Updated June 2014

OFFICE OF PREPAREDNESS AND EMERGENCY MANAGEMENT

Hospital Based Decontamination Preparedness Resources

Minimum Decontamination Capabilities for Hospitals in Massachusetts

Hospital Decontamination Self-Assessment Tool

Strategies for First Receiver Decontamination

HARVARD SCHOOL OF PUBLIC HEALTH

Emergency Preparedness and Response Exercise Program

OFFICE OF PREPAREDNESS AND EMERGENCY MANAGEMENT

Hospital Based Decontamination Preparedness Resources

This binder contains hospital decontamination resources developed by the Harvard School of Public Health Emergency Preparedness and Response Exercise Program (HSPH-EPREP) on behalf of the Massachusetts Department of Public Health Office of Preparedness and Emergency Management. These resources, developed in June of 2013, were made possible through funding from the Assistant Secretary for Preparedness and Response (under the U.S. Department of Health and Human Services). The content of these resources does not necessarily represent the views of the Assistant Secretary for Preparedness and Response, the U.S. Department of Health and Human Services nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.

These resources have been designed to assist hospitals and their response partners with addressing challenges with hospital based decontamination in all four phases of the emergency management cycle. While each document can be used individually to facilitate improvement, the resources are most effective when used in combination.

Proposed Minimum Decontamination Capabilities for Hospitals in Massachusetts– The purpose of this document is to suggest common capabilities that all hospitals in Massachusetts should target in their provision of care to patients who may present to their facilities after contamination with hazardous substances.

Hospital Decontamination Self-Assessment Tool – This document was developed to provide a structured critique that hospitals may use when evaluating their decontamination plans and capabilities considering current regulatory standards, recommendations from subject matter experts, and national and international best practices.

Strategies for First Receiver Decontamination– This is a collection of tactics and scalable considerations intended to assist hospitals facing common challenges planning for hospital based decontamination of patients.

These documents and additional resources can be found at www.hsph.harvard.edu/eprep

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HSPH - EPREP

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Introduction

When an event occurs that exposes humans to hazardous substances, the people in the event area may become contaminated with those substances. Those who are either potentially contaminated or known to be contaminated generally require decontamination to be performed by trained teams to limit the extent of their exposure and to limit the collateral spread of contamination. While it is generally preferable that decontamination be performed as soon as possible at the site of the exposure, history has shown that this does not always occur (Kirk & Deaton 2007). Especially when hazardous substance exposures cause significant illness and/or create large numbers of victims, history has shown that some patients who are contaminated with hazardous substances may present to hospital facilities before being decontaminated. Hospitals therefore must plan for the arrival of potentially contaminated patients following hazardous materials events, be able to limit the extent of collateral exposure from the presentation of a contaminated patient or patients, and be able to safely provide initial triage and care for arriving victims (OSHA 2005; TJC 2011).

The *Proposed Minimum Decontamination Capabilities for Hospitals in Massachusetts* is the product of several efforts to help the hospitals of Massachusetts plan for, mitigate against, respond to, and recover from incidents that create contaminated patients who may present to hospitals in the Commonwealth. First, the Massachusetts Department of Public Health (MDPH) sponsored a statewide tabletop exercise series focused on hazardous materials events to gauge the overall plans and capabilities of hospitals in this arena. Second, MDPH and staff from the Harvard School of Public Health Emergency Preparedness and Response Exercise Program (HSPH-EPREP) performed comprehensive research into the scientific literature, regulations and best practices that are publicly available. This included direct contact with leading federal agencies who have been engaged in a similar review of plans and ideal hospital capabilities for the nation. Third, HSPH-EPREP conducted site visits of more than one-third of off hospitals in MA to examine their plans and equipment for responding to the arrival of contaminated victims of hazardous materials events, and to discuss the successes and challenges each hospital experienced in its planning for these types of events. HSPH-EPREP visited hospitals in all regions of the state as part of this program, and also visited a wide range of hospitals from rural to urban and from small to large. Lastly, MDPH and HSPH-EPREP convened a working group of hospital and hazardous materials response practitioners, local representatives and subject matter experts to examine what is an ideal minimum response for hospitals in the Commonwealth and to discuss what is practically achievable by hospitals and first responders.

The capabilities in this document are intended to describe a minimum level of response that may be expected to exist at all hospitals in Massachusetts to ensure a uniform level of preparedness and response to support the health of the citizens of the Commonwealth. This

list of proposed capabilities should not be interpreted in any way to supersede otherwise negate any existing laws, regulations or standards, though the proposed capabilities were drafted with those existing laws, regulations and standards in mind. The proposed capabilities are listed in approximate chronological sequence of how a typical event might unfold, and not necessarily in order of importance.

In separate documents, the *Proposed Minimum Decontamination Capabilities for Hospitals in Massachusetts* are supported by tools that have been developed by MDPH and HSPH-EPREP to help all hospitals ensure that they can achieve these capabilities. These tools include checklists that assess current plans, equipment, training and facilities and also tools that provide concrete examples of best practices of how other hospitals around the state and nation have successfully achieved these capabilities.

The additional tools have been made possible through a grant from the Massachusetts Department of Public Health and are available at: http://www.hsph.harvard.edu/eprep

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Assumptions

The assumptions below form the framework upon which the capabilities are based. They are based upon existing regulatory and legal guidance, review of previous events, and expert opinion.

1. *The safety of hospital staff, patients and visitors, as well as the protection of hospital facilities, during decontamination operations is paramount, and must be carefully considered in all aspects of the planning process.*

2. *Despite best efforts, contaminated patients may self-present to any hospital or arrive by ambulance without warning (CEEP 2009).*

3. *Hazmat and decontamination events require the coordinated response of multiple departments throughout the hospital; the response is not the sole responsibility of the Emergency Department* (CR-MMRS 2008; Okumura, et al 2005).

4. *Information regarding the contaminant may not be immediately available (CEEP 2009).*

5. *All hospitals with an emergency department should have practical plans that address decontamination of victims of small and large scale incidents, and will be better prepared to do so with a well-developed, practiced plan outlining decontamination procedures, capabilities, and resources* (OSHA 2005; TJC 2011).

6. *Hospitals should expect that all incoming victims of a hazmat event will need to be decontaminated unless otherwise informed by first responders, and prepare accordingly when notified of the event by public safety (ATSDR 2000).*

7. *Hospitals should expect that some incoming victims will be individuals with disabilities and other functional needs. Hospitals should be prepared to decontaminate these individuals in a manner that ensures accessibility and non-discrimination. (Stafford Act 2007, PKEMRA 2006)*

8. *Hospitals benefit from regular training and full-scale exercises designed to test and reinforce knowledge of hospital decontamination plans (NFPA 471).*

9. *All minimum capabilities must be simple and easily understood (DHS 2010).*

Basic Common Capabilities

The capabilities are intended to set a minimum standard of care that hospitals should be able to provide to contaminated patients. These capabilities should in no way supersede, conflict or otherwise negate any existing laws, regulations or standards. Hospitals are still obligated to comply with all such laws, regulations and standards as they were previously. The capabilities should help achieve compliance in particular with The Joint Commission (TJC) elements of performance EM 02.02.05 and EM 02.02.06. The capabilities are approximately listed in chronological order, and not in order of importance. Documentation should be maintained to demonstrate the hospitals efforts to meet each capability. Hospitals should collaborate with their response partners in order to meet these capabilities. While meeting the capabilities is an important first step towards a hospital's preparedness for contamination events, it should not be considered an end point. Hospitals are encouraged to work to exceed these capabilities to provide better care and protection to their patients.

Capability 1 – Early Incident Recognition

Capability 1.1

Fire Departments and emergency medical services (EMS) agencies should notify hospitals via their regional Central Medical Emergency Dispatch (CMED) within five minutes of becoming aware of an event that is likely to involve contaminated patients requiring transport to a hospital (Mcintyre 2000; Horton 2003)[1]. The content of the notification should include the nature of the event, agent(s) involved if it can be ascertained, and potential number of patients. Upon notification, the CMED center shall subsequently notify all appropriate potentially affected hospitals and health agencies, including adjacent CMED centers if applicable, coordinating command and control centers (e.g. fire district control centers) and the regional EMS Director.

At the state level, the Massachusetts Department of Public Health's (MDPH) Liaison to the Department of Fire Services Hazardous Materials Response Division should notify the MPDH Duty Officer any time a regional or state Hazmat team is activated for an incident that may have a healthcare component. The MDPH Duty Officer will provide potentially affected hospitals and health agencies with notification and situational awareness via the Health and Homeland Alert Network (HHAN) per standard operating guidelines.

[1] Areas where C-MED is not available will use normal notification methods.

In the event a hospital receives a patient suspected of being contaminated with hazardous materials prior to notification from external sources, a staff member will notify the local Fire Department of the situation via 911. The appropriate Fire Department response should be determined collaboratively between the Fire Department and hospital in advance.

Rationale:

Hospitals and first responders should anticipate the possibility of self-evacuation of patients from the scene of a hazardous materials incident and the possibility of such patients arriving unannounced and contaminated to a hospital. Contaminated patients pose a risk to hospitals since if they make entry into a hospital there is the potential for contamination, injury or illness of hospital staff, patients and/or visitors (OSHA 2005). Contamination of the hospital facility may cause healthcare services to be shut down in the contaminated area (OSHA 2005). Additionally, hospitals often require significant lead time to activate appropriate staff, initiate applicable protocols, and determine appropriate equipment and personnel if a hospital-based response is required[2] and the earliest possible notification is of great importance in those circumstances.

[2] Per consensus of Working Group

Capability 1.2

In order to prevent potentially contaminated patients from entering the hospital and also to limit the spread of contamination, 95% of hospital front of the house staff (Emergency Department (ED) physicians, ED nurses, ED aides, ED unit coordinators, ED secretaries, valet parkers, registration, greeters, security and engineering) should receive specific training in recognition of potentially contaminated patients and the initial institutional response actions required under its Hazmat plan. Refresher training should be conducted annually.

Rationale:

Hospitals that fail to recognize potentially contaminated patients as early as possible run the risk of secondary injury to staff, patients and visitors, as well as the contamination of facilities.

Online, web-based, training can be used to provide a standardized message and operational guidelines to meet this capability.

As an example, training staff to use the acronym RAIN (Recognize, Avoid, Isolate and Notify) would meet this capability.

It is recommended to make quick guides and/or cheat sheets and signage readily available for front of the house hospital staff to assist them in retaining the content of training and recognizing contaminated patients as they arrive.

Capability 2 – Decontamination Practice

Capability 2.1

All hospitals preferably should have at least two staff members on duty in the hospital at all times (24/7/365) who are trained to recognize a potential contamination event, don PPE, provide decontamination, and self-decontaminate. If this is not possible, the hospital should make prior arrangements to be able to have trained personnel on site within 15 minutes 24/7/365. Trained personnel can be staff who are able to arrive at the hospital within 15 minutes or a local fire department with which the hospital has a Memorandum of Understanding (MOU) detailing the agreements of the response.

For hospitals with greater than 20,000 annual ED visits, at least one of the two staff members on duty at the hospital at all times (24/7/365) who is trained to don personal protective equipment (PPE) and provide basic decontamination should be able to perform emergency triage and basic medical care.

Rationale:

Emergency events that involve decontamination require a rapid response to limit morbidity and mortality (Weingart 2011). Hospitals may not have any significant notice of such events and/or may only recognize the need for patient decontamination after the patient has arrived at the hospital. Therefore, hospitals need to be prepared to respond quickly by having hospital staff trained in the use of PPE and decontamination on-site or readily available at all times.

OSHA 1910.120(q)(6)(ii), First Responder Operations Level training is more commonly known as 8-hour level C training. OSHA has clearly stated that this standard is a performance or function based standard. Hospital staff should, therefore, be trained in the skills they will be expected to perform, in the environment in which they will be expected to perform them. Hospitals should utilize first receiver specific training and not first responder training (for more information about training requirements follow the links in the References Section to the OSHA Interpretation Letters and to the OSHA *Best Practices For Hospital-Based First Receivers Of Victims From Mass Casualty Incidents Involving The Release Of Hazardous Substances*).

The hospital should maintain a list of all staff that are up to date in their training and authorized in the use of PPE and decontamination. Only those staff members on the list should be allowed to don PPE and/or perform decontamination (OSHA Standard 29 CFR 1910).

Due to the time sensitive nature of such events, staff members who are involved in a decontamination response should be empowered to activate notification procedures and to call additional staff to the hospital for decontamination operations.

OSHA requires the Incident Command System (ICS) be used at all events involving hazardous materials. Therefore, at a minimum, ICS 100 should be required of staff members that are expected to wear PPE and perform decontamination. Likewise, staff members that are expected to wear a respirator (i.e., PAPR) must have medical clearance beforehand, and may require periodic fit testing. Appropriate medical monitoring of staff should occur prior, during and immediately after wearing PPE.

Because emergency events requiring decontamination are rare, it is important to practice the skill set in order to avoid degradation of capability. It is recommended that staff who are expected to wear PPE and perform decontamination be involved in training, drills and exercises using PPE and other decontamination equipment at least twice per year[3] (OSHA 2005).

[3] Per Capability 3.1 one of these could be part of a full-scale exercise at least every two years.

Capability 2.2

Hospitals should maintain a sufficient supply of appropriate PPE to support the minimum response outlined in Capability 2.1, or support a greater response as determined by their Hazard Vulnerability Analysis (HVA).

Rationale:

Trained staff members need rapid access to appropriately sized and fitted PPE to protect them from the possible chemical, biological and radiological (CBR) hazards encountered during decontamination. The available PPE should consist of at least chemical resistant boots, an appropriate chemical-resistant suit, gloves and appropriate breathing protection (with batteries in good condition and fully charged, where applicable) and proper filter cartridges (NFPA 471 & 472; CEMSA 2005).

PPE varies by manufacturer and by the hazards from which it is intended to provide protection. Therefore, PPE should be selected by appropriate subject matter experts based on the CBR hazards most likely to be encountered. Hospitals can help determine the possible CBR hazards by contacting their local or regional emergency planning committee (LEPC or REPC).

The PPE should be in a location that is easily accessible, temperature controlled per manufacturer/industry standards, and in close proximity to where decontamination will first take place (McIntyre 2000).

Capability 2.3

Hospitals should have pre-specified arrangements that permit access to appropriate subject matter expertise if assistance is needed in determining whether decontamination is indicated and/or which manner of decontamination is appropriate. This access should be available within five minutes of recognizing a potential contamination event at all times (24/7/365).

Rationale:

The need for decontamination and associated risks to responders, bystanders and the hospital needs to be weighed against potential delays in patient care and the possible adverse outcomes from such delays (Koenig 2008). Nonetheless, since determining the level of contamination and the identity of the contaminant may be difficult in the early stages of an event, it is recommended hospitals err on the side of safety and decontaminate patients from any event where contamination has been reported or is suspected (AHRQ 8/2005) – see Appendix A for General Guidelines on Decontamination.

When the hospital does not have experts in-house to meet this capability they should explore contracts and/or Memorandums of Understanding (MOU) with outside experts.

Hospitals should strongly consider contacting their local fire department for coordination of efforts during decontamination operations.

Capability 2.4

The contaminated clothes of arriving patients should be removed, collected, stored and secured in a safe location as soon as possible after initial patient presentation. If at all possible, this removal of clothing (with the subsequent provision of a temporary cover-all to the patient for modesty and environmental protection) should not be delayed while waiting for other hazardous materials assets such as water, soap, trained staff wearing PPE, or supplemental public safety resources.

