

# RECOMMENDATIONS FOR HOSPITAL BASED HAZARDOUS MATERIALS DECONTAMINATION CAPABILITIES IN THE NORTHWEST OHIO REGION

---

Developed for comments: February 03, 2008

Final Document Effective: February 09, 2009

DEVELOPED BY: Gregory Locher

Northwest Ohio Regional Health Care Disaster Preparedness

Exercise/Training/Planning Coordinator

## BACKGROUND

Healthcare workers risk occupational exposures to chemical, biological, or radiological materials when a hospital receives contaminated patients, particularly during a mass casualty incident. In general fire departments within the Northwest Ohio Region have pledged to decontaminate patients prior to transportation to the hospital. Field decontamination will work well at hazardous materials incidents where there are a limited number of exposed/contaminated patients. However, there is a scenario where a number of exposed/contaminated patients from a hazardous materials incident bypass first responders and present to the hospital without undergoing field decontamination. This document refers to these types of incidents, ones that involve a limited number of patients and industrial/transportation/agriculture hazardous materials, as “traditional hazardous materials incidents”. A different scenario involves much larger numbers of patients who are contaminated/exposed. During these “mass casualty hazardous materials incidents”, patients that are exposed/contaminated to a hazardous materials agent will likely bypass fire department decontamination efforts and self-refer to hospital Emergency Rooms. Because hospital employees, who are termed first receivers, work at a site remote from the location where the hazardous substance release occurred<sup>1</sup>, it can be assumed that their exposure is limited to material transported to the hospital on the patient’s skin, hair, or clothing (Horton et al., 2003).

Emergency first responders at the site of the release are covered under the Occupational Safety and Health Administration (OSHA) Standard on Hazardous Waste Operations and Emergency Response (HAZWOPER). However, OSHA recognizes that first receivers require somewhat different training and personal protective equipment (PPE) needs and has developed the OSHA Best Practices for the Protection of Hospital-Based First Receivers document.<sup>2</sup> The OSHA Best Practices document provides practical information to help hospitals address employee protection and training as part of emergency planning for mass casualty incidents. The OSHA document encourages sound planning by hospitals as the first line of defense in all types of emergencies and encourages these emergency plans to reflect the reasonably predictable “worst case” scenario under which first receivers might work. The Joint Commission (JC) requires an all hazards approach to allow hospitals to be flexible enough to respond to emergencies of all types, whether natural or manmade.

---

<sup>1</sup> Hazardous substance for this document is defined as any chemical or biological substance to which exposure may result in adverse effects on the health or safety of employees. This includes substances defined under Section 101(14) of CERCLA; any substance listed by the US Department of Transportation as hazardous material and 49 CFR 172.101 and appendices; substances classified as hazardous waste; and biological or disease-causing agents that may reasonably be anticipated to cause death, disease, or health problems. Radiological considerations need to be developed under separate recommendations.

<sup>2</sup> OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances; US Department of Labor, Occupational Safety and Health Administration, January 2005, [www.osha.gov](http://www.osha.gov).

Worst case scenarios take into consideration the challenges associated with communication, hospital resources, and number of victims. For the worst case scenario of hospitals receiving patients from a “traditional hazardous materials” incident, the hospitals would not receive advanced notification concerning patient’s potentially contaminated and requesting medical assistance. This worst case scenario is also expected during a “mass casualty hazardous materials incident”, as hospitals can anticipate little or no warning before victims begin arriving<sup>3</sup>. Hospitals can also anticipate a larger number of self-referred victims (as many as 80 percent of the total number of victims) and must assume the victims have not been decontaminated prior to arriving at the hospital. Additionally, first receivers can anticipate that information regarding the hazardous agent(s) would not be immediately available. The Tokyo Sarin incident (Nozaki et al.,1995), where patients with no prior warning self-rescued and entered the hospital prior to being decontaminated and as a result cross-contaminated twenty-five per cent of the hospital staff serves as model for mass casualty hazardous materials incidents for hospitals.

