularly if risk of disease transmission to family members was high.


This issue brief discusses how recent disasters have highlighted gaps, lack of training, and resource constraints related to disaster preparedness for nurses. The author notes that nurses want, and need, access to more training, and acknowledges the challenges to preparedness presented by declining funding and lack of regular engagement of nurses in exercises and training.


The author conducted a literature review (25 quantitative and 2 qualitative studies) on willingness to work and found pet care needs and the lack of personal protective equipment were top barriers.


The authors surveyed 1,822 hospital employees (clinical and non-clinical) to determine willingness to work during an earthquake versus a pandemic. They found that willingness to work may be increased by considering care for dependent family members, and by providing greater worker protection, cross training, and job importance education for staff.


The authors surveyed 1,234 healthcare workers from the 2 hospitals affected by the Joplin Tornado in 2011 to assess number reporting to work, willingness to work, personal disaster preparedness, and childcare responsibilities following the disaster. The vast
majority of respondents reported to work the week after the tornado, and most indicated they would have used childcare at their hospital if it was provided.


The authors surveyed pediatric surgeons to determine their baseline experience, preparedness, willingness, and availability to act as first receivers during a disaster. They found that 74% of respondents felt they needed more training; those with prior disaster experience felt most prepared to respond; and those with defined leadership roles in the disaster response plan felt prepared, and were 5 times more likely to respond than those without defined leadership roles.


The authors surveyed clinical and non-clinical support staff at the Children’s Hospital in Denver in 2007. Willingness to respond was associated with higher levels of professionalism, and non-clinical support staff were found to be significantly less likely to report during a pandemic, suggesting the need for additional training for these staff members to help them understand the value of their roles.


The authors surveyed physicians, nurses, and pharmacists in Florida in 2009 to assess their ability and willingness to respond to bioterrorist attacks. Only 32% were determined to be competent and willing to respond, with the lowest competency seen in the ability to identify cases and the ability to communicate risk to others. Previous training and drill participation were found to be significant predictors of preparedness.


The author evaluated 32 peer-reviewed, quantitative articles published from January 2001-June 2010 to determine willingness to work during an influenza public health emergency. He found that “factors associated with a willingness to work during an influenza public health emergency include: being male, being a doctor or nurse, working in a clinical or emergency department, working full-time, prior influenza education and training, prior experience working during an influenza emergency, the perception of value in response, the belief in duty, the availability of personal
protective equipment (PPE), and confidence in one's employer.” Preferential treatment of healthcare workers and their families for the receipt of vaccines and antivirals were noted as the interventions that most positively influenced willingness to work.


The authors surveyed hospital and public health workers to assess their willingness to respond to a pandemic influenza emergency scenario and a radiological 'dirty' bomb scenario. They found that respondents that felt psychologically prepared were more willing to respond, and self-reported willingness to respond was influenced by perceived self-efficacy and perceived family preparedness.


The authors conducted a national survey of pediatric nurse practitioners to learn about their personal preparedness plans, disaster training, prior disaster experience, and likelihood of responding in the event of a disaster. They found that those who were male, had prior military experience and disaster training, and had a defined role in response plans were most likely to respond during a disaster.


A web-based survey of anesthesiologists was conducted to assess self-reported perceptions of knowledge and skills, as well as attitudes and beliefs regarding education and training, employee development, professional obligation, safety, psychological readiness, efficacy, personal preparedness, and willingness to respond during a natural disaster, pandemic flu, and a radiological event. Few respondents indicated that they think they receive sufficient education for disaster response, and most think that their hospitals should provide this training to them. The authors recommend that additional training be provided, and support for staff to meet family obligations be put in place to encourage providers to come to work during disasters.


The authors discuss disaster response requirements for Family Medicine residents, and note that there is little outcomes-based evidence to support them in the literature.

Doctors, nurses, and nonclinical hospital staff were surveyed to determine how likely they would be to report to work during an influenza pandemic. Doctors were found to be most likely to come to work, as were male respondents. For those unsure about reporting for work, their personal safety was the most significant concern, and the authors note the importance of ensuring workers’ confidence in adequate personal protections.


The authors conducted a review of scientific articles conducted from 2006 to 2016 on nurses’ preparedness for disasters, and found that nurses are insufficiently prepared and do not feel confident responding effectively to disasters. Previous disaster response experience and disaster-related training were found to increase preparedness. The authors note that more, realistic disaster exercises are needed to further prepare nurses.


Physicians and physician assistants from 21 specialties were surveyed to examine their perceptions related to roles and responsibilities of clinicians in a disaster; barriers to participation; implementation of chemical, biological, radiological, nuclear, and explosive training; and training preferences. Respondents indicated that concerns about risk and malpractice, the cost of training, the time involved in training, and the cost for the time in training were all barriers to training. There were no clear preferences for training strategies.