Rationale:

While there are no evidence based studies to date showing the exact percentage of contaminant removed through the removal of clothes, it is a logical and effective means of reducing contamination significantly (DHS 2010). Likewise, it is a well-accepted belief within the HAZMAT field that a large portion of decontamination occurs through the removal of clothes (some estimates are as high as 90%), and since clothes must be removed in order to perform decontamination, doing so in advance expedites the process. Nonetheless, efforts should be made to keep the patient safe from weather related injury or illness; protect the patients' privacy; and to collect and account for clothing and personal belongings.

If it is determined that the weather could exacerbate or create additional mortality or morbidity then clothing removal may be delayed until appropriate protection can be provided. If the patients' privacy cannot be maintained through the use of cover-ups, screens, curtains and other such items then clothing removal may be delayed.

Capability 3 – Evaluating the Effectiveness of Decontamination Program

Capability 3.1

Hospitals should conduct exercises as frequently as possible to ensure their ability to meet capability 1.2 and 2.1 (recognize hazmat event, don PPE, and perform decontamination). A full-scale exercise should occur at least every two years and should include expected response partners to ensure that the interdependent components of the decontamination system are functioning and adequate (NFPA 471). Staff expected to wear PPE and perform decontamination should participate in yearly refresher trainings during which they don and doff PPE to demonstrate competence (OSHA 1910.120).

Response to an actual event may be considered sufficient to meet these requirements.

Rationale:

The skills of donning PPE, performing decontamination, and doffing PPE require on-going practice for staff to remain proficient after initial training. Additionally, equipment can degrade even when not in use. Therefore, it is important to conduct additional exercises of staff and equipment. It is strongly recommended that other exercise types (e.g., PPE don/doff drills, tabletops, recognition drills, resource mobilization drills, and notification functional exercises) be used more frequently. In particular, those staff that is expected to wear PPE and perform decontamination should be involved in training, drills, or exercises using PPE and other decontamination equipment at least twice per year.

It is further recommended that quarterly the hospital's decontamination equipment should be fully utilized, including running water through all pipes, nozzles and shower heads. Likewise all engines, motors, generators and heaters should be operated quarterly[4].

In order to fully test mechanical equipment, it should be run for at least 30 minutes. All other systems, such as running water, should likewise be run for 30 minutes.

[4]If, during the year the hospital activates its Hazmat plan in response to an actual emergency where all aspects of this capability are met, this can serve in the place of the yearly exercise.

Appendix A - General Guidelines on Decontamination

In the absence of specific information about the contaminant, it is recommended water be used for decontamination. The following parameters are recommended for water-based decontamination (SBCCOM 2000):

1. Low pressure (~50 – 60 psi)
2. High volume (supply for at least 15 minutes)
3. Tepid (slightly warm, not hot) temperature. 100^{o}f for pediatrics.
4. Duration for a minimum of three minutes and ensure thorough soaking

Water based decontamination can lead to an increase in the risk of cold related illnesses, such as hypothermia, as well as slips and falls (U.S. Army 2008). Care should be taken to mitigate these risks. Likewise, extra caution needs to be taken when decontaminating with water for the following populations:

1. People using walkers, canes and wheelchairs due to an increase in the risk of slipping.
2. Pediatric and geriatric patients due to their restricted ability to regulate their temperature.
3. Service animals due to the possibility of their drinking contaminated water and the increased risk of secondary contamination when they shake off.
4. Non-ambulatory patients due to their airway potentially being exposed to a stream of water pointed downwards.
5. Whenever possible, patients should be instructed to perform self-decontamination.

Hospitals should be prepared to receive patients with disabilities and other functional needs. To comply with federal law, decontamination processes should incorporate the concepts of accessibility and non-discrimination (FEMA 2010). For example:

1. The decontamination process should be designed to keep people connected to their support system including mobility equipment, assistive devices, service animals, and caregivers.
2. If certain equipment or devices cannot be decontaminated, there should be a procedure to replace that equipment or provide appropriate support services after decontamination.
3. The decontamination process should recognize that individuals are most knowledgeable about their own needs. Patients with disabilities and other functional needs should be consulted about potential modifications if the standard decontamination process poses challenges for the individual or decontamination personnel.

4. Hospitals should be prepared to provide information that is comparable in content and detail to all patients including those who have a disability or have limited English proficiency.

Some studies have shown the use of a mild soap, non-abrasive sponge, washcloth, or similar item may enhance water-based decontamination by increasing the physical removal of a contaminant, but decontamination should not be delayed for such items (Ready Now 2012).

It is possible patients will not be able to be fully decontaminated. In such cases, the level of contamination should be reduced to levels as low as reasonably achievable. Hospitals may be able to utilize hazardous materials teams to assist in quantifying levels of contaminant post decontamination.

Contaminated water will need to be disposed of in a manner compliant with local, state and federal regulations and laws (MDEP 2008). Emergency notification to the Massachusetts Department of Environmental Protection (MDEP) can be made at (888) 304-1133 or by email to ESF.Hotline@state.ma.us.

Appendix B – Subject Matter Expert (SME) Examples

Contact should be made prior to an event and details of how the SME can assist during an emergency should be detailed in an MOU or other contract.

- Local Fire Department
  - Emergency 911
  - Business _____
- Department of Fire Services 1-877-385-0822

The following is a list of potential providers. It is not comprehensive; other providers may exist in your area. The authors of this document, the Working Group, MDPH, and HSPH-EPREP do not endorse any of the providers listed below. The numbers listed here are NOT FOR EMERGENCY USE. Contracts must be established prior to an event.

- Chemtrec (customer service) 1-800-262-8200
- Clean Harbors (customer service) 1-800-645-8265
- Triumvirate (customer service) 1-888-834-9697
- Clean Venture (customer service) 1-508-875-5271
- EnPro (customer service) 1-978-463-4100

Appendix C – Working Group Members

Name	Title or Position	Organization
Captain Edward Anderson	Special Operations	Boston Fire Department
Captain John Delaney	Special Operations	Arlington County Fire Department (VA)
Captain Paul Gabala	Captain	Holyoke Fire Department
Charlotte Roy	Safety Officer	Newton Wellesley Hospital
Chief James McMorrow	MDU Coordinator, Fire Chiefs Association of Massachusetts	Wrentham Fire Department
Chief Mario Orangio	President, Fire Chiefs Association of Massachusetts	Fire Chiefs of Massachusetts
Dave Faunce	Executive Director	Southeastern Massachusetts EMS (Region V)
David Ladd	Director, Hazmat Emergency Response	Massachusetts Department of Fire Services
Deputy Chief Gerard Fontana	Deputy Chief	Boston Fire Department
Deputy Chief Robert Rossi	Deputy Chief	Cambridge Fire Department
Donna Auger	Emergency Preparedness Coordinator	Milford Regional Medical Center
Edward Hennegan	Hospital Preparedness Coordinator - Region Five	Massachusetts Department of Public Health
Jaclyn E. Hamel	Operations Support Coordinator	Massachusetts Emergency Management Agency
Jendy Dunlop	Planning Project Coordinator	Harvard School of Public Health
Jennifer Ball	Senior Policy Advisor for Homeland Security	Executive Office of Public Safety and Security
John L. Murray, Jr. CHMM CSP CIH	Director of Safety and Environmental Affairs	Baystate Health System
Johnathan Epstein	Executive Director	Northeast Emergency Medical Services (Region III)
Lieutenant Brian Pomodoro	Senior Program Director	Boston Emergency Medical Services

Name	Title or Position	Organization
Lillian Yadgood	Regional Representative	Region III Hospital Preparedness Group
Major Matthew D. Woolums	Commander	1st Weapons of Mass Destruction Civil Support Team
Mark Mahoney	Director	New Bedford Emergency Management Agency
Mark Pare	Operations Section Chief	Department of Fire Services
Matthew Donahue	Emergency Management Coordinator	Harrington Memorial Hospital
Matthew Matosic	CBRNE Homeland Security Planner	DelValle Institute for Emergency Preparedness
Michael Flanagan	Senior Project Manager	Harvard School of Public Health
Operations Section Chief Mark Pare	Operations Section Chief	Massachusetts Department of Fire Services
Paul Biddinger	Primary Investigator	Harvard School of Public Health
Robert Osgood	Emergency Preparedness Coordinator	Tufts Medical Center
Sheila Wallace	Safety Officer	Steward Good Samaritan and Steward St Anne's
Susan Cibulsky, PHD	Chemical Science Branch Chief	US Department of Health and Human Services
Thomas O'Connell	Hazardous Materials Liaison	Massachusetts Department of Public Health
Timothy McDonald	Senior Healthcare Systems Manager	Massachusetts Department of Public Health

Acronyms

CBR: Chemical, Biological and Radiological

CMED: Central Medical Emergency Dispatch

ED: Emergency Department

EMS: Emergency Medical Services

HAZWOPER: Hazardous Waste Operations and Emergency Response

HSEEP: Homeland Security Exercise and Evaluation Program

HVA: Hazard Vulnerability Analysis

ICS: Incident Command System

LEPC: Local Emergency Planning Committee

MCI: Mass Casualty Incident

MDPH: Massachusetts Department of Public Health

MDEP: Massachusetts Department of Environmental Protection

MOU: Memorandum of Understanding

OSHA: Occupational Safety and Health Administration

PAPR: Powered Air Purifying Respirator

PPE: Personal Protective Equipment

PSI: Pounds per Square Inch

REPC: Regional Emergency Planning Committee

TJC: The Joint Commission

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OFFICE OF PREPAREDNESS AND EMERGENCY MANAGEMENT

Hospital Decontamination Self-Assessment Tool

A resource to assist hospitals evaluate decontamination plans and capabilities

HSPH-EPREP

Updated June 2014

HARVARD SCHOOL OF PUBLIC HEALTH
Emergency Preparedness and Response Exercise Program

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Foreword

The *Hospital Decontamination Self-Assessment Tool* was developed by the Harvard School of Public Health Emergency Preparedness and Response Exercise Program (HSPH-EPREP) through a contract with the Office of Preparedness and Emergency Management at the Massachusetts Department of Public Health, with funding from the Office of Assistant Secretary for Preparedness and Response (ASPR) Hospital Preparedness Program.

The views and opinions expressed as part of this toolkit do not necessarily represent the views and opinions of the Office of the ASPR Hospital Preparedness Program or the Massachusetts Department of Public Health.

A list of references used to support the development of this document can be found in Appendix C.

Introduction

In 2011, through a contract with the Massachusetts Department of Public Health, the Harvard School of Public Health Emergency Preparedness and Response Exercise Program (HSPH EPREP) engaged Massachusetts' hospitals in a series of regional tabletop exercises focused on response to a hazardous materials incident. The exercise series highlighted a significant degree of heterogeneity among hospital decontamination programs and capabilities. Subsequent on-site assessments of hospital decontamination systems conducted at a representative sample of facilities throughout the Commonwealth confirmed this finding.

To begin to address this issue of heterogeneity, HSPH-EPREP developed structured tools and guides to assist hospitals develop, maintain, and augment their decontamination programs. The *Hospital Decontamination Self-Assessment Tool* was developed to provide hospitals with a means of evaluating decontamination plans and capabilities against current regulatory standards, recommendations from subject matter experts, and national and international healthcare decontamination best practices. This tool provides scalable considerations based upon presently available guidance to assist hospitals plan for and respond to small and large-scale incidents requiring the decontamination of patients contaminated by and/or exposed to chemical, biological, radiological, and/or nuclear agents.

How to use this tool:

The Hospital Decontamination Self-Assessment Tool is intended for use by hospital emergency preparedness planners, hospital decontamination team members, and other personnel with a responsibility for their facility's decontamination plans and procedures.

The tool is designed to walk the user through the *emergency management cycle* of a hospital response to a hazardous materials incident requiring decontamination of patients. Each 'cycle', or section, contains a list of questions drawn from current subject-matter guidance and best practices, intended to assist the user evaluate the degree to which their facility has planned and prepared for hazardous materials incidents involving the decontamination of patients. The checklist format allows the user to keep track of the specific planning and response considerations their hospital has addressed. Links to additional resources and other useful information on hospital decontamination can be found on the "posted notes" throughout the document.

Additional resources, including planning matrices to assist with the development of decontamination teams, are available in the appendices of this document.

Assumptions

The content presented in this tool revolves around the following assumptions, which should be taken into consideration in the development, evaluation, and revision of hospital decontamination plans:

- *Hospitals will be relied upon to provide medical care to victims of a mass-casualty event resulting from a chemical, biological, radiological, nuclear, or explosive incident.*
- *All hospitals with an emergency department should be prepared to decontaminate victims in small and large- scale hazardous materials incidents.*
- *An influx of patients requiring decontamination has the potential to overwhelm any hospital.*
- *The safety of hospital personnel during decontamination operations is paramount, and should be carefully considered as a critical component of decontamination planning, training, response and recovery.*
- *The hospital's main priorities in a decontamination event are responder safety, limiting the spread of contamination, patient triage, decontamination, and medical care, as well as medical monitoring of patients and staff.*
- *Information regarding the contaminant, number of victims, and victim status may not be immediately available to hospital decontamination staff.*
- *Victims are likely to self-transport from the incident scene to the closest hospital, often arriving with little or no advance warning.*
- *Effective field decontamination resources may be limited, and hospitals should assume that all incoming victims may need to be decontaminated, unless otherwise notified by first responders.*
- *During a large-scale mass-casualty incident, hospitals should anticipate that non-symptomatic, "worried-well" victims will present to the hospital along with contaminated and/or injured victims.*
- *Victims of a hazardous materials incident may have certain access, functional, and social needs and should be accommodated to the greatest extent possible during a decontamination response. These needs should be considered in decontamination planning, training, exercise, and response.*
- *Hospitals will benefit from regular training and exercises designed to test and reinforce knowledge of hospital decontamination plans and procedures.*

Decontamination Planning and Preparedness

- ☐ Has your facility developed a written Decontamination/Hazardous Materials Incident Plan or Annex as a component of the hospital Emergency Operations Plan (EOP)?
- ☐ Is the decontamination plan reviewed and revised in conjunction with your hospital's Hazard Vulnerability Analysis (HVA)?
- ☐ Is there at least one person at your facility who is responsible for the ongoing maintenance and revision of the decontamination plan?
- ☐ Is the decontamination plan reviewed internally with staff on an annual basis?
- ☐ Is the decontamination plan reviewed with local emergency response partners on an annual basis?
- ☐ Is the decontamination plan scalable to facilitate a response to both small and large-scale incidents?
- ☐ Does the decontamination plan include clearly defined activation levels or phases designed to facilitate a timely, measured response?
- ☐ Does your facility oversee a Decontamination or Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) planning committee that meets at least on a quarterly basis?
- ☐ Does at least one hospital representative participate on a standing Local or Regional Emergency Planning Committee (LEPC/REPC) to collaboratively address community hazards and/or decontamination response protocols?
- ☐ Does your plan include decontamination team-specific Job Action Sheets (JAS) to assist team personnel in completing essential duties?

The Center for Bioterrorism Preparedness and Planning (Continuum Health Partners) developed a hospital-based decontamination policy document which includes decontamination team-specific Job Action Sheets. This resource is available at:

http://www.nyc.gov/html/doh/downloads/pdf/bhpp/bhpp-focus-hosp-chpprot-decon.pdf

Which of the following methods does your facility use to distribute the decontamination plan to internal personnel with an expected role in decontamination planning and response?

- ☐ Hard copy document/email distribution
- ☐ Review at team meetings
- ☐ In-house trainings
- ☐ Other:

☐ Is the decontamination plan accessible to staff via your facility's intranet system, Learning Management System, or other readily available database?

☐ Are hospital personnel with a role in hospital decontamination planning familiar with how to access relevant guidance and regulatory standards?

Staffing/Decontamination Team

☐ Is your facility's decontamination team capable of receiving patients within 15 minutes of activation on a 24/7 basis?