The appropriate employee training and PPE selection processes are defined in applicable OSHA standards<sup>4</sup>. An employee’s role and the hazards an employee might encounter dictate the level of training that must be provided to any individual first receiver. Proper PPE selection must be based on a hazard assessment that considers both of these factors, along with a process taken to minimize the extent of an employee’s contact with hazardous substances. The OSHA Best Practices document specifies PPE the hospital could use to effectively protect first receivers assisting victims contaminated with unknown substances provided the hospital meets certain prerequisite conditions designed to minimize the quantity of substance to which first receivers might be exposed. The specified PPE is appropriate when the hazardous substance is unknown and the concentration is strictly limited by several assumptions: 1) the quantity of material is associated with living victims and 2) the conditions, policies, equipment, and procedures are in place that will limit employee exposure. An accurate and current Hazard Vulnerability Analysis (HVA) and Emergency Management Plan (EMP) are two examples of specific prerequisites. Section C of the OSHA Best Practices document provides a discussion of training required for first receivers. The final portion of this section matches the required training levels to employee roles and work areas during decontamination procedures.

## **CURRENT STATUS IN NW OHIO**

In 2006, the hospitals within the Northwest Ohio Planning Region had an evaluation of their decontamination capabilities performed by Ecology and Environment, Incorporated. The results of this evaluation revealed hospitals within the region have widely varying capabilities. Additionally, this assessment was focused primarily on “traditional hazardous materials incident” capabilities. A review of

---

<sup>3</sup> Mass casualty may be defined as “a combination of patient numbers and patient care requirements that challenges or exceeds a hospital’s ability to provide adequate patient care using day-to-day operations” (Barbera and Macintyre, 2003).

<sup>4</sup> Applicable OSHA standards include: 29 CFR 1910.120-HAZWOPER; 29 CFR 1910.132-Personal Protective Equipment-General Requirements; 29 CFR 1910.133-Eye and Face Protection; 29 CFR 1910.134-Respiratory Protection.

the Hazard Vulnerabilities Analysis submitted by hospitals reveals a fairly consistent risk to receiving patients involved in a “traditional hazardous materials incident”. Most hospitals list the typical range of transportation accidents as the most likely venue from which they could potentially receive patients involved in a hazardous materials incident.

It is important to note that in addition to varying capabilities, hospitals within the region have different degrees of risk with respect to the potential numbers of anticipated contaminated patients during a mass casualty incident involving hazardous materials. Hospitals serving densely populated urban areas are more likely to receive larger numbers of patients from a mass casualty incident than smaller, less populated, rural hospitals. The hospitals serving larger populations also tend to have larger staffs, which should result in being able to develop larger decontamination teams.

The National Response Framework, formerly referred to as the National Incident Management System (NIMS), was developed to ensure the uniform development of a particular capability. Important components to consider when developing capabilities are using a risk-based vulnerability/capability approach, resource typing, and regionalization to fill the identified capability gaps. As discussed previously, the hospitals’ HVAs indicate a common risk for “traditional hazardous materials” incidents and a varied risk for larger numbers of patients in a mass casualty hazardous materials incident. Hospitals in densely populated areas are more vulnerable to a potential mass decontamination incident. However it is important to remember that the smaller rural hospitals may become quickly overwhelmed by a smaller number of contaminated patients, effectively making the incident a mass casualty scenario. Risk-based capability development would ensure the capability to effectively manage a mass casualty incident at hospitals reasonably expected to receive large numbers of patients. By using a regional approach towards the development of a mass decontamination capability, hospitals with a larger, well developed decontamination capability could assist smaller decontamination teams on the rare occasions they become overwhelmed throughout the region.