The authors administered a survey to emergency department staff to determine if household preparedness correlates with likelihood of reporting to work during a disaster. Household preparedness did not have an effect on self-reported likelihood of reporting during a disaster. Having dependents in the home; female gender; past disaster relief experience; having a spouse or domestic partner; and not owning pets were factors found to be associated with predicted absenteeism, though this varied based on disaster type.
This study explored willingness to work among medical, nursing, and pharmacy students. Medical students indicated they were most willing to work, and greater willingness to work was associated with prior disaster training. The authors cite the “remarkable underemphasis on disaster preparedness in health care curricula,” and note how important it is to prepare health professional students, who will become the healthcare workforce.

Medical students were asked to participate in an online disaster training consisting of 4 modules to determine if the training helped them feel more prepared to respond during a disaster, and if it would affect their willingness to volunteer during an emergency. Pre- and post-survey results showed a significant increase in perceptions of preparedness among participants, though the course did not affect the initially high level of willingness to volunteer.

A survey of more than 6,400 healthcare workers (HCW) in New York City revealed that “in terms of willingness, HCWs were most willing to report during a snow storm (80%), MCI (86%), and environmental disaster (84%) and least willing during a SARS outbreak (48%), radiological event (57%), smallpox epidemic (61%), and chemical event (68%).” Barriers included childcare, elder care, and pet care, but the authors noted that many barriers were also open to interventions.

The authors surveyed bioterrorism coordinators and emergency managers for 31 hospitals in a suburban area to determine which staff members were considered “essential” for disaster response, and if essential staff had been trained on their emergency response roles. Emergency physicians, nurses, and support staff were the 3 categories of staff most often cited, and some hospitals noted that these staff members had not been trained in their roles.

This presentation discusses research conducted to identify influences of perceived threat and efficacy on willingness to respond in public health emergencies. Emergency-specific patterns of response willingness are reviewed, and recommendation for improving response willingness are provided.


The authors evaluated the effects of targeted training on Emergency Department staff members’ Ebola-related perceptions and attitudes. Post-training survey responses across all disciplines demonstrated that participants felt better able to care for an Ebola patient and understood team roles better, and that the hospital was better prepared for Ebola response.


Researchers conducted a national poll among 1,603 practicing physicians in a range of specialties in hospital and nonhospital settings to assess their preparedness and training for emergency response (among other things). Results indicated that there were significant gaps among physicians’ preparedness for public health emergencies, and their participation in trainings and other institutional preparedness activities. The authors recommend collaboration between hospitals and public health agencies to develop useful educational tools, and incorporate online resources into training.


The authors reviewed over 100 reports, articles, documents, and analyses related to whether or not responders would be willing to report to work during a disaster. They summarize the research, and present conclusions pertaining to role conflict, role strain and role abandonment, emphasizing worker safety, family support and safety, and communicating expectations and a culture of responsibility in the workplace.

The authors reviewed published literature on healthcare workers’ willingness to work during a disaster or public health emergency to identify related motivation factors. One key finding from their review was that healthcare workers are more likely to come to work if they understand their anticipated response role, and feel prepared to carry it out. The authors recommend frequent training of health care workers in disaster response, as well as the integration of such information into health professional educational curricula.


The authors discuss the future of nursing in disaster preparedness and response, and provide recommendations for nursing practice, education, policy, and research to enhance preparedness among nurses. Current barriers and opportunities to advance professional disaster nursing are also included.


More than 1,500 (non-healthcare) employees in a major German city participated in an online survey that measured variables such as risk perception, role competence, self-efficacy, role importance, sense of duty, and willingness to report to work in the case of a pandemic. Results indicated that nearly 20% would not be willing to report in the event of a pandemic, primarily because of perceived risk of infection and risk of infecting loved ones.


The authors surveyed hospital-based pediatric staff in 2009 to characterize their perceptions of, and willingness to respond during, public health emergencies, with the goal of developing a methodology for an institution-specific training package to improve response willingness. The vast majority of respondents indicated a need for more training to respond to the survey scenarios (pandemic influenza and radiological dispersal device), and the authors found six “distinct perceived attitudes/beliefs that had an institution-specific high impact on response willingness: colleague response, skill mastery, safety getting to work, safety at work, ability to perform duties, and individual response efficacy.”
Agencies and Organizations

American Nurses Credentialing Center. National Healthcare Disaster Certification.


Associated Schools and Programs in Public Health (ASPHH).

Center for Domestic Preparedness.

Center for HICS Education and Training.


National Association of County and City Health Officials (NACCHO).


National Center for Interprofessional Practice and Education.

National Ebola Training and Education Center.

Oak Ridge Institute for Science and Education. Radiation Emergency Assistance Center/Training Site (REAC/TS).


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