Does the size and structure of your decontamination team allow your facility to address the following?

- ☐ 24/7 coverage to respond to an incident
- ☐ Periodic shift rotations for all personnel, as appropriate to the incident
- ☐ Specific needs/vulnerabilities of the surrounding community

Larger, metropolitan hospitals should aim to have a 5-6 member decontamination team trained and available on a 24/7 basis. Smaller, more rural hospitals should aim to have a 2 person team available at all times. (Hick et al, n.d.)

☐ Does your facility use a specific algorithm or trigger to determine how many decontamination team members to deploy for a given incident?

☐ Has your hospital devoted at least one Full Time Employee (FTE) to oversee the planning aspects of facility-based decontamination and/or response to hazardous materials/CBRNE events?

☐ Has your facility designated one or more Points of Contact (POCs) to coordinate the delivery and/or set up of supplemental decontamination resources such as CHEMPACK, decontamination teams, mobile decontamination units, etc.?

☐ Does your facility's decontamination plan designate one or more non-clinical decontamination team members to oversee the bagging, sealing, and preserving of decontaminated patient belongings?

☐ Does your facility's decontamination plan designate specialists or supplemental personnel such as mental health professionals, interpreters, and respiratory therapists to assist with the decontamination response?

Training and Exercise

☐ Have a sufficient number of hospital personnel with the potential to identify contaminated patients on a 24/7 basis received **OSHA HAZWOPER Hazardous Materials Awareness-Level Training[1]?**

- ☐ Are all personnel provided with the opportunity to either receive ongoing training or attend an annual refresher training in order to maintain proficiency?

☐ Have a sufficient number of hospital decontamination zone (warm zone) personnel required for a 24/7 response received at least eight hours of **OSHA HAZWOPER Hazardous Materials Operations-Level Training[2]?**

- ☐ Are all personnel provided with the opportunity to either receive ongoing training or attend an annual refresher training in order to maintain proficiency?

☐ Has your facility's Decontamination Team Leader received at least 24 content hours of **OSHA HAZWOPER Hazardous Materials Technician-Level Training[3]?**

- ☐ Are all personnel provided with the opportunity to either receive ongoing training or attend an annual refresher training in order to maintain proficiency?

☐ Have all decontamination team personnel assigned to work in the hospital decontamination zone received training on proper use of the hospital's PPE and other decontamination equipment?

As a provision in OSHA 1910.120(q)(4): "Skilled support personnel" are those who are not originally designated to serve on the decontamination team but may be called upon during a decontamination response to provide ancillary or emergency services (e.g. specialized medical procedures, utility connections, etc.) within the hospital decontamination zone. (Hick et al, n.d.)

Does your facility's decontamination plan include just-in-time training material for "skilled support personnel" [4], inclusive of at least the following?

- ☐ Nature of the contaminant
- ☐ Anticipated duties
- ☐ Appropriate use of PPE (assuming medical clearance and fit-testing has occurred)
- ☐ Other health and safety precautions

☐ Does your facility's decontamination plan provide measures to support Just-in-Time skilled support personnel with trained, supervisory decontamination team personnel?

Are all clinical Emergency Department personnel trained to recognize the signs and symptoms of exposure to the following chemical agents?

- ☐ Nerve agents
- ☐ Vesicants/Blister agents
- ☐ Cyanides
- ☐ Pulmonary/Choking agents

☐ Are all clinical Emergency Department personnel trained to implement facility infection control and isolation procedures in order to effectively respond to a biological mass casualty incident?

☐ Is at least one clinical Emergency Department staff member available on a 24/7 basis who understands the basics of radiation contamination and is trained to use a radiation survey meter?

The U.S. Department of Health and Human Services' Radiation Emergency Medical Management has developed a training video on use of dosimeters to screen for radiation. The video, "How to Use Hand-Held Radiation Survey Equipment", along with other resources, is available at:

http://www.remm.nlm.gov/surveymetervideo.htm

Does your facility conduct at least one annual decontamination drill/exercise that tests the following?

- ☐ Ability and time needed to set up the decontamination/shower system
- ☐ Functionality of water system hookups, pressure, and temperature
- ☐ Functionality of lighting and other decontamination system equipment/resources
- ☐ Ability of staff to don, doff, and simulate decontamination procedures while suited in PPE
- ☐ Approximate patient throughput/capacity
- ☐ Incident-specific communication/coordination with local response partners

☐ Are front line personnel trained to use tools such as the R.A.I.N. Acronym to assist in recognizing and handling potentially contaminated patients?

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Decontamination Response

Alert and Notification

Upon receiving initial notification of an incident potentially requiring patient decontamination, what type of information does your plan instruct staff to collect?

- ☐ Type and nature of the incident
- ☐ Contact information of the notifying entity (name, phone number, email address)
- ☐ Approximate number and ages of victims
- ☐ Victim signs and symptoms
- ☐ Nature/degree of victim injury
- ☐ Type of chemical or other agent involved
- ☐ Extent of victim decontamination occurring in the field
- ☐ Approximate time of EMS arrival, if applicable
- ☐ Expected number of self-presenting patients
- ☐ Other:

☐ Does your facility have a method of obtaining immediate access to expertise regarding the potential hazard and response required?

☐ Does your plan specify a protocol for incident confirmation and corresponding reassessment procedures in the event that initial notification comes from victims, bystanders, or another informal source?

Which of the following means of communication does your facility use to internally notify staff of decontamination plan activation?

- ☐ Cellular phones
- ☐ Landline phones
- ☐ Pagers
- ☐ Mass alerting system

- ☐ Email and hospital intranet system
- ☐ Two-way radios
- ☐ Overhead broadcasting system
- ☐ Fax
- ☐ Runners/verbal instruction
- ☐ Other: _____

☐ Does your plan specify a protocol for communicating incident updates to actively mobilized decontamination team members?

☐ Is a hospital Public Information Officer (PIO) available on a 24/7 basis to manage requests for information from the media?

☐ Does your facility have a process to initiate and sustain scene-to-hospital communication in order to obtain information regarding the contaminant and approximate number of casualties?

☐ Does your facility have a means of participating in timely, region-wide, interagency communication in the event of a mass-casualty incident involving patient decontamination?

☐ Does your facility operate on an interoperable radio frequency/channel dedicated for interagency communication during mass casualty incidents?

☐ Has your facility identified an information resource center (such as CHEMTREC[5]) that could be contacted to provide on-demand, expert guidance regarding the properties of chemical, biological, and/or radiological agents?

☐ Has your facility identified an information resource center (such as Poison Control) that could potentially be contacted to provide guidance regarding definitive care procedures?

CHEMTREC is a no-fee, 24/7/365 emergency on-call resource providing information and assistance regarding hazardous materials incidents. Additional information can be accessed at:

http://www.chemtrec.com

Security and Access Control

☐ Have all security personnel with the potential to encounter incoming, potentially contaminated patients been trained and equipped with PPE?

Which of the following security/access control measures are specifically addressed in your facility's decontamination plan?

- ☐ Preliminary and ongoing priority actions for hospital security personnel
- ☐ Method of securing the Emergency Department and/or all other hospital access points that contaminated patients may use
- ☐ Crowd containment procedures
- ☐ Protocol for directing and controlling traffic into and around the hospital campus
- ☐ Whether patient discharge/egress routes will be separate from patient access routes
- ☐ Parking arrangements for a large number of vehicles
- ☐ Protocol for management of contaminated vehicles
- ☐ Method of identifying hospital personnel
- ☐ Method of providing hospital personnel with a separate entrance to the facility
- ☐ Process for maintaining chain of custody of patient belongings

☐ Does your facility have a mechanism for separating contaminated patients from uncontaminated patients and visitors who arrive for care?

How does your facility prevent unauthorized patient/visitor access to the Emergency Department and other entrance points during a decontamination response?

- ☐ Staging of staffed security guards at doors/entrances
- ☐ Use of barriers/blockades
- ☐ Securing/locking hospital entryways
- ☐ Use of keycard systems
- ☐ Other:

Which of the following supplies does your facility stage in easily accessible locations in order to support security/access control procedures during a decontamination response?

- ☐ Traffic cones
- ☐ Barrier tape
- ☐ Rope
- ☐ Traffic control vests
- ☐ Bullhorns or whistles
- ☐ Megaphones
- ☐ Two-way radios
- ☐ Other:

☐ Has your facility established Memorandums of Understanding (MOUs) or made other arrangements with local law enforcement agencies to provide support with traffic and/or crowd control procedures during decontamination response?

Personal Protective Equipment (PPE)

Which of the following OSHA-recommended Level C Personal Protective Equipment (PPE) [6] does your facility maintain in appropriate quantities to protect all responding decontamination team personnel against unknown hazards?

- ☐ Hooded, NIOSH-approved Powered Air-Purifying Respirators (PAPRs) with a 1,000 fold protection factor
- ☐ NIOSH-approved 99.97% high efficiency particulate air (HEPA) filters
  - ☐ Organic vapor cartridges
  - ☐ CBRNE cartridges
- ☐ A chemically protective suit that is tested for [7]:
  - ☐ Resistance to tears
  - ☐ Resistance to liquid and blood-borne pathogens
  - ☐ Performance in cold weather
  - ☐ Evaporative heat transfer
  - ☐ Bursting strength
  - ☐ Seam and closure strength

- ☐ Double-layer of gloves made of two different materials
- ☐ Chemically-protective and water-repellant boots, a minimum of 200 m (8 inches) in height, made out of a similar material as the gloves selected

☐ Does your facility's plan call for the use 2-3 inch tape to cover all open/exposed areas of protective suiting?

☐ As specified in the **OSHA Standard 29 CFR 1910.134** [8] or comparable state plan standard, are all PAPRs and/or other types of respiratory protection designated for use by decontamination team personnel outlined in a formal written respiratory protection program?

☐ Does your facility maintain an inventory of fully charged, routinely tested PAPR batteries?

☐ Does your facility pre-assemble and label decontamination team PPE in easily accessible containers?

☐ Does your facility maintain a separate cache of PPE that is designated for staff training purposes only?

- ☐ Is the equipment in this cache clearly labeled as training material and stored separately from response PPE?

☐ Has your facility established MOUs or made other arrangements with PPE distributors/manufacturers to ensure quick access to additional resources?

Staff Safety/Medical Monitoring

☐ Has your facility appointed at least two clinical personnel to conduct medical monitoring of suited decontamination team personnel?

Which of the following do clinical personnel responsible for medical monitoring routinely assess and document for each suited decontamination team member:

- ☐ Vital signs inclusive of temperature, blood pressure, pulse, respirations
- ☐ Weight
- ☐ List of current medications
- ☐ Basic medical history (chronic and/or recent illnesses, current symptoms)
- ☐ Absence of any upper respiratory tract infection, chronic obstructive pulmonary disease, sinusitis, or gastrointestinal illness
- ☐ Mental status, noting presence of fatigue, stress, and/or psychological distress
- ☐ Other:

☐ Do these clinical personnel perform medical monitoring of suited decontamination response personnel before and immediately following each work shift?

☐ Has your facility appointed at least one non-clinical decontamination team member to assist decontamination response personnel don and doff PPE?

☐ Do decontamination team personnel follow an established PPE donning/doffing sequence?

☐ Have maximum shift durations been pre-determined for all decontamination team personnel?

☐ Does your facility specify maximum in-suit operation time?

- ☐ Does this time change with evolving conditions such as heat stress, level of PPE required, etc.?

How does your facility track and document the shift duration of decontamination team members?

- ☐ Time-in-PPE written on the back of team member's suit
- ☐ Log sheets/White boards
- ☐ Timers
- ☐ One or more staff members assigned to monitor

☐ Has your facility made arrangements for a decontamination team rest/rehydration area that is within close proximity to, yet out of immediate sight of the decontamination zone?

☐ How do decontamination personnel communicate with each other when suited in PPE?

- ☐ Temple-transducer headset radios, worn under PAPR hoods
- ☐ Hand held radios
- ☐ Pre-established safety hand signals
- ☐ Whiteboards
- ☐ Signs/flashcards
- ☐ Other:

Which of the following medical countermeasures does your facility maintain onsite to treat personnel against CBRNE agents:

Chemical Agents:

- ☐ Mark 1 kits (Atropine and Pralidoxime in dual-dose injections)
- ☐ DuoDote Auto-Injectors (Atropine and Pralidoxime in a single-dose injection)

Biological Agents:

- ☐ Ciprofloxacin
- ☐ Doxycycline

Radiological Agents:

- ☐ DPTA
- ☐ Prussian Blue
- ☐ Sodium thiosulfate
- ☐ Other:

☐ Is at least one clinical Emergency Department staff member trained to don PPE and rapidly administer CBRNE medical countermeasures to staff present on a 24/7 basis?

Decontamination Zone (Warm Zone) Setup

Decontamination Zone:

- ☐ Has your facility established decontamination zone locations that will enable response to both small and large-scale hazardous materials incidents?
- ☐ Are hot, warm, and cold zone boundaries clearly demarcated?
- ☐ Is the hospital decontamination zone located in an area that is accessible to fire hydrants/hook-up to a water supply?
- ☐ Does your decontamination plan specify procedures for waste water runoff and collection for disposal in both small and large scale decontamination incidents?
- ☐ Is the hospital decontamination zone set-up in a manner that will accommodate incoming EMS and/or Fire Service equipment and personnel?
- ☐ Does the hospital decontamination zone provide ample space for the movement of multiple casualties?
- ☐ Has your facility designated a 24/7/365 holding area for patients in the event that decontamination must be conducted during periods of cold/severe weather?
- ☐ If your facility has indoor decontamination capacity, is the area separately ventilated from the rest of the hospital?
  - ☐ Does a Certified Industrial Hygienist or Ventilation Engineer conduct an annual inspection of the indoor decontamination facility?

- ☐ Is the hospital decontamination zone that is used in a large scale response located at least 50 yards from the Emergency Department and the rest of the hospital post-decontamination zone [9]?

☐ Has your facility identified an easily accessible staging area for the storage of decontamination equipment?

☐ Has your facility identified a staging area for the arrival of CHEMPACK and other supplemental resources?

☐ Have personnel responsible for the setup of the hospital decontamination zone been trained to establish electrical connections, hot/cold water hook-ups, and outdoor lighting required for use of decontamination systems in a large-scale incident?

☐ Is the hospital decontamination zone clearly denoted on facility planning maps?

☐ How will your facility physically demarcate the hospital decontamination zone:

- ☐ Ropes
- ☐ Engineer tape
- ☐ Caution tape
- ☐ Paint
- ☐ Traffic cones
- ☐ Barriers/blockades/posts
- ☐ Hazard signs
- ☐ Color-coding system
- ☐ Other:

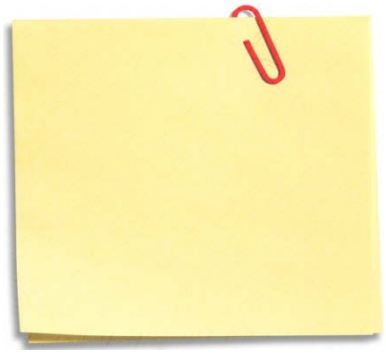
Decontamination System:

Which type of decontamination system does your facility maintain on-site:

- ☐ Fixed (permanent)
- ☐ Portable (temporary)
- ☐ Rapid Access Mass Decontamination (RAM) capability via use of fire hydrants equipped with special adaptors hoses, etc.

☐ If your facility maintains a portable decontamination shower system, can it be fully activated and operational within approximately 10-15 minutes of initial notification [10]?

☐ Is the decontamination system large enough to facilitate decontamination of more than one patient at a time?



Which of the following does your plan call for to support the decontamination system?