Resource typing is important for the effective management of resources during any emergency incident. Resource typing would also ensure the common development of hospital decontamination capability in the Northwest Ohio Region. When considering resource typing for the decontamination capability, the following factors should be considered: 1) PPE and respiratory protection, 2) other equipment associated with the decontamination capability, 3) training of decontamination team members and staff working in the cold zone, 4) number of personnel required to accomplish the mission of the particular resource type, and 5) the specific capability of each type of team. The State of Ohio Hazardous Materials/ Decontamination Technical Advisory Committee (TAC) has established three first responder team types using these factors.<sup>5</sup> Currently there are no established team types by the NIMS Integration Center for hospital decontamination capability.

---

<sup>5</sup> The Federal Emergency Management Agency (FEMA) or the NIMS Integration Center has not yet resource typed hazardous materials teams for first responders. The Ohio Hazardous Materials/Decontamination TAC has established three types of first responder hazardous materials teams using these factors.

It should be recognized that hospitals heavily rely on the fire service first responders during any hazardous material incident. Early notification of potential receiving hospitals during both the “traditional hazardous materials” incident and “mass casualty hazardous materials incident” is essential. Early notification and communication with hospitals during “traditional hazardous materials” incidents allows hospital personnel to be assured that an attempt to properly decontaminate patients prior to transportation to the receiving hospital will occur. The fire service can also communicate available information concerning product identification, patient signs and symptoms, and expected numbers of contaminated patients. Early notification of hospitals during a “mass causality hazardous materials incident” is essential for the hospital to initiate lockdown procedures and prepare for a large influx of contaminated/exposed patients.

As discussed previously, during mass casualty hazardous materials incidents, it is unreasonable to expect the first responders to be able to decontaminate the large number of contaminated/exposed patients. Ambulatory patients will not wait at the scene to be decontaminated, but rather self-refer to a hospital. The fire service should recognize that a hospital is considered a critical community resource and therefore should allocate some of its decontamination resources to protect this asset. Specifically, the regional fire service leaders should be encouraged to respond with an engine capable of rapidly initiating a large flow of low pressure water to a pre-designated location at a hospital. The fire service response to local hospitals, besides rapidly establishing a mass decontamination capability, also has another benefit. Fire service personnel are required to be trained to the Operations Level for a hazardous materials incident and are accomplished and well exercised in this specialty area. The expertise that the fire service brings to the hospitals will assist in ensuring success of a hospital-based decontamination system. Hospital decontamination teams and local fire departments should be encouraged to interface in training and joint exercises to facilitate any potential incident<sup>6</sup>. Hospitals are encouraged to develop Memorandum of Understanding (MOU) with their local fire departments to assist with mass decontamination capability.

The Northwest Ohio Hospital Decontamination Recommendations Policy recognizes the OSHA Best Practices document, Environmental Protection Agency standards, Occupational Safety and Health Act, HRSA Hazards Mitigation Target Capabilities, and Joint Commission standards. With these standards and requirements in mind, the following recommendations are made for Northwest Ohio hospitals.

## **DECONTAMINATION CAPABILITY RECOMMENDATIONS FOR NORTHWEST OHIO HOSPITALS**

### TRAINING OF HOSPITAL PERSONNEL

The training indicated for first receivers depends on the individual’s roles and functions, the zones in which they work, and the likelihood that they will encounter contaminated patients. This document recommends the following levels of training be **MANDATORY** for hospital employees:

---

<sup>6</sup> JC (2004) requires, and OSHA (2001) recommends, that organizations coordinate emergency management and planning efforts.

- **AWARNESS LEVEL.** Required for all employees who work in the contaminate-free Hospital Post-Decontamination Zone, but might be in a position to identify a contaminated victim who arrives unannounced<sup>7</sup>. This group includes ED clinicians<sup>8</sup>, ED clerks, and ED triage staff who would be responsible for notifying authorities of the arrival, but would not reasonably be anticipated to have contact with the contaminated victims, their belongings, or waste. This group also includes decontamination set-up crew members and patient tracking clerks if their roles do not put them in contact with contaminated victims; e.g.; setting up the decontamination system before victims arrive or tracking patients from a location outside the decontamination zone.

