



OFFICE OF
PREPAREDNESS
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Proposed Minimum Decontamination Capabilities for Hospitals in Massachusetts

HSPH - EPREP
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HARVARD

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Emergency Preparedness and Response
Exercise Program

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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

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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 required² 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 year³ (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 quarterly⁴.

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.

⁴If, 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^of 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

<u>Name</u>	<u>Title or Position</u>	<u>Organization</u>
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

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<u>Name</u>	<u>Title or Position</u>	<u>Organization</u>
Lillian Yadgood	Regional Representative	Region III Hospital Preparedness Group
Major Matthew D. Woolums	Commander	1 st 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

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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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National Fire Protection Agency 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=472>

National Fire Protection Agency 473: Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents
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