- ☐ High capacity, low pressure showerheads or hoses, connected to a high capacity, temperature-controlled water source
- ☐ Capability to heat ambient air
- ☐ Permanent and/or portable lighting fixtures
- ☐ Portable generators, capable of providing power to the area in the event of a loss of power
- ☐ PA speaker system for communication purposes
- ☐ Other:

Decontamination Triage

☐ Has your facility identified a patient reception area located away from the Emergency Department, where incoming patients will be triaged for decontamination?

☐ Does your facility use the *Simple Triage and Rapid Treatment* (START)[11] principle or other process for prioritizing patient decontamination?

☐ Has your facility trained and appointed at least two dedicated, skilled, clinical decontamination team members to perform decontamination triage while wearing PPE?

☐ Are decontamination triage personnel capable of conducting an initial patient assessment at a rate of 30 seconds or less per patient while wearing Level C PPE?

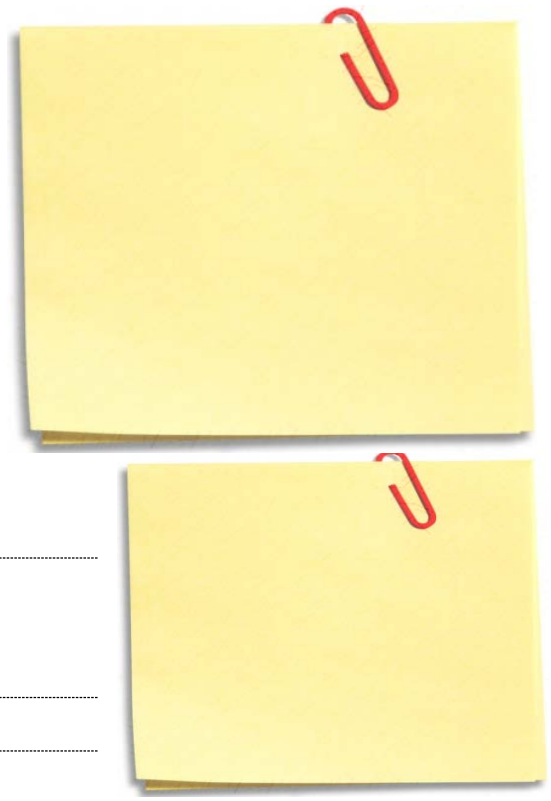
☐ Does your facility use waterproof patient tags (such as SMART [12] Triage Tags) to document each patient's triage status?

☐ Which of the following does your facility implement in order to conduct decontamination triage?

- ☐ An expedited decontamination line for individuals presenting with serious or life-threatening symptoms
- ☐ A separate lane for individuals who arrive by EMS and have been decontaminated at the incident scene
- ☐ Separate triage lanes for ambulatory and non-ambulatory patients
- ☐ Separate triage lane for "worried well" or psychogenic patients
- ☐ Separate triage lane/area for infants and children
- ☐ Separate triage lane/area for those with cognitive impairments
- ☐ Separate area for decontamination of service animals and pets
- ☐ Other:

☐ Does your facility prioritize non-ambulatory patient decontamination?

Patient Decontamination



Which of the following supplies does your facility utilize to perform patient decontamination?

- ☐ Tepid water, capable of being held at a constant temperature
- ☐ Mild liquid soap, with good surfactant [13] properties
- ☐ Sterile saline for wound irrigation purposes
- ☐ Sterile sponges/sterile gauze
- ☐ Soft cloths
- ☐ Long handled brushes with soft bristles
- ☐ Dry decontamination supplies
  - ☐ Brushes
  - ☐ Baking powder, Fuller's earth, diatomaceous earth, etc.
  - ☐ Baby wipes
- ☐ Other:

Which of the following supplies does your facility use to address patients' concerns of privacy during decontamination procedures?

- ☐ Gender-specific decontamination lanes, stalls, or screens (not necessary for smaller children)
- ☐ Patient replacement clothing (ponchos, coveralls, gowns, scrubs, booties)
- ☐ Towels
- ☐ Blankets
- ☐ Other:

Which of the following supplies does your facility use to assist with patient tracking purposes throughout the decontamination process?

- ☐ Waterproof patient triage tags
- ☐ Waterproof wrist bands/bracelets
- ☐ Wax pens and/or waterproof permanent markers
- ☐ Small and large sealable plastic bags (one of each recommended per patient)
- ☐ Waterproof labels to affix to bagged patient belongings
- ☐ Biohazard bags and/or large sealable drums for storage and/or disposal of patient belongings
- ☐ Polaroid camera with film, digital camera, or smartphone with photo capability
- ☐ Other:

How do decontamination team personnel provide instruction to patients regarding decontamination procedures?

- ☐ Pictorial/illustrated signage
- ☐ Multilingual signage
- ☐ Scripted, looped audio messaging
- ☐ Scripted, looped video messaging
- ☐ Verbal instruction, using megaphones or other amplified device
- ☐ Other:

☐ Does your facility institute minimum/maximum per-patient shower times, scalable to the specific hazard and/or other decontamination considerations?

Which of the following supplies does your facility maintain onsite in order to assist with non-ambulatory patient decontamination procedures?

- ☐ Litter conveyor system/rollers
- ☐ Sawhorses
- ☐ Spine boards/backboards
- ☐ Wheelchairs
- ☐ Backpack sprayers
- ☐ Snub-nosed trauma scissors
- ☐ Plastic chairs
- ☐ Other:

Has your facility developed specific decontamination procedures to address the needs of the following patient populations and scenarios?

- ☐ Individuals with physical and/or cognitive impairments
- ☐ Non-English speaking individuals or Limited English Proficiency (LEP) individuals
- ☐ Individuals with prosthetic devices or other medical aids (e.g. hearing aids)
- ☐ Individual with service animals and/or pets
- ☐ Law enforcement personnel or other individuals carrying weapons
- ☐ "Worried well" Individuals, and those displaying signs of psychological distress
- ☐ Noncompliant Individuals, refusing to disrobe and/or participate in the decontamination process
- ☐ The contaminated deceased

☐ Has your facility developed specific plans and procedures regarding decontamination of infants and small children?

☐ Does your facility maintain a list of items that cannot be decontaminated, such as hearing aids?

☐ Has your facility established a policy for the return of valuables to patients following decontamination?

Which of the following resources does your facility use to perform patient decontamination in instances of extreme cold (temperature of 35 degrees Fahrenheit and below)? [14]

- ☐ Decontamination trailers
- ☐ Indoor shower facilities
- ☐ Indoor swimming pools
- ☐ Dry decontamination only
- ☐ Other:

☐ Do decontamination team personnel medically monitor patients before, during, and following the decontamination process?

☐ Does your plan specify how patients will be inspected for thorough decontamination prior to leaving the hospital decontamination zone?

☐ In a small-scale incident, is your facility able to decontaminate the resulting number of patients per hour, using the algorithm below?

Annual Number of ED Visits/1000 = Patient per Hour Capacity [15]

☐ In a large-scale incident, is your facility capable of decontaminating approximately 12 patients per showerhead, per hour? [16]

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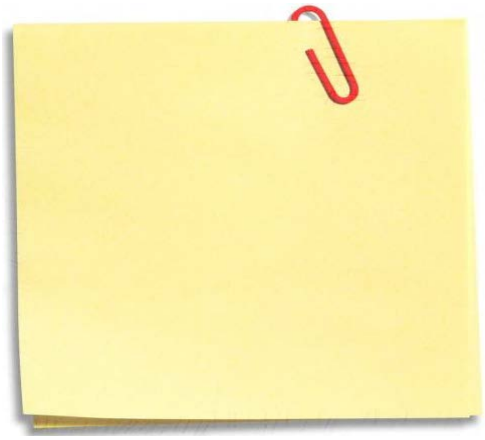
Decontamination Recovery

Has your facility appointed at least one dedicated, skilled decontamination team member to perform and/or oversee contracted vendor technical decontamination of the following?



- ☐ Suited decontamination team personnel
- ☐ Decontamination equipment
- ☐ Hospital decontamination zone /warm zone
- ☐ Contaminated vehicles

☐ Has your facility established a MOA/MOU or other agreement with a local hazardous waste company or municipal wastewater treatment facility to provide assistance with waste and waste water removal following a decontamination incident?

☐ Has your facility developed discharge plans/follow-up procedures for decontaminated patients?

☐ Does your facility follow an established process for returning all decontamination equipment and supplies to a centralized location?

☐ Does your facility have a method of determining whether equipment used in conjunction with decontamination operations is able to be decontaminated and reused?

☐ Does your facility have a process for timely replacement of disposed-of decontamination equipment and resources?

☐ Does your facility's decontamination plan demobilize resources and personnel by priority levels or phases?

☐ Does your facility have a method of determining the approximate time it will take to fully restore decontamination capability following a decontamination response?

☐ Does your plan specify procedures for storage and analysis of collected patient belongings in the event of a suspected terrorist or intentional hazardous material release?

An intentional hazardous materials release is considered a criminal offense and requires investigation by law enforcement personnel. (OSHA, 2005)

☐ Does your facility provide post-event counseling and/or other mental health services for staff involved in the decontamination response?

☐ Does your plan specify whether patients will be billed for decontamination services in both small and large-scale incidents?

☐ For potential reimbursement purposes, does your facility utilize a cost-tracking system to document all expenses associated with the decontamination response?

☐ Does your facility conduct a hotwash following decontamination demobilization in order to capture key response actions, forming the basis of an Improvement Plan?

☐ Does your facility follow an established process for timely implementation of recommendations/lessons learned from either real-world decontamination events or simulated decontaminated exercises?

☐ Does your facility have a method of sharing lessons learned from decontamination exercises and real world events with community partners?

Appendices

Appendix A: Planning Matrices

Appendix B: Acronym List

Appendix C: List of References

Appendix A: Planning Matrices

Figure 1. Hospital Decontamination Planning Matrix

The following matrix provides an overview of essential decontamination planning considerations regarding collaboration with local response agencies. Select the boxes that are applicable to your facility.

HOSPITAL DECONTAMINATION PLANNING MATRIX

	FIRE SERVICES	EMS	LAW ENFORCEMENT	PUBLIC HEATLH	EMERGENCY MANAGEMENT	OTHER: _____
OBJECTIVE:						
Does your facility work collaboratively with a Planning Point of Contact (POC) from the agency, at least twice per year?	☐	☐	☐	☐	☐	☐
Is a representative from the agency routinely present at Local Emergency Planning Committee (LEPC) meetings?	☐	☐	☐	☐	☐	☐
Does your facility have contact information for at least one POC from the agency that can be reached on a 24/7 basis?	☐	☐	☐	☐	☐	☐
Is your facility able to initiate and sustain redundant, two-way communication with the agency during an incident?	☐	☐	☐	☐	☐	☐
Does your facility conduct training and exericses focused on or inclusive of hospital decontamination operations with the agency at least once annually?	☐	☐	☐	☐	☐	☐
Has your facility established MOUs/MOAs with the agency to provide assistance with decontamination operations?	☐	☐	☐	☐	☐	☐

Figure 2. Hospital Decontamination Team Matrix

The following matrices provide an overview of essential decontamination team planning considerations. Select the boxes that are applicable to your facility.

DECONTAMINATION TEAM PERSONNEL CONSIDERATIONS

	ED PHYSICIANS	ED NURSES	ED NURSING ASSISTANTS	SECURITY	MAINTENANCE/ FACILITIES	ENVIRONMENTAL HEALTH	RECORD KEEPER
Which positions are represented on your hospital's decontamination team?	☐	☐	☐	☐	☐	☐	☐
Which positions are taffed on a 24/7 basis?	☐	☐	☐	☐	☐	☐	☐
Does your plan include up-to-date contact information for each staff member assigned to the position?	☐	☐	☐	☐	☐	☐	☐
Which positions require use of PPE?	☐	☐	☐	☐	☐	☐	☐
Which positions have received training on PPE?	☐	☐	☐	☐	☐	☐	☐
Which positions have received medical clearance to use PPE?	☐	☐	☐	☐	☐	☐	☐

OSHA HAZWOPER HAZARDOUS MATERIALS TRAINING

	ED PHYSICIANS	ED NURSES	ED NURSING ASSISTANTS	SECURITY	MAINTENANCE/ FACILITIES	ENVIRONMENTAL HEALTH	RECORD KEEPER
OSHA HAZWOPER TRAINING:							
Which positions have received **Hazwoper Awareness-Level Training**?	☐	☐	☐	☐	☐	☐	☐
Number of trained staff:							
Which positions have received **Hazwoper Operations-Level Training**?	☐	☐	☐	☐	☐	☐	☐
Number of trained staff:							
Which positions have received **Hazwoper Technician-Level Training**?	☐	☐	☐	☐	☐	☐	☐
Number of trained staff:							

DECONTAMINATION TEAM CAPACITY

	ED PHYSICIAN	ED NURSE	ED NURSING ASSISTANT	SECURITY	MAINTENANCE/ FACILITIES	ENVIRONMENTAL HEALTH	RECORD KEEPER
DECONTAMINATION TEAM CAPACITY:							
Which position(s) have the capacity to serve as the **Decontamination Team Leader**?	☐	☐	☐	☐	☐	☐	☐
Which position(s) have the capacity to serve as **Decontamination Safety Officers**?	☐	☐	☐	☐	☐	☐	☐
Which positions have the capacity and have received training to perform decontamination triage?	☐	☐	☐	☐	☐	☐	☐
Which positions have the capacity and have received training to conduct medical monitoring of suited decontamination response personnel?	☐	☐	☐	☐	☐	☐	☐
Which positions have the capacity and have been trained to peform **technical decontamination** (decontamination of personnel, equipment, and/or surface areas)?	☐	☐	☐	☐	☐	☐	☐

Appendix B: Acronym List

CBRNE: Chemical, Biological, Radiological, Nuclear, and Explosives

EMS: Emergency Medical Services

EOP: Emergency Operations Plan

HEPA: High Efficiency Particulate Air

HVA: Hazard Vulnerability Analysis

JAS: Job Action Sheets

LEPC: Local Emergency Planning Committee

MOA: Memorandum of Agreement

MOU: Memorandum of Understanding

NIOSH: National Institute for Occupational Safety and Health

OSHA: Occupational Safety and Health Administration

PAPR: Powered Air Purifying Respirator

PIO: Public Information Officer

PPE: Personal Protective Equipment

REPC: Regional Emergency Planning Committee

SLUDGEM: Salivation, Lacrimation, Urination, Defecation, Gastrointestinal upset, Emesis, Miosis

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OFFICE OF PREPAREDNESS AND EMERGENCY MANAGEMENT

Strategies for First Receiver Decontamination:

A collection of tactics to assist hospitals address common challenges associated with all-hazards decontamination of patients

HSPH-EPREP
Updated June 2014

HARVARD SCHOOL OF PUBLIC HEALTH
Emergency Preparedness and Response Exercise Program

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Foreword

Strategies for First Receiver Decontamination of Patients was developed by the Harvard School of Public Health Emergency Preparedness and Response Exercise Program (HSPH-EPREP) through a contract with the Office of Preparedness and Emergency Management at the Massachusetts Department of Public Health, with funding from the Office of Assistant Secretary for Preparedness and Response (ASPR) Hospital Preparedness Program.

The views and opinions expressed in this document do not necessarily represent the views and opinions of the Office of Assistant Secretary for Preparedness and Response (ASPR) Hospital Preparedness Program or the Massachusetts Department of Public Health.

A list of references used to support the development of this document can be found in Appendix C.

Background

Historically, healthcare facilities have been underprepared to care for large numbers of contaminated casualties (Wetter et al, 2001). Since the events of September 11th, 2001, acts as well as threats of terrorism involving chemical and other weapons of mass destruction, have bolstered attention toward this vulnerability, yet the potential for an accidental release associated with the ongoing production, transport, and utilization of hazardous materials is equally concerning.