Training requirements for First Responder Awareness Level appear under 29 CFR 1910.120 (q) (6) (i), which does not require a specific minimum training duration, but outlines competencies the employee must acquire. The competencies required for Awareness Level training are:

- An understanding of what hazardous materials are, and the risks associated with them in an incident.
- An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
- The ability to recognize the presence of hazardous substances in an emergency.
- The ability to identify the hazardous substances, if possible.
- An understanding of their role in the hospital's emergency response plan, including site security and control, and decontamination procedures.
- The ability to recognize the need for additional resources and to make appropriate notifications.

The OSHA Best Practices document recommends that in addition to these topics, hospital staff should be well trained in the following procedures:

- Avoid physical contact with the patient.
- Immediately notify a supervisor and safety officer of possible contamination.
- Allow other properly trained and equipped staff to isolate and decontaminate the victim according to the hospital emergency management plan.

**Annual refresher training is required for employees trained to the Awareness Level.**

There is considerable variability in the extent of training provided at the Awareness Level. The OSHA Best Practices document surveyed hospitals and found hospitals used curricula that range from 2 to 4 hours and most required an annual refresher course of 1 – 4 hours. In the

---

<sup>7</sup> JC standards require an orientation and education program for all personnel who participate in implementing the EMP. This education addresses: 1) specific roles and responsibilities during emergencies, 2) methods used to recognize specific types of emergencies, and 3) information and skills required to perform assigned duties during emergencies.

<sup>8</sup> The term clinician refers to physicians, nurses, nurse practitioners, physicians' assistants, and others.

Northwest Ohio Region there is a wide variety of Awareness Level courses offered by educational institutions, private companies, fire departments, and private contractors. This document **RECOMMENDS** that hospitals submit these various courses for review and approval by the Northwest Ohio Hospital Steering Committee. The Hospital Steering Committee would be responsible for ensuring submitted courses meet the required Awareness Level competencies and are relevant to hospital-based personnel. This method would allow hospitals in the Northwest Ohio Region to establish a cadre of courses available for Awareness Level training and ensure a minimum level of competency for this level of training throughout the region.

**OPERATIONS LEVEL.** OSHA Letters of Interpretation specify that hospitals must provide HAZWOPER First Responder Operations Level training to first receivers who are expected to decontaminate victims or handle victims before they are thoroughly decontaminated (OSHA, 2003, 2002b, 1999, 1992c, 1991a). This level of training is appropriate for any hospital employees with a designated role in the hospital decontamination zone.

Training requirements for First Responder Operations Level appear under 29 CFR 1910.120 (q) (6) (ii) and require a minimum of 8 hours and outlines the competencies the employee must acquire. OSHA allows these competencies, but not the training time, to be tailored to better meet the needs of first receivers. For example, the training might omit topics that are not directly relevant to the employee's role, such as recognition of Department of Transportation (DOT) placards, but instead should include alternative training on hazard recognition (e.g., signs and symptoms of contamination or exposure), on decontamination procedures provided by the hospital, and on the selection and use of PPE (OSHA, 1992c). Training that is relevant to the required competencies counts towards the 8-hour requirement, even if the training is provided as a separate course. The competencies required for Operations Level training are:

- The competencies listed for Awareness Level training above.
- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper PPE.
  - When PPE is necessary
  - What PPE is necessary
  - How to properly put on, remove, adjust, and wear PPE
  - Limitations of PPE
  - Proper care, maintenance, useful life, and disposal of PPE
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and PPE available.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.

Refresher training is specified under 1910.120(q)(8)(i), however the length of the refresher training is not specified. **Instead the standard requires employees “shall receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate their competency in those areas at least yearly”.**

Operations Level training must also include training required by OSHA’s Respiratory Protection Standard (29 CFR 1910.134). At a minimum, training under OSHA’s Respiratory Protection Standard must cover the following topic areas:

- The nature of the respiratory hazard and why a respirator is needed.
- Respirator capabilities, limitations, and consequences, if the respirator is not used correctly.
- How to handle respirator malfunctions and other emergencies.
- How to inspect, put on, remove, use, and check seals on the respirator.
- Maintenance and storage procedures.
- When to change the cartridges on APR’s.
- How to recognize medical signs and symptoms that may limit or prevent effective use of a respirator.
- General requirements of the respiratory protection program.

The employee must be able to demonstrate competence in wearing the complete PPE ensemble, including respirator, protective garment, gloves, boots, and other safety equipment required for the employee’s role.

First receivers who wear respiratory protection must be deemed medically qualified to do so, following the process required by CFR 1910.134(e)(1) through (e)(6) of OSHA’s Respiratory Protection Standard. Employees who wear tight-fitting respirators must also be properly fit-tested as required in 29 CFR 1910.120.134(f).

As an alternative to the 8 hour training requirement, the HAZWOPER Standard allows employees with sufficient experience to demonstrate competencies in specific areas; however it is important for the hospital to document how the training requirements were met. In most hospital settings, however, it might be difficult to ensure employees have sufficient experience to waive the training requirement. Most hospital employees do not have extensive experience with hazardous materials and decontamination activities which are performed infrequently. These 8 hours of training may be required to assure competence. Employees particularly benefit from the practical experience they gain during training provided as part of exercises and drills. These events also offer employees an opportunity to demonstrate competence in critical areas.

The First Responder Awareness Level training is allowed to count towards fulfilling the 8 hour Operations Level training requirement.

There is also a variety of Operations Level training courses offered in the Northwest Ohio Region. This document **RECOMMENDS** that hospitals submit these various courses for review and approval by the Northwest Ohio Hospital Steering Committee. The Hospital Steering Committee would be responsible for ensuring submitted courses meet the required Operations Level competencies and are relevant to hospital-based personnel. This method would allow hospitals in the Northwest Ohio Region to establish a cadre of courses available for Operations Level training and ensure a minimum level of competency for this level of training throughout the region.

This document **RECOMMENDS** the following:

- **BRIEFING FOR SKILLED SUPPORT PERSONNEL WHOSE PARTICIPATION WAS NOT PREVIOUSLY ANTICIPATED.** A member of the staff who has not been designated, but is unexpectedly called on to treat a contaminated victim, or to perform work in the decontamination zone, is considered “skilled support personnel”. The OSHA Best Practices document allows “just-in-time” training for these members and outlines the specific areas that must be covered. While this is the only training required for these personnel, time and resource limitations inherent in a crisis will likely diminish the effectiveness of such training. With this in mind, **this document recommends using this training only as a last resort for personnel that may be required to work in the Warm Zone to keep decontamination operations smoothly functioning, but are not directly involved in patient decontamination.** An example of when this type of training might be required would be an emergency repair of equipment involved in the decontamination process, such as an electrical generator, is necessary by a maintenance employee not trained to the Operations Level.
- **TRAINING SIMILAR TO THAT OUTLINED IN THE HAZARD COMMUNICATION STANDARD.** This level of training communicates the potential hazards associated with a hazardous materials incident and familiarizes employees with the hospital decontamination policy<sup>9</sup>. This level of training is recommended for other personnel in the Hospital Post-decontamination Zone who reasonably would not be expected to encounter or come in contact with unannounced contaminated patients, their belongings, or waste (e.g.: other ED Staff such as housekeepers)

**This document would REQUIRE the following training level at all hospitals:**

- **HAZMAT BRANCH DIRECTOR.** This level of training should be reserved for a select number of individuals within the hospital institution. Individuals taking this training would be expected to fill the Hazmat Branch Director/Hazmat Safety Officer position during an incident. In addition,

---

<sup>9</sup> Employer obligations pursuant to the HAZWOPER and HAZCOM standards are determined by the hazards to which it is reasonably possible for employees to be exposed, given the nature and locations of the employee’s work.

these individuals would be responsible for the training of hospital decontamination team members, record-keeping for team members, oversight of the respiratory protection program for first receivers<sup>10</sup>, and maintenance of the hospital's PPE.