Regardless of the cause of the incident, previous hazardous materials incidents have demonstrated that a large percentage of victims are likely to self-transport from the incident scene to the closest hospital for care, often arriving with little or no advance warning (Stone, 2007). Incoming victims of a hazardous materials incident may require decontamination prior to receiving definitive medical care in order to avoid compromising the integrity of the emergency department and the rest of the hospital facility.

Limited guidance surrounding first receiver decontamination, in addition to competing priorities, financial constraints, and other limitations of healthcare facilities have contributed to a significant degree of variability among hospital-based decontamination programs and capabilities. Furthermore, many widely accepted, yet continually evolving decontamination practices have not yet been quantified due to a lack of evidence-based techniques by which they can be evaluated. While further research is necessary to define optimal patient decontamination practices, hospitals may benefit from sharing best practices developed from lessons learned during participation in hazardous materials exercises and in response to real world incidents.

Scope

In 2011, through a contract with the Massachusetts Department of Public Health, the Harvard School of Public Health Emergency Preparedness and Response Exercise Program (HSPH-EPREP) engaged Massachusetts' hospitals in a series of regional tabletop exercises focused on response to a hazardous materials incident. The exercise series highlighted a significant degree of heterogeneity among hospital decontamination programs and capabilities. This finding was confirmed by subsequent onsite assessments of hospital decontamination system conducted at a representative sample of facilities throughout the Commonwealth.

To begin to address the issue of heterogeneity among hospital decontamination programs and capabilities, HSPH-EPREP developed structured tools and guides to assist hospitals develop, maintain, and augment their decontamination programs. *Strategies for First Receiver Decontamination* is a collection of tactics intended to assist hospitals begin to address common challenges and "frequently asked questions" surrounding all-hazards, first-receiver decontamination of patients. This resource serves as a companion document to the *Hospital Decontamination Self-Assessment Tool* and the *Proposed Minimum Decontamination Capabilities for Hospitals.* Specifically, each proposed minimum capability is referenced and addressed within this document, highlighting potential methods of meeting each objective.

The content presented in this document was obtained through a comprehensive literature review of regulatory guidance, national and international guidance and best practices, and recommendations from subject-matter experts, as well as from the on-site assessments of hospital decontamination systems throughout the Commonwealth of Massachusetts.

It should be noted that the strategies included in this document are presented as 'best practice' considerations only, and are not intended to replace regulatory guidance, or to serve as expectations for hospital decontamination programs and performance. Furthermore, it is understood that decontamination of patients is not the hospital's primary objective, and therefore, hospitals should operate with the principle of doing the greatest good for the greatest number. Each facility should carefully evaluate which tactics, methods, and practices will best address the needs of their patient population and surrounding community infrastructure in a decontamination response.

Assumptions

The content presented in this tool revolves around the following assumptions, which should be taken into consideration in the development, evaluation, and revision of hospital decontamination plans:

- *Hospitals will be relied upon to provide medical care to victims of a mass-casualty event resulting from a chemical, biological, radiological, nuclear, or explosive incident.*
- *All hospitals with an emergency department should be prepared to decontaminate victims in small and large- scale hazardous materials incidents.*
- *An influx of patients requiring decontamination has the potential to overwhelm any hospital.*
- *The safety of hospital personnel during decontamination operations is paramount, and should be carefully considered as a critical component of decontamination planning, training, response and recovery.*
- *The hospital's main priorities in a decontamination event are responder safety, limiting the spread of contamination, patient triage, decontamination, and medical care, as well as medical monitoring of patients and staff.*
- *Information regarding the contaminant, number of victims, and victim status may not be immediately available to hospital decontamination staff.*
- *Victims are likely to self-transport from the incident scene to the closest hospital, often arriving with little or no advance warning.*
- *Effective field decontamination resources may be limited, and hospitals should assume that all incoming victims may need to be decontaminated, unless otherwise notified by first responders.*
- *During a large-scale mass-casualty incident, hospitals should anticipate that non-symptomatic, "worried-well" victims may present to the hospital along with contaminated and/or injured victims.*
- *Victims of a hazardous materials incident may have certain access, functional, and social needs and should be accommodated to the greatest extent possible during a decontamination response. These needs should be considered in decontamination planning, training, exercise, and response.*
- *Hospitals will benefit from regular training and exercises designed to test and reinforce knowledge of hospital decontamination plans and procedures.*

Decontamination Preparedness Strategies

Challenge:

Selecting and maintaining Personal Protective Equipment (PPE) for a decontamination response

Addresses Proposed Minimum Decontamination Capability 2.2 – Decontamination Practice

Level C PPE has been broadly recommended as the minimum level of protection to be used by hospital personnel when acting as first receivers of victims contaminated with an unknown agent, yet there is little specific guidance available to assist facilities in determining the specific types and an appropriate quantities of PPE to maintain onsite. Additionally, hospitals may face logistical and financial challenges associated with the ongoing maintenance of differing types and quantities of PPE due to issues surrounding available storage space, product degradation and inventory control.

Strategies:

1) Consider how a routinely updated hospital and local Hazard Vulnerability Analysis (HVA) can guide and streamline hospital PPE purchases. A well-developed, routinely reviewed HVA should enable hospitals to determine the greatest hazards present within their community, which in turn, may help to narrow the focus regarding which type(s) of PPE should be prioritized for purchase. Hospitals should consider working in conjunction with their Local Emergency Planning Committee (LEPC) or Regional Emergency Planning Committee (REPC) to develop and revise the HVA.

2) Ensure that Powered Air Purifying Respirator (PAPR) batteries are maintained and kept fully charged at all times to promote product efficacy. Consider how Biomedical Engineering or other personnel may be able to provide an ongoing support role in this regard. Additionally, the use of disposable batteries may be a preferable option to ensure proper PPE maintenance.

3) To avoid product degradation and preserve the shelf life associated with PAPR face shields, consider purchasing low-cost foam inserts, which are available through most medical device manufacturers. A hospital in Western Massachusetts discovered that long term storage caused the product to fold in on itself, distorting the view. Foam inserts can help to maintain the shape of the PAPR lens when not in use.

4) Ensure that PPE designated for training purposes is stored in a separate location from equipment used in a formal decontamination response.

5) Ensure that PPE is stored in a temperature controlled environment to prevent against product degradation.

6) Utilize rolling cabinets or carts to store PPE and other decontamination equipment in a location in close proximity to the decontamination area. Equipment should be organized and clearly labeled for quick access.

Challenge:

Ensuring 24/7 decontamination team coverage

Addresses Proposed Minimum Decontamination Capability 2.1 – Decontamination Practice

Ensuring around-the-clock coverage of the hospital decontamination team is an essential component of an efficient decontamination response, yet hospitals may experience difficulty in identifying an adequate number of appropriately trained personnel to serve on the team without compromise to patient care. In addition, limited guidance exists regarding optimal decontamination team staffing practices.

Strategies:

1) Integrate decontamination team operations within the existing Hospital Incident Command System (HICS). At a minimum, the decontamination team should consist of the following:

- **Decontamination Team Unit Leader** (Responsible for overall decontamination operations management)
- **Decontamination Safety Officer** (Responsible for ensuring safety of personnel and equipment within the decontamination area)
- **Decontamination Triage Unit Leader** (Responsible for the medical assessment of patients)
- **Decontamination Team Officers/Members** (Responsible to assist with patient decontamination procedures)

2) To the greatest extent possible, ensure at least two *Operations-Level trained* decontamination team members are available onsite on a 24/7 basis.

3) Build measures of redundancy into the structure of the decontamination team by ensuring a second team or tier of individuals are available on an on-call basis, should primary appointees be unable to respond.

4) Encourage volunteer decontamination team participation as opposed to mandated assignments. Personnel who voluntarily participate are likely to be more interested in and committed to the decontamination process, and responsive to requests for participation on hospital drills and exercises.

5) Consider how your facility might publicize and incentivize staff participation on decontamination teams. Low and no-cost tokens of appreciation can consist of gift cards, T-shirts, employee recognition via a newsletter or presentation in a meeting, as well as paid time-off to attend required trainings.

6) Encourage decontamination team participation from employees of various backgrounds. A mix of clinical and non-clinical personnel is optimal, including such disciplines as mental health, facilities management, engineering, and security. Consider the benefits of drawing upon personnel from non-clinical departments, as well as those with relevant backgrounds such as former military, fire services, and or hazardous materials experience.

7) Develop comprehensive contact/call-down lists inclusive of all personnel with a potential role on the decontamination team, as well as personnel and/or agencies providing support to the decontamination team.

8) Identify a method of immediately alerting decontamination personnel of team activation. Consider the benefits of utilizing a mass alerting system capable of reaching recipients within minutes via text, pager, phone, and/or email capability.

9) Develop decontamination team-specific Job Action Sheets (JAS) to provide information regarding essential functions to decontamination team personnel. Examples of decontamination team job action sheets can be accessed at: http://www.enmagine.com/images/shared/Download_Central/Hazardous_Materials/HazMat%20Incident%20Command/hics_HazMatDeconJobActionSheets_EnMagine.pdf and http://www.nyc.gov/html/doh/downloads/pdf/bhpp/bhpp-focus-hosp-chpprot-decon.pdf.

10) Investigate how your facility might partner with hazardous materials training centers and other similar entities offering educational resources appropriate for decontamination teams. For example, the DelValle Institute for Emergency Preparedness in Boston, MA, offers hazardous materials and other all-hazards emergency preparedness education and training for emergency management, community and private sector partners.

Challenge:

Ensuring staff are appropriately trained to identify and decontaminate contaminated patients

Addresses Proposed Minimum Decontamination Capability 1.2 – Early Incident Recognition

While the importance of a robust, well-trained hospital decontamination team and a hospital-wide awareness hazardous materials awareness program is well-recognized, competing priorities, financial constraints, and other facility-specific challenges such as high rates of staff turnover may impede progress towards these goals. In addition, traditional hazardous materials training programs are largely focused on first-responder objectives, and may fall short of addressing the most critical elements of first receiver decontamination. Lastly, unfamiliar concepts and procedures associated with hazardous materials training may not be well-retained by staff if a mechanism does not exist with which they can be regularly reinforced.

Strategies:

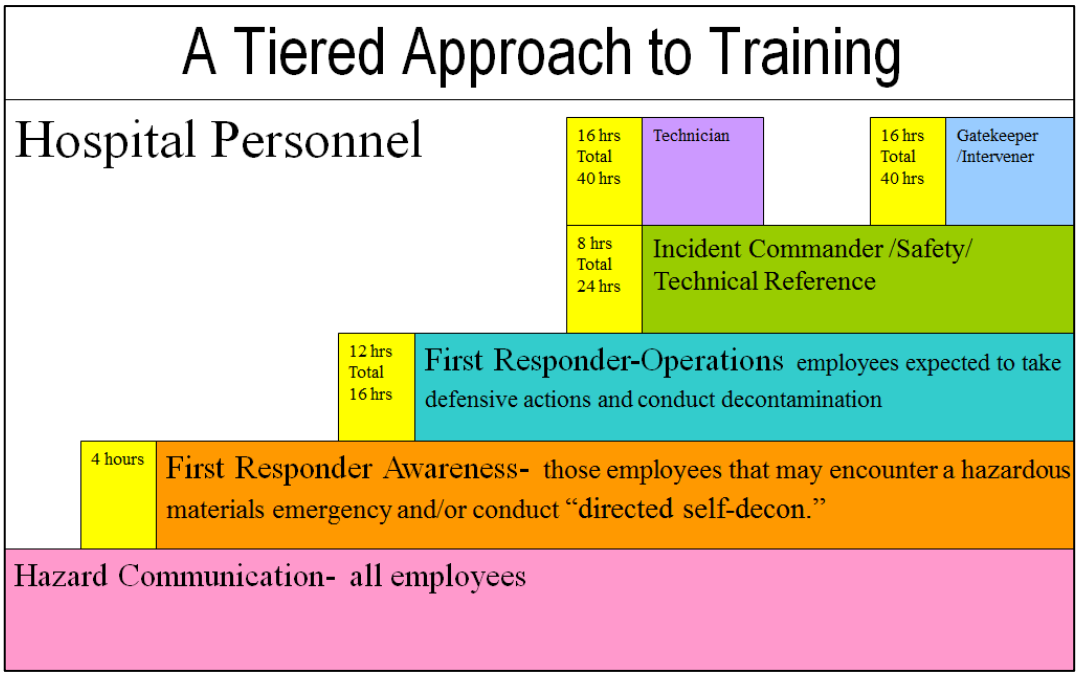
1) If possible, train and appoint internal personnel to serve as Train-the-Trainer instructors of an in-house hazardous materials training program. Doing so may yield the following:

- *A reduction of costs associated with ongoing external/vendor training;*
- *Increased flexibility with staff schedules and hospital-specific requirements;*
- *Promotion of a hospital-centric training approach to hazardous materials incidents;*
- *Streamlined training concepts and objectives based on the specific hazards and characteristics of the surrounding community;* and
- *Ongoing study with familiar personnel and use of internal hospital equipment.*

2) Modify the traditional OSHA Hazwoper Hazardous Materials training curriculum to meet the specific needs of your facility. As an example, routine eight hour training blocks can be broken down into half-hour or one-hour monthly module increments or other format designed to work within the time constraints of staff schedules. This model of study may foster skills retention, as it provides ongoing opportunities for staff to reinforce new concepts as well as practice decontamination procedures, donning and doffing PPE, etc.

3) Promote a tiered approach to hazardous materials training in order to ensure that personnel are trained according to the specific responsibilities associated with their job function and/or role in the decontamination response. As an example, EnMagine Inc.'s "Hazmat for Healthcare" Program developed such a model, as depicted below in **Figure 1**. Additional information on this model and similar resources are described in the *Safety Manual to Healthcare Professional Safety Certificate Program* at: https://www.iahss.org or http://www.enmagine.com

Figure 1: A Tiered Approach to Training (Penn, 2002)



Challenge:

Promoting situational awareness between first receivers and first responders during a hazardous materials incident

Addresses Capability 1.1 – Early Incident Recognition

Maintaining situational awareness among first receivers and first responders is a critical component of any emergency situation, yet arguably, even more necessary when dealing with the presence of potentially unknown chemical, biological, radiological, or nuclear agents. Developing collaborative protocols and procedures in advance may promote a common operating picture and facilitate a more unified, efficient community response to a hazardous materials incident.

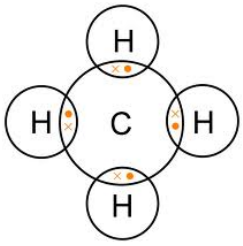
Strategies:

Development of a two-way communication protocol

1) In conjunction with first responder agencies, evaluate how tools such as the **METHANE Report** can be used to facilitate two-way communication during a hazardous materials response. (Emergency Medicine Society of South Africa, 2008) This incident management and communication tool is intended to be used as a community model among first responders and first receivers as a way of developing a common operating picture during a hazardous materials incident. It is important to incorporate the use of such tools into hazardous materials trainings, drills and exercises in order to ensure their efficacy during an actual event. *The seven-stage METHANE Report process is depicted on the following page.*

Figure 2. METHANE Report

METHANE Report



My call sign/name/appointment *(Example: Incident Commander at scene)*

Exact location *(1212 Smith Street)*

Type of incident *(Chemical release)*

Hazards, present and potential *(Chlorine)*

Access to scene *(Scene on lockdown)*

Number and severity of casualties *(10 symptomatic)*

Emergency services present and required *(HazMat on scene providing gross decon)*

2) In conjunction with the LEPC, REPC, or other multidisciplinary emergency preparedness forum, facilitate a process to designate a central coordinating body responsible for alerting and providing ongoing situational awareness to hospitals and other emergency management partners within a specific geographic area of a hazardous materials incident. Alerting mechanisms should be redundant and capable of reaching intended recipients within minutes through such channels as mass texting, calling, paging, and/or emailing capabilities.