The training for this person(s) should consist of hazardous materials courses beyond the Operations Level (i.e., courses available through Center for Domestic Preparedness in Anniston, Alabama and various courses on equipment maintenance offered by manufacturers), a sound knowledge of the Hospital Incident Command System, and competency or experience with safety in a hospital environment.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

This document considers two types of PPE for hospital personnel working in the hospital decontamination zone: 1) Respiratory protection and 2) Skin protection. This document also uses the assumptions listed in Tables #1 and #2 in the OSHA Best Practices document. The following are considered **MINIMUM** standards for PPE:

- RESPIRATORY PROTECTION IN THE HOSPITAL DECONTAMINATION ZONE.
  - Powered air-purifying respirator (PAPR) that provides a protection factor of 1,000. The respirator must be National Institute for Occupational Safety and Health (NIOSH) approved. The hood style is RECOMMENDED, which has several advantages:
    - Eliminates the necessity of sizing face-pieces
    - Eliminates the OSHA fit-testing requirement
    - Allows hospital employees with facial hair a tight-fitting seal
  - Combination 99.97% high efficiency particulate air (HEPA) / organic vapor/acid gas respirator cartridges.
- SKIN PROTECTION IN THE HOSPITAL DECONTAMINATION ZONE.
  - Triple layer protective gloves. (Nitrile under-gloves with chemically resistant outer-gloves that allows sufficient chemical protection and dexterity. Nitrile gloves would be the layer against the skin and the last removed when decontaminating hospital decontamination team members.) Hospitals should consider their Hazard Vulnerability Analysis when specifying glove materials.
  - Chemical resistant suit. Following the OSHA Best Practices document, it is recommended that hospitals use their Hazard Vulnerability Analysis towards the selection of this PPE item. The hospital must consult with the Local Emergency Planning Committee (LEPC) and Emergency Management Agency to determine the chemical hazards present within their region in order to adequately protect their decontamination team members. In addition, under OSHA's Personal Protective Equipment Standard (29 CFR 1910.132) hospitals must certify in writing that a hazard

---

<sup>10</sup> As required by 29 CFR 1910.134 (Respiratory Protection)

assessment has been performed. Hospitals likely to receive patients from a specific hazard should adjust the PPE accordingly. It is recommended that hospitals use an all hazards approach towards the selection of skin protection PPE.

The optimal garment material for first receivers will protect against a wide range of chemicals in liquid, solid, or vapor form (phase). Because first receivers might become cross-contaminated with liquid or solid contaminants through physical contact with a contaminated victim, the ideal fabric will repel chemicals during incidental contact. Protection from gases is less important because, as described earlier, gases generally will dissipate before a victim arrives at the hospital. Additionally, the optimal garment will restrict the passage of vapors, both through the suit fabric and through openings in the suit.

Unless the hospital's HVA indicates a special hazard, **Level C protection is recommended**. Increasing the level of protection to Level B or A requires a different respiratory protection (Level B: SCBA or tight-fitting APR face-piece with the correct cartridge for the specific chemical. Using an APR would also require the hospital to monitor the environment with air sampling equipment. Level A: SCBA required).

High-level chemical protective suits that have a wide range of chemicals to which they are resistant are recommended. Some mid-level chemical resistant suits, such as the Dupont SL or CPF series, do not have chemical resistance for a wide range of chemicals.<sup>11</sup>

It is **RECOMMENDED** that hospitals purchase chemical resistant suits with head covering<sup>12</sup> and foot protection<sup>13</sup> incorporated into the suit.