3) In conjunction with the LEPC, REPC, or other multidisciplinary emergency preparedness forum, develop and utilize web-based tools or other platforms to allow real-time information sharing between first responders and first receivers.

Decontamination Response Strategies

Challenge:

Ensuring a timely, appropriate activation of the hospital decontamination plan

Following initial notification about a potential hazardous materials incident, hospital personnel may experience uncertainty in anticipating *when* and *to what level* to activate the hospital decontamination plan and mobilize necessary resources, particularly when incident information is ambiguous. While a premature activation during a "false alarm" could result in a costly and unnecessary deployment of resources, a delayed response to an actual incident could produce far more dire consequences for patients and first receivers alike. This challenge may be particularly apparent if collaborative relationships with first responder agencies have not been established ahead of time, and if information sharing protocols and procedures have not been sufficiently developed and tested.

Strategies:

1) Consider how development of a phased alert and activation protocol may allow hospitals to appropriately and proactively react to initial information regarding a potential threat to hospital safety. A consortium of acute care hospitals, in collaboration with local first responder agencies in the Washington, D.C. area, developed such an alerting protocol to facilitate timely, appropriate activation of hospital decontamination resources. The protocol is comprised of two distinct alerts that correspond with appropriate activation levels, and is described in further detail below. (Capitol Region MMRS, 2003)

A **DECON ALERT** is implemented when a hazardous materials incident has been reported, but the number of victims and/or need for decontamination has not yet been determined. At this level of alert, hospitals will:

- *Conduct a thorough check of decontamination equipment and resources, to ensure it is ready for use should the alert be elevated to a full activation level;*
- *Evaluate the need for ambulance diversions;*
- *Alert and increase security presence;*
- *Evaluate the need to alter ED waiting room isolation protocol;* and
- *Notify secondary health facilities about the initiated decontamination alert.*

In contrast, a **DECON STANDBY** is implemented by the hospital when enough information is available to confirm that a hazardous materials incident has occurred, and that decontamination is required before victims can receive medical attention and/or be released. Specific details concerning the agent in question may not be available. At the standby level of activation, hospitals will:

- *Immediately deploy the decontamination team and equipment;*
- *Implement hospital lock-down procedures, ensuring a single point of access and egress to avoid facility contamination;* and
- *Notify secondary health facilities about the initiated decontamination standby activation.*

Challenge:

Determining an appropriate course of action when information from the incident scene is unavailable

Addresses Proposed Minimum Decontamination Capability 2.3 – Decontamination Practice

The arrival of patients seeking care may often be the first signal to the hospital that a hazardous materials incident has occurred, a phenomenon evident during the 1993 World Trade Center bombing, the 1995 Oklahoma City bombing and Tokyo Sarin Attacks, and the 2001 Terrorist Attacks in New York City and Arlington, Virginia. (Pye, n.d.) First responders may be unable to relay information regarding the agent in question, the number, age, and status of victims, and other incident details to first receivers on a timely basis due to their involvement at the scene. In such instances, hospital personnel should have a process in place to obtain on-demand guidance and subject matter expertise and determine the best course of action to facilitate a decontamination response.

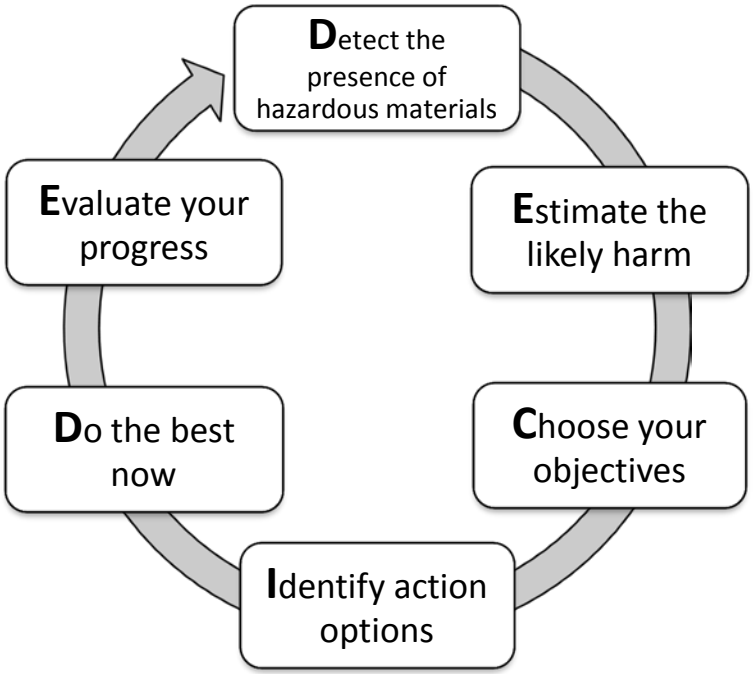
Strategies:

1) Develop a partnership with an entity capable of and willing to provide around-the-clock subject matter expertise regarding definitive care procedures for contaminated and/or exposed patients (such as Poison Control). Consider how development and testing of written protocols and/or Memorandums of Agreement (MOAs) in advance of an incident can facilitate a more efficient timely response during a hazardous materials incident.

2) Identify and train staff to utilize an information resource center or other method to obtain on-demand, expert guidance regarding the properties of and suggested response actions concerning chemical, biological, and radiological agents. As an example, CHEMTREC is a no-cost resource providing around-the-clock, expert guidance on response to hazardous materials incidents. More information about this service is available at: http://www.chemtrec.com/responder/Pages/default.aspx

3) Evaluate how the **DECIDE Process** may assist personnel in determining the best course of action to take at various intervals of a hazardous materials emergency. (St. Barnabas Health Care System, n.d.) *The DECIDE Process is depicted below.*

Figure 3. DECIDE Process



Challenge:

Preventing contamination of the hospital facility

Addresses Proposed Minimum Decontamination Capability 1.2 – Early Incident Recognition

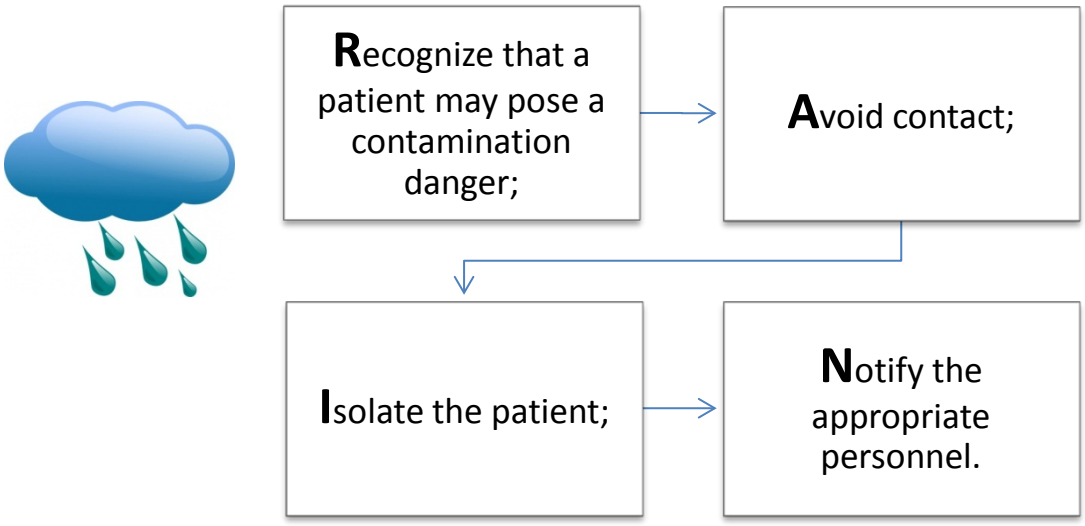
Past mass decontamination incidents have demonstrated that a significant percentage of victims are likely to self-transport from the incident scene to the closest hospital, often arriving with little or no advance warning. Following the Tokyo Subway Sarin Attacks in 1995, over 4,000 victims self-presented at hospitals in comparison to the 688 victims transported by first responders. (Okumura et al, 1998) Even in small scale hazardous materials incidents, it is possible that victims may choose to self-transport, thereby bypassing routine first responder channels through which a hospital may receive advance notification. A single contaminated patient accessing the emergency department has the potential to cripple routine operations and cause serious disruptions to patient care. For this reason, front line personnel (such as Security, Patient Registration, Reception, etc.) must be alert to the signs and symptoms of patients who have been contaminated and appropriately implement security and access control plans to prevent unauthorized patient access to the emergency department.

Strategies:

1) Display pictorial reference guides in the hospital emergency department that clearly depict signs and symptoms typical of hazardous materials contamination and exposure. As an example, the University of North Carolina at Chapel Hill compiled a matrix of chemical terrorism agents and corresponding signs/symptoms, and the Minnesota Department of Public Health created an illustrative chemical terrorism informational poster to promote early detection. These resources are available at http://healthvermont.gov/emerg/wallchart.pdf and http://www.health.state.mn.us/divs/phl/labep/posters.html.

2) Evaluate how the use of simple mnemonics such as the **R.A.I.N** Acronym (Pye, n.d.) may assist front-line hospital personnel recall the appropriate measures to take when responding to a potential hazardous materials incident. *The RAIN Acronym is depicted on the following page.*

Figure 4. RAIN Acronym



3) Require hazardous substance contamination awareness training for all front-line personnel. Awareness level training is designed to provide a basic understanding of a hazardous materials response, and enable personnel to recognize the signs and symptoms of a contaminated patient. Front line personnel should include any persons with the potential for initial contact with an incoming patient, and may include, but is not limited to: Security, Patient Registration, Front Desk/Reception, etc. This training requirement can be included as part of the hiring process, and evaluated on an annual basis.

4) Consider placing color-coded bollards or other brightly colored markers throughout the decontamination area to demarcate hot, warm, and cold parameters. It is likely that patients will not fully understand the extent of the danger of contamination, and may attempt to move in and out of the warm zone, perhaps to reunite with family or friends. (Fitzgerald et al, 2003) It is also possible that hospital decontamination personnel may absentmindedly walk in and out of the cold zone. Color-specific markers can reinforce the establishment of warm and cold zones.

5) Consider how construction of a simple security post immediately outside of the emergency department entrance may serve as a stopgap to the hospital emergency department. One Boston area hospital recently

implemented this plan as a way of promoting early recognition of potentially contaminated patients. The post is staffed on a 24/7 basis by security guards who have received a minimum level of awareness level training as determined by the facility.

6) Alert staff to the possibility that incoming ambulances transporting potentially contaminated victims from the scene may have become contaminated. Precautions should be taken to limit these additional risks of facility contamination.

Challenge:

Minimizing delays in the decontamination process

Addresses Proposed Minimum Decontamination Capability 2.4 – Decontamination Practice

Before patient decontamination can commence, the hospital decontamination team must be activated and dressed in the proper PPE. Additionally, the decontamination zone must be established, and supplemental equipment, assembled. Depending on the team's level of familiarity with these procedures as well as the specific type of decontamination equipment used, it is not uncommon for this process to take upwards of 45 minutes (MDPH HazMat Tabletop Exercise Series, 2011), thereby creating the potential for significant delays in patient decontamination if more immediate measures are not put in place.

Strategies:

Improvements to Decontamination Systems

1) Utilize upcoming or long-term facility construction plans as an opportunity to retrofit or create new decontamination shower systems capable of receiving patients within 10-15 minutes of arrival. Emergency preparedness and/or decontamination team personnel should partner with hospital administration to ensure these changes are planned for in a manner that will meet the needs of both entities.

2) Construct a simple, ready-to-use, fixed decontamination shower system capable of decontaminating multiple patients simultaneously. One Boston area hospital constructed an outdoor, seven-head shower

system in their Emergency Department bay. The hospital plans to use this resource when more than one, but less than 10 patients require decontamination. This resource will allow patients to be quickly cared for, as it does not require set-up of mass decontamination resources. (See Appendix C for a picture of this shower system.)

3) If resources allow, consider purchasing a temporary, inflatable decontamination system that can be quickly and easily assembled. This resource can be used for mass decontamination itself or as a staging area for patients awaiting decontamination.

Promotion of self-decontamination procedures

4) Promote "self-decontamination" among patients as a method of decreasing delays in the decontamination process. Timely removal of contaminated clothing is widely accepted as the most critical aspect of patient decontamination (U.S. Army Chemical, Biological, Radiological and Nuclear School and U.S. Army Edgewood Chemical Biological Center, 2008) and should ideally occur within minutes of exposure. (Vogt et al, 2002) Within a staging area capable of safely holding patients awaiting full decontamination, individuals should be provided with simple instructions on how to disrobe (to ensure contamination is not further spread through movement of clothing) and supplied with sealable bags in which to place their belongings. Patients may also be provided with towels, wet wipes, etc. to remove any visible contamination on the skin. (DHS, DHHS, 2012)

Efficiency in donning PPE

5) Utilize every scheduled training and exercise as an opportunity for staff to practice donning and doffing protective equipment. The more familiar personnel become with these procedures, the more likely they are to efficiently don necessary equipment in a decontamination response, limiting the time until the first patient can be decontaminated.

Challenge:

Minimizing the potential for noncompliance with the decontamination process

A lack of knowledge among patients about the decontamination process may foster feelings of fear and confusion, undermine trust in hospital personnel, and potentially increase non-compliance with decontamination procedures. Several studies evaluating hospital decontamination drills yielded the following observations from interviews with volunteer patients:

- *Patients reported feeling confused about the purpose of decontamination as well as what to expect during and after the decontamination process;*
- *Patients reported feeling anxious as a result of a lack of instruction supplied by decontamination personnel ;*
- *Patients experienced feelings of frustration regarding their ability to communicate with decontamination team personnel wearing PPE;*
- *Patients expressed concerns for their privacy during decontamination; and*
- *Many patients stated that in a real-world event, their experience would have caused them to question the decontamination process and/or refuse decontamination treatment.* (Carter et al, 2012)

Hospitals may benefit from the following strategies to decrease the potential for non-compliance and promote efficiency with the decontamination response.

Strategies:

Effective Communication

To the greatest extent possible, patients should be provided with situational awareness before, during, and following the decontamination process. Hospitals should develop a comprehensive crisis communications plan as a method of providing this information to patients. (AHRQ, 2005)

1) Conduct "Just-In-Time" information sessions with groups of patients at triage. These sessions should inform patients why decontamination is necessary and what to expect as they go through the process. Providing patients with this basic information in a clear, concise format may help to assuage patients' concerns and facilitate a more efficient response.

2) Encourage patients to verbalize any questions or concerns they may have about the decontamination process.

3) Ensure that the decontamination zone and shower system are equipped with large, brightly colored pictograms with easy to follow, step-by-step decontamination procedure instructions. Pictograms should be placed at various stages within the warm zone and may provide patients awaiting decontamination an opportunity to mentally prepare ahead of time for the decontamination process. A consortium of hospitals in Cambridge, Massachusetts developed mass decontamination signage that can be printed at no cost and used in the decontamination zone. Pictogram examples are shown below. This resource can be accessed at: http://www.cambridgepublichealth.org/services/emergency-preparedness/products/mass-decontamination-signs.php. (Cambridge Health Alliance, n.d.)

4) Use chalk, tape, or other method of marking the ground with footprint symbols and/or phrases such as "Stand Here", "Start Here" as a way of alerting patients where to line up and await decontamination procedures.