- Chemical protective boots are **recommended** rather than disposable outer-protective chemical shoe covers.
- Suit openings sealed with tape. While duct tape or masking tape is commonly used to seal suits, **it is RECOMMENDED that hospitals reserve the use of this taping material for training and purchase the necessary amount of chemically resistant tape for actual**

---

<sup>11</sup> Manufacturers can provide laboratory-testing information regarding specific materials.

<sup>12</sup> When placing the chemical resistant suit in-service, the hospital may either: 1) cut away the hood material or, 2) fold the hood material inside the suit to allow the first receiver to properly fit their hood-style suit to the PAPR. Suits with hoods are recommended as an interoperable component with fire department first responders who wear different respiratory protection (SCBA). If fire department first responders have hood-style suits available at the hospital, they will have adequate skin protection available to assist with hospital decontamination efforts.

<sup>13</sup> Suits with the additional foot protection are recommended for hospital first receivers that will be walking through water run-off during decontamination efforts.

**incidents.** Chemically resistant tape is a cost effective choice as it does not have a shelf life.

- It is also **RECOMMENDED** that M-8 paper be available to hospital personnel working in the decontamination zone during a suspected Chemical/Biological/Radiological/Nuclear/Explosive (CBRNE) incident. M-8 paper is specific to the detection of liquid CBRNE agents and could be used for several purposes:
  - Worn at strategic positions by hospital personnel working in chemical resistant suits to potentially identify cross-contamination.
  - Used by hospital personnel working at the end of the decontamination zone to swipe patients. This could provide an indication of the effectiveness of the hospital decontamination efforts.
  - Used by hospital personnel working in the hospital decontamination zone to assist in determining if the decontamination zone needs to be extended to include areas affected by water run-off.
- It is **RECOMMENDED** that all hospitals have rapid access to ionizing radiation meters. Experts suggest that alpha or beta emitting particles may be more likely contaminants in a “mass casualty hazardous materials event”. Relatively reliable and easy to use instruments are available for measuring ionizing radiation. Hospitals that offer patients nuclear medicine services generally have access to radiation meters.<sup>14</sup>

This document follows the OSHA Best Practices and **REQUIRES** the following for hospital personnel working in the hospital post-decontamination zone that are receiving “clean” patients and working in an enclosed environment. The enclosed environment presents a potential hazard to hospital personnel from patients that may not have been completely decontaminated.

- **RESPIRATORY / SKIN PROTECTION FOR PERSONNEL IN THE HOSPITAL POST-DECONTAMINATION ZONE**
  - Normal work clothes and PPE, as necessary, for infection control purposes.
  - It is **RECOMMENDED** that hospitals utilize chemical detection strips that are commercially available that detect a wide range of chemicals. These strips cost approximately twenty dollars each and have a two year shelf life. These strips should be worn by hospital personnel that have direct patient contact.

This document considers the hospital decontamination of patients a system whose components will ensure speedy, efficient decontamination of patients while protecting hospital personnel. Hospitals should strive to employ all of these decontamination system components during a hazardous materials incident. The following are considered **MIMIMUM** system components:

- The implementation of a strong command and control process using Hospital Incident Command System (HICS) – 4.

---

<sup>14</sup> The intent of this document is address decontamination concerns from a chemical or biological incident. Radiological decontamination concerns should be considered under an appendix to this document.