5) Encourage and train decontamination team personnel to act out key decontamination functions using broad, widely understood gestures such as hair washing, moving from station to station, etc.

6) Utilize a variety of methods and formats to communicate decontamination information with patients. Consider utilizing pre-recorded, looped audio and/or video messaging as a way of providing quick, basic instructions to patients awaiting decontamination procedures.

7) Conduct debriefing sessions with groups of patients in the cold zone following decontamination. The objective of the debriefing sessions should be to allay patients' fears of re-contamination and to provide information and resources regarding follow-up care.

8) Test all methods of communication to be used to support the decontamination process ahead of time, through drills and exercises. A study by Amlot et al. found that pictograms intended to simplify decontamination instructions had a seemingly opposite effect on several adult patients, who reported they had misunderstood and/or forgotten the instructions as they had been supplied before, but not inside the decontamination system. (Health Protection Agency, 2009)

9) Consider purchasing devices that enhance voice communication when personnel are wearing face pieces or masks.

Patient Privacy

While not *required* to ensure the efficacy of decontamination, failure to address patients' concerns of privacy during decontamination is a serious issue that may similarly undermine patient trust in hospital personnel, decrease patient compliance with decontamination procedures, and/or diminish the overall efficiency of decontamination operations. (DHS, DHHS 2012) In 1995, two female Seattle-area police officers sued a local fire department for failing to address their concerns of privacy while undergoing decontamination procedures. (Fitzgerald et al, 2003) In 2011, a lawsuit was filed by a female deputy sheriff citing privacy violation during decontamination procedures at a local hospital. Allegedly, the hospital did not provide towels or coverings to the officer following decontamination. The officer also reported that while undergoing decontamination procedures, she had been videotaped against her will by a fellow police officer, citing training purposes. (AELE, 2011)

1) Ensure that the decontamination shower system(s) include separate, gender-specific lanes/areas.

2) Affix screens, curtains, or stalls to separate each gender-specific lane within the decontamination system, as well as in between each decontamination station, if possible.

3) Provide patients hospital gowns or a similar covering with which to clothe themselves following decontamination.

4) Consider how "trash bag decontamination kits" (Continuum Health Partners, 2006) may serve as a cost-effective method of addressing patients' privacy. Large, opaque trash bags are used in place of more traditionally used manufactured ponchos or patient gowns, providing a covering under which patients may disrobe and rinse. Kits should be pre-assembled in large (24"x30"), sealable bags which are numbered and include the following:

- One large opaque, plastic lawn-type trash bag (ideally 59 gallon, 2.0 mil thickness), pre-cut so as to use as a covering under which the patient can undress
- One large sealable bag (24"x24"), pre-numbered) for collection of patient clothing
- One medium sealable bag (gallon sized, pre-numbered) for collection of patient valuables (wallet, watch, etc.)
- Wristband (pre-numbered), taped to the outside of one of the bags
- *Optional: Tyvek or other gown/covering for patients to don following decontamination

Challenge:

Promoting clear communication among suited decontamination team personnel

While personal protective equipment is essential to protect hospital decontamination personnel operating in the warm zone, the bulky nature of the equipment (primarily noticeable with level C equipment and higher) may impede team members' ability to communicate with each other. Clear communication is essential in order to maximize the safety of suited decontamination team personnel and to ensure an efficient response.

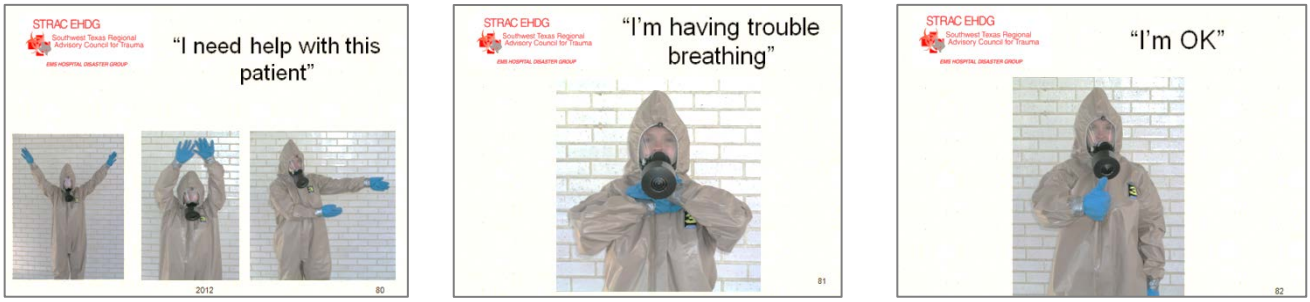
Strategies:

1) Consider purchasing a voice amplification system designed to be worn under PPE. This push-to-talk equipment enables hands-free communication capability via a 2-way radio system that is capable of operating in a variety of environments.

2) Consider using two-way, "temple-transducer" style radio headsets. These hands-free, behind-the head headsets are worn under the PAPR hood and may be more comfortable and functional than over the head styles. (OSHA, 2005)

3) Train decontamination team personnel ahead of time to use safety hand signals as a way of communicating basic functions and needs during the decontamination process. Examples of basic safety signals for decontamination team personnel as depicted by the *Southwest Texas Regional Advisory Council for Trauma EMS Hospital Disaster Group (STRAC EHDG)* can be seen below in Figure 5. Additional examples can be referenced at http://www.nyc.gov/html/doh/downloads/pdf/bhpp/bhpp-focus-hosp-chpprot-decon.pdf.

Figure 5: Decontamination Safety Signals



Challenge:

Conducting decontamination during periods of inclement weather

Hazardous materials incidents can occur at any time, and the decontamination of large numbers of patients may prove particularly challenging during periods of inclement weather, as decontamination typically takes place in an outdoor environment. In cold weather conditions, patients may be less likely to disrobe and comply with decontamination procedures. Additionally, there is real concern regarding the potential for cold weather injury such as cold shock and hypothermia, particularly with vulnerable patient populations. Hospitals should evaluate their capacity to decontaminate small and large numbers of patients in a variety of weather conditions, incorporating specific plans for decontamination during periods of extreme cold.

Strategies:

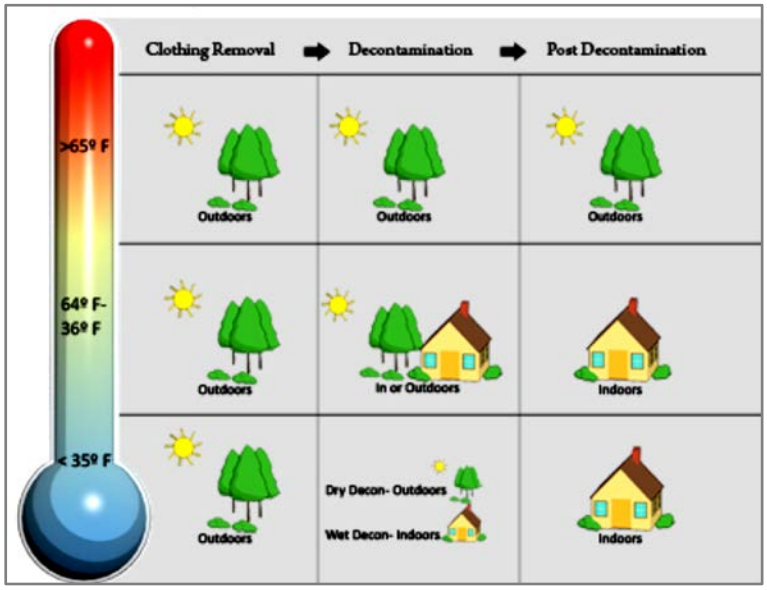
1) Anticipate that patients will be reluctant to remove clothing in cold weather environments and may be more likely to exhibit non-compliant behaviors.

2) Identify and provide a temperature controlled staging/holding area for patients awaiting decontamination.

3) Assess the situation and determine if partial or total decontamination should occur outdoors or indoors. Utilize resources to assist with this decision-making, such as the *Temperature Decontamination Guide* developed by the U.S. Army Chemical, Biological, Radiological and Nuclear School and U.S. Army Edgewood Chemical Biological Center. *The Temperature Decontamination Guide is depicted below, and can be accessed at:*

http://www.nfpa.org/~/media/files/research/resource%20links/first%20responders/decontamination/ecbc_guide_masscasualtydecontam_0813.pdf

Figure 6: Temperature Decontamination Guide



4) Identify and provide a temperature controlled shelter for patients immediately following decontamination.

5) Utilize space heaters to increase the temperature within the decontamination area. It is important to follow standard safety precautions when using electrical and fuel-type space heaters within a confined area.

6) Minimize the distance between the triage area and the decontamination system to limit exposure to outside air.

7) Consider how alternate spaces may be utilized as a cold-weather decontamination area. One large, metropolitan Boston area hospital plans to turn their parking garage into a decontamination area during periods of extreme cold. Exposed areas of the garage will be covered will large tarps, and the area will be warmed by portable heaters. Patients will immediately be taken indoors following decontamination.

8) Inquire about any pre-existing medical conditions patients may have prior to decontamination.

9) In periods of extreme cold, consider utilizing dry decontamination procedures following the removal of clothing in instances of liquid contamination. Dry decontamination may involve the following:

- Disrobement only;
- Face/hand washing only;
- Using paper towels or cloths to blot away contamination;
- Using absorbent materials such as baking powder, Fuller's earth, dirt, etc. to absorb chemical agents;
- Using body brushing techniques to remove dry contamination particles from clothing or the body.

10) Ensure that the water used within the decontamination system is able to be maintained at a tepid temperature (between 80-100 degrees Fahrenheit).

Challenge:

Addressing the specific needs of diverse patient populations in a decontamination response

Decontamination is not a one-size-fits-all procedure. Hospitals should be prepared to address the specific decontamination needs of heterogeneous, and often vulnerable patient populations including, but not limited to:

- Patients with physical and cognitive impairments;
- Infants and small children;
- "Worried-well" patients;
- Limited English Proficiency (LEP) patients/patients of different cultures;

- Non-compliant patients;
- Patients with pets and service animals; and
- Law Enforcement personnel and/or patients presenting with weapons.

Strategies:

Decontamination of patients with physical and cognitive impairments

Nearly one of every five individuals in the United States has a disability, and since not all disabilities are identifiable by sight alone, hospital personnel may not be fully aware of the specific needs of physically and cognitively impaired patients in a decontamination response. Often, even the most well-intended, pre-established plans and accommodations are not sufficient. (Taylor et al, 2009)

1) At triage, make a point of asking each patient if they have a physical or cognitive impairment that may require them to be assisted through the decontamination process. Post signs within the decontamination area and/or operate overhead messaging loops with this information to supplement one-on-one interaction.

2) Institute a *culture of care* among the decontamination team whereby each patient is treated as an expert of his or her own specific needs during the decontamination operation.

3) Maintain a list of patient items (electric wheelchairs, leather components, mechanical vents, hearing aids, etc.) that cannot be decontaminated without compromising the product's integrity, incorporating this information into decontamination plans, trainings and exercises. Examples of items that can and cannot be decontaminated can be accessed at: http://www.nyc.gov/html/doh/downloads/pdf/bhpp/bhpp-focus-hosp-nyctpprot-decon.pdf

4) Anticipate that the removal of adaptive equipment such as walkers, canes, eyeglasses, etc. may cause stress, fear, and a sense of lost independence among patients who rely on them. To the greatest extent possible, allowing patients to go through decontamination with these items may facilitate a more successful, efficient process for both patients and decontamination personnel. Recall that this equipment will need to be decontaminated as well. (NYCTP, 2006)

5) Consider how alternative equipment such as rolling shower chairs can be used to assist with decontamination of higher-functioning non-ambulatory patients. Doing so may conserve use of the traditional roller boards for more seriously impaired and/or non-responsive patients, and may free up staffing resources as it promotes self-decontamination among those that are able.

Decontamination of infants and children

Since the medical and social needs of pediatric patients differ considerably from those of adults, special measures must be taken to ensure their safety in a decontamination response. (Freyberg et al, 2008) In developing plans and procedures, it is critical to recall that infants and children may exhibit the following vulnerabilities:

- *Increased susceptibility to contaminants due to a faster rate of respiration, shorter stature, higher metabolism and rates of cellular growth, more permeable skin, and less developed immune systems*
- *Increased susceptibility to hypothermia due to larger body surface area and thinner skin*
- *Increased risk of dehydration due to a smaller volume of circulating blood throughout the body*
- *Need for different medication delivery methods and dosing requirements*
- *Decreased ability to recognize potentially dangerous situations and/or help themselves*
- *Decreased ability to comprehend decontamination concepts*
- *Fear, as a result of the appearance of PPE worn by hospital personnel*
- *The potential to become inconsolable, withdrawn or otherwise uncooperative with personnel as a result of fear* (Chicago Healthcare System Coalition for Planning and Response, 2012).

1) Develop a protocol for prioritizing decontamination of infants and children in both ambulatory and non-ambulatory groups.

2) Anticipate that decontamination of children may require additional time and staff assistance. Ensure that decontamination plans and procedures allow for this probability.

3) Utilize short cartoon videos and/or cartoon posters as a way of communicating basic decontamination instructions while decreasing the potential for fear among children.

4) To the greatest extent possible, allow families to undergo decontamination together. Doing so will allow parents to assist their children with proper procedures, and may help allay the fears of young children.

5) When possible, assign personnel of the same sex to assist older children with decontamination procedures.

6) When possible, allow a parent/caregiver to carry their infant through the decontamination line, with supervision and assistance from decontamination team personnel. If the infant must be separated from the parent/caregiver, consider utilizing a baby bath, stretcher/roller board, or laundry basket to carry and decontaminate the infant in, using a gentle hand-held shower sprayer.

7) Following decontamination, cover children in foil blankets to prevent against hypothermia.

Response to "worried-well" patients

Previous incidents have demonstrated that large numbers of worried well patients are likely to seek medical care following a large scale or widely publicized mass casualty incident. This phenomenon appears to be particularly apparent when information about the incident is communicated to the public in an ambiguous manner. (Stone, 2007) Following the Tokyo Sarin Attacks, more than four times as many worried well patients sought care than their injured counterparts. (Pilch, n.d.) Such a scenario presents a real challenge for hospitals, as large numbers of worried well patients may expend critical resources and restrict access of their contaminated and/or injured counterparts. Despite these concerns, it is faulty to assume that worried well patients are entirely without needs. Stein et al. assert that worried well patients should be thought of as patients who are "not well", and at a minimum, require an "initial medical evaluation, understanding, guidance, and a plan". (Pilch, n.d.)

1) Alter traditional perceptions of worried well patients. Worried well patients are often thought of in a negative light, when in fact, studies have shown that their behavior in response to a stressful, ambiguous situation is quite logical. Changing how this population is perceived can begin with utilizing a different term to describe them, such as "low risk", which denotes that while they may have been exposed to some degree, they are not in need of immediate treatment. (Stone, 2007)

2) Recognize that worried well patients may actually be 'low exposure' patients. A follow up study with victims of the Tokyo Sarin Attacks found that many worried well patients denied initial care but later treated in

outpatient facilities actually had low levels of contamination, leading, in many cases, to nervous system impairment and decrease in long-term memory function. (Stone, 2007)

3) Triage and separate worried well patients in an area where they can be observed for potentially later-developing signs/symptoms.

4) Designate an alternate space where mental health practitioners and other professionals can provide psychological first aid to worried well patients. Psychological first aid should consist of the following:

- Treating patients with compassion;
- Providing physical and emotional comfort and support;
- Calming and reorienting patients;
- Identifying patients' needs;
- Providing practical assistance, when possible;
- Linking patients with social support networks and resources; and
- Providing information on coping.

5) Depending on the scale and severity of the incident, carefully evaluate your facility's ability to successfully fully decontaminate all patients, regardless of whether they are suspected to be contaminated or not.

6) Identify and consider utilizing minimally invasive measures that can be taken to address patients' concerns in a way that will conserve decontamination resources. For example, a large, rural hospital in Massachusetts plans to take patients' vital signs and request a urine sample. The hospital believes this is quick, easy, cost-effective measure that can be taken to allay the concerns of worried well patients.

7) Consider how dry decontamination procedures may be utilized as a measure of conserving time and resources while simultaneously assuaging the fears of worried-well victims.

8) Provide patients with informational handouts or other resources containing general guidance about the scenario/agent involved, follow-up procedures, and any available resources in the community.

9) Designate a hospital phone line that patients and the public can call to obtain general information about the incident and/or follow up procedures. (KAMEDO, 2007)

Cultural sensitivity and resources for decontamination of Non-English Speaking and Limited English Proficiency (LEP) patients

Between 1980 and 2007, the number of persons in the United States speaking languages other than English at home has increased by 140%, while the general population has increased by only 34%. (U.S. Census, 2007) From 1990 to 2010, the Limited English Proficiency (LEP) population grew by 80% in the U.S. (Migration Policy Institute, 2011). Communicating decontamination procedures and other emergency preparedness concepts with patients that speak little or no English can be challenging, especially when staff are involved in the middle of a potentially stressful response. It is recommended that hospitals develop methods to successfully communicate key decontamination principles and procedures to patients ahead of time in order to facilitate an effective response.

1) Consider incorporating basic cultural competency training into routine training programs and sessions for hospital decontamination team personnel.

2) Utilize multilingual signage within the decontamination area that is most representative of the cultural populations within the community, when possible.

3) Consider how multilingual educational resources such as *Health Info Translations* can assist hospital decontamination personnel communicate with Non-English or Limited English Proficiency (LEP) and/or hearing-impaired patients in a hazardous materials response. Health Info Translations is a database of simple, easy to read educational materials, providing audio, video, and written instructions on many health topics, including decontamination, in over 17 languages as well as in American Sign Language. Resources can be accessed at: https://www.healthinfotranslations.org/

4) Maintain awareness about and sensitivity towards the values, gender roles, and social norms of different cultures. For example, maintaining eye contact is not always appropriate in some cultures. Pay attention to the patient's comfort level when speaking to them and making eye contact.

5) When possible, include interpreters/bilingual personnel on the hospital decontamination team as well as in the cold zone. As with other resources, interpretive services should be available for the languages/cultures most significantly represented in the surrounding community.

6) When utilizing interpretive services, look at and speak directly to the patient, rather than the interpreter.

7) If possible, allow LEP and/or Non-English speaking patients to undergo decontamination with others who speak their language. A decontamination exercise conducted by Taylor et al. in 2009 found that Spanish-speaking patients were reportedly more at-ease with decontamination procedures when accompanied by other Spanish-speaking individuals. (Health Protection Agency, 2009)

Response to non-compliant patients

Contaminated patients refusing to comply with decontamination procedures may pose a risk of cross-contamination to hospital staff, other patients, and the hospital facility, yet attempts to force patients to undergo procedures are largely unsuccessful and ethically questionable. (Capitol Region MMRS, 2003). During a decontamination response to a suspected white powder release in Washington, D.C., attempts to control non-compliant "victims" resulted in "contaminated" law enforcement officers acting aggressively and striking the first responders. During a 1999 response to a pesticide release, first responders forcibly removed the clothing of non-compliant victims, who later reported feeling humiliated, fearful and distrusting of responders. (Carter et al, 2013) Hospitals should be prepared to appropriately respond to patients refusing to participate in decontamination procedures.

1) Anticipate and recognize that patients who are unwilling to undergo decontamination may present with a variety of signs and symptoms, including, but not limited to:

- Agitation;
- Intoxication;
- Irrational behavior;
- Self-inflicted injury or threats of self-injury;
- Limited cognitive ability; and
- Unexplained attitude of ambivalence.

2) Approach individuals from the front, while maintaining eye contact, and speaking in a controlled, even tone.

3) Avoid touching or pointing at the patient, and refrain from speaking in a loud tone or talking down the individual.

4) Provide mental health/counseling assistance, as some patients may simply need to be reassured of the purpose of decontamination and of their safety throughout the process.

5) On a case-by-case basis only, evaluate if certain aspects of decontamination plans/procedures might be modified to accommodate the request of the patient. When doing so, the safety of staff, other patients, and the facility should be prioritized.

6) Immediately assess the potential for cross-contamination to others and maintain detailed records of the incident. Documentation should include the name and address of all patients refusing decontamination, along with a description of what occurred. This information can be of assistance when/if the patient requires follow-up care and can also be shared with local public health authorities as needed.

Decontamination of patients with service animals

In the aftermath of Hurricane Katrina, the PETS Act of 2006 was created to ensure that state and local emergency management partners address the specific needs of individuals with service animals and pets before, during, and after disasters. (ASPCA, 2013) As with other patient populations, hospitals may benefit from an awareness of various planning considerations to address the needs of contaminated patients presenting with service animals. (DHS, DHHS, 2012)

1) Describe the decontamination process, explaining specific procedures that will be used on the animal with the owner.

2) Obtain contact information of a secondary caregiver for the animal in the event that the owner must stay at the hospital for further care.

3) If possible, allow the service animal to go through the decontamination process with the owner to promote patient safety and comfort.

4) Utilize moist towelettes to decontaminate the areas around the animal's eyes, nose, mouth, and in ears, where traditional washing methods may be more difficult.

5) Consider using a muzzle on the animal to prevent it from licking/drinking contaminated water, or biting service personnel.

6) Ensure that extra attention is directed towards decontamination of the animal's paws, as particles can easily become trapped in the deep creased edges of the paw pad.

7) Utilize child gates or other functional barriers to protect against a potential spray of water from animals' natural tendency to shake when wet. (Gordon, 2008)

Decontamination of Law Enforcement personnel and/or patients presenting with weapons

It is likely that law enforcement personnel who have been injured in a hazardous materials incident will have had their weapon(s) removed prior to transfer to the hospital for care. Yet, in a chaotic environment, it is possible that this step could be overlooked, or that civilians presenting to the facility may be carrying firearms or other weapons. In order to ensure safety in a decontamination response, hospitals should develop a protocol to address such scenarios in conjunction with their firearms policy.

1) If permitted by the hospital firearms policy, remove the gun belt, ensuring the weapon remains within the holster, and store it in a clear, sealable plastic bag labeled with the patient's name or other source of identification. The sealed bag should then be transferred to the custody of law enforcement for safekeeping. In the event that the weapon cannot be left in the holster, it should only be removed by a decontamination team member who is familiar with firearms and designated to do so per the hospital's firearms policy. Decontamination of the weapon, belt, and all other associated equipment is the responsibility of law enforcement personnel.
2) Remove ballistic vests by loosening the Velcro straps and pulling the vest apart and off the patient. Similar to the procedure for weapons, the vest should be bagged, sealed, documented, and transferred to a law enforcement officer.

3) Anticipate the possibility that law enforcement personnel may be carrying a secondary weapon. Decontamination team personnel should carefully check in the patient's pockets and around ankles and chest area where holsters are usually worn (EnMagine, 2013).

Challenge:

Ensuring the effectiveness of decontamination

Many sources assert that the removal of contaminated clothing accounts for an 80-90 percent contaminant reduction, yet there is presently no quantifiable, evidence-based method available with which to evaluate this claim. (DHS, DHHS, 2012) According to the Agency for Toxic Substances and Disease Registry (ATSDR) "effective decontamination consists of making the patient As Clean as Possible (ACAP) [meaning that] the contamination has been reduced to a level that is no longer a threat to the patient or to the responder". (DHHS, 2001) Absent a scientifically tested protocol to evaluate "cleanliness" following completion of decontamination procedures, there are measures hospitals can take to follow ACAP guidance and reduce the likelihood of lingering contamination.

Strategies:

1) Incorporate a primary water rinse station in the decontamination shower system. It may be beneficial for patients to immerse themselves under a deluge of water only for a minimum of 30-60 seconds prior to advancing to supplemental soap and rinse stations.

2) Incorporate programmable timers within the decontamination showers that are capable of operating via an on/off feature, and/or sound an alarm to notify the patient when to move to the next station.

3) Purchase one or more radiological monitoring devices to survey patients for thorough decontamination following exposure to radiation.

4) To the greatest extent possible, visually inspect patients for signs of lingering contamination.

Challenge:

Identifying plans and procedures for handling the contaminated deceased

While it is assumed that decontamination team personnel have been trained to operate in potentially contaminated environments, they may not be experienced with procedures for handling and processing

remains. (SBCCOM, 2000) Furthermore, hospital mortuary personnel may not be appropriately trained to recognize the dangers associated with chemically contaminated casualties or may not have access to the appropriate PPE. The contaminated deceased may pose an ongoing risk to hospital and other personnel if not handled properly. In instances of chemical contamination, for instance, the potential for "off-gassing" can occur, particularly if bodies are stored in a closed-off space where concentrations of the agent can reach toxic levels. (Continuum Health Partners, 2006)

Strategies:

1) Evaluate your facility's ability to thoroughly decontaminate deceased patients before they are released to the morgue or coroner's office. Decontamination of the dead should occur in an area that is separate from the main decontamination area and located away from the view of the public.

2) Evaluate whether your facility has the necessary resources available to store contaminated bodies until they are picked up by mortuary personnel or an alternate determination is made as to their next destination. Bodies should be stored in air-tight, marked body bags in an outdoor location away from the view of the public.

3) Recall that a criminal investigation will be necessary in the event that an intentional hazardous material release/act of terrorism is suspected. Consider developing plans/procedures in conjunction with Law Enforcement personnel regarding the collection of clothing and personal effects from the deceased for analysis purposes. In such an instance, all actions taken by the hospital and decontamination team should be thoroughly documented.

4) Encourage local coroners, funeral directors, and other mortuary personnel to participate on hospital and community-based hazardous materials exercises and planning initiatives. Doing so may facilitate interdisciplinary awareness about the unique challenges each may face in a hazardous materials response and may foster ongoing collaboration.

Challenge:

Augmenting hospital decontamination plans, procedures, and capabilities through well-developed drills and exercises

Addresses Proposed Minimum Decontamination Capability 3.1 – Evaluating the Effectiveness of Decontamination Programs

Perhaps the most integral component of ensuring an efficient, effective decontamination response is the hospital's commitment towards regular decontamination and hazardous materials training and exercise. Prioritizing such drills and exercises enables staff to become more familiar with equipment, skills, and concepts, and scenarios they may otherwise be unaccustomed to. Additionally, regular participation in exercises can create an opportunity for identification of new solutions to common challenges, and can foster collaboration with community partners involved in the response.

Strategies:

1) Conduct at least one decontamination exercise annually, whereby all decontamination equipment is fully utilized to test its effectiveness. At a minimum, the following elements should be included:

- Running of water through all pipes and shower heads (30 minute minimum);
- Operation of all engines, motors, generators and heaters (30 minute minimum);
- Donning and doffing of full PPE.

2) Consider using external evaluators such as contracted vendors, staff from surrounding hospitals, and/or qualified community partners in addition to internal personnel to observe and assess hospital performance on decontamination drills and exercises. While internal evaluation is essential, an external perspective may help to reduce the potential for unintentional bias and help to identify areas for improvement in hospital decontamination preparedness and response. In addition, bringing in outside personnel may promote mutual learning and foster relationship-building, which is critical for a community's successful response to hazardous materials incidents.

3) Consider video-recording partial or total portions of decontamination drills and exercises, for the purpose of review on an as-needed basis. Doing so may be a cost-effective method of allowing hospital personnel to

increase improvement plan accuracy, which may often prove challenging due to the potential for observer bias, accurate incident recall during a stressful response, and/or incomplete written evaluations.

4) In addition to collecting exercise evaluation forms and conducting a large group hotwash, conduct interviews with volunteer patients/participants to collect more specific, and valuable data on their perceptions of the decontamination process.

5) Ensure that exercise participants are representative of the hospital's actual patient populations. Doing so should allow a more realistic picture of potential training and resource needs for a real-world response. As an example, a Chicago-area healthcare coalition recruited participants for a hospital decontamination exercise mirroring their patient population, which is largely comprised of Spanish-speaking and deaf individuals. As a result, hospitals identified gaps in their plans and procedures, made recommendations for improvement, and most importantly, recognized the "universal benefit" in incorporating the needs of special populations into a system-wide decontamination operation. (Chicago Healthcare System Coalition for Planning and Response, 2012)

6) Involve the local community in hospital decontamination drills and exercises. Consider publicly advertising upcoming decontamination drills and exercises to solicit participation. Doing so may alert the hospital to currently unmet needs, while educating the public about hazardous materials incidents and the decontamination process.

7) Ensure that all decontamination drills and exercises are followed by a written After Action Report (AAR) to document key findings from the exercise.

8) Develop a process for the sharing of information and lessons learned from decontamination drills and exercises. Consider submitting finalized AARs or case studies to the Federal Emergency Management Agency's Lessons Learned Information Sharing network (FEMA LLIS) to assist other facilities improve upon decontamination capabilities. The LLIS database can be accessed at: https://www.llis.dhs.gov/. In addition, consider how your facility might share lessons learned within a hospital/healthcare coalition, emergency preparedness committee, or other collaborative forum to promote relationship-building and foster community readiness.

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Appendices

Appendix A: Acronym List

Appendix B: Common Terminology

Appendix C: List of References

Appendix A: Acronyms

CBRNE: Chemical, Biological, Radiological, Nuclear, and Explosives

EMS: Emergency Medical Services

HVA: Hazard Vulnerability Analysis

JAS: Job Action Sheets

LEPC: Local Emergency Planning Committee

MOA/MOU: Memorandum of Agreement/Memorandum of Understanding

MOU: Memorandum of Understanding

NIOSH: National Institute for Occupational Safety and Health

OSHA: Occupational Safety and Health Administration

PAPR: Powered Air Purifying Respirator

PPE: Personal Protective Equipment

REPC: Regional Emergency Planning Committee

Appendix B: Terminology

First Receiver:

Employees at a hospital engaged in decontamination and treatment of victims who have been contaminated by a hazardous substance(s) during an emergency incident. The incident occurs at a site other than the hospital. These employees are a subset of first responders.

First Responder:

Personnel who have responsibility to initially respond to emergencies. Some examples are firefighters, HAZMAT team members, law enforcement officers, lifeguards, forestry personnel, ambulance attendants, and other public service personnel. In the case of hazardous materials incidents, these personnel typically respond at the site where the incident occurred.

Hospital Decontamination Zone:

This zone includes any areas where the type and quantity of hazardous substance is unknown and where contaminated victims, contaminated equipment, or contaminated waste may be present. It is reasonably anticipated that employees in this zone might have exposure to contaminated victims, their belongings, equipment, or waste. This zone includes, but is not limited to, places where initial triage and/or medical stabilization of possibly contaminated victims occur, pre-decontamination waiting (staging) areas for victims, the actual decontamination area, and the post decontamination victim inspection area. This area will typically end at the emergency department door. In other documents, this zone is sometimes called the “Warm Zone”, “contamination reduction zone”, “yellow zone”, or “limited access zone”.

Hospital Post-Decontamination Zone:

The Hospital Post-decontamination Zone is an area considered uncontaminated. Equipment and personnel are not expected to become contaminated in this area. At a hospital receiving contaminated victims, the Hospital Post-decontamination Zone includes the emergency department (unless contaminated). This zone is sometimes called the “Cold Zone” or “Clean Area”.

Common terminology taken from OSHA Best Practices for Hospital-based First Receivers, Appendix B.

Appendix C: List of References

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