- The ability to assemble all decontamination equipment and begin gross decontamination within ten (10) minutes notification of a “mass casualty hazardous materials incident”.<sup>15</sup>
- A written and tested Lockdown Policy for the hospital. The hospital must be able to rapidly initiate this policy upon notification of an external hazardous materials incident. For this reason, the lockdown policy must not rely on assistance from public safety forces.
- Provisions for an alternate route to the Emergency Department during a hazardous materials / decontamination incident, for admission of patients that have not been involved in the hazardous materials incident when the hospital decontamination site is located near the ambulatory or EMS entrance. Patients unrelated to the hazardous materials incident will continue to arrive at the hospital and an identified alternate route of entry for these patients must be established. This alternate route should be provided in a diagram to local emergency responders. (See fire department assisted mass decontamination below) Hospitals should consider the implementation of a more desirable location for a decontamination area when performing redesigns of their Emergency Departments.
- A holding area for at least 50 patients protected from the elements. (Hospitals serving metropolitan areas should be capable of holding at least 100 patients.)<sup>16</sup>
- Provision for temporary clothing for patients to wear following the decontamination process.
- Communication ability for decontamination team members, and staff/patients, both indoors and outdoors. The communication ability between staff should be portable radios that allow communication among decontamination team members and other areas in the hospital. The hospital must also consider communication ability with patients during a mass decontamination incident to ensure an orderly flow of patients to the decontamination entry point. At a minimum, decontamination team members should have hand signals to communicate with each other and the Hazmat Branch Director/Safety Officer that are clearly presented in the hospital decontamination policy.

---

<sup>15</sup> This timeframe is based on the OSHA Best Practices document which assumes that viable patients that arrive at the hospital will have reduced levels of contamination if they are further than ten minutes from the hazardous materials site.

<sup>16</sup> The numbers of persons capable of being decontaminated by each “type” of hospital decontamination team is further defined under the Team Resource Typing section of this document.

- A Medical Monitoring Procedure, as outlined in the OSHA Best Practices document, for Hospital Decontamination Team members.
- A decontamination system that addresses gender and privacy concerns.
- A decontamination system that addresses ambulatory and non-ambulatory patients. Hospitals should carefully consider how they will handle the more time-consuming non-ambulatory patients when purchasing decontamination equipment.
- A written Memorandum of Understanding (MOU) with the local fire department(s) to make all reasonable attempts to :
  - Initiate early notification of local hospitals in the event of a hazardous materials incident that involves potential contaminated patients. This early notification is especially important in mass casualty incidents where contaminated patients may be shortly arriving at the hospital.
  - Field-decontaminate patients involved in a chemical hazardous materials incident prior to transportation to the local hospital. Note: radiological patients do not require field decontamination prior to transport<sup>17</sup>.
  - Assist the hospital with decontamination efforts during mass casualty decontamination incidents. As previously discussed, the local fire department(s) should automatically respond an engine capable of rapidly flowing large volumes of water at low pressure to provide initial decontamination of patients that have self-referred to the hospital. The site for the fire department to set-up should be provided in diagram form to the local fire department(s) along with the alternate route for ER admissions.
  - Note: This MOU should also include a provision for the hospital and local fire department(s) to test and exercise the mass decontamination plan for patients during a mass casualty incident.
- Mark 1 chemical antidotes in sufficient quantity for the **protection of hospital decontamination team members**. Hospital/EMS CHEMPAKS which are strategically located in the Northwest Ohio Region are designated for patient use. Refer to the State of Ohio CHEMPAK Activation Plan to access antidotes for patients.
- Tepid water for wet decontamination during the “final decontamination process” performed by the hospital. (Note: This does not necessarily include any gross decontamination systems developed for mass decontamination prior to the final hospital decontamination system.)

---

<sup>17</sup> Radiological Emergency Response Health and Safety Manual, U.S. Department of Energy, DOE/NV/11718-440, May 2001.

- Provide a capability to separate, isolate, and secure personal property for later possible decontamination or evidence.
- Incorporation of a liquid soap with good surfactant properties and non-irritating to the skin and mucus membranes, such as a baby soap, into the hospital decontamination process.<sup>18</sup> The decontamination process should never be delayed to add soap (SMCCOM, 2000b).
- A cold weather decontamination procedure to allow rapid patient decontamination without initially using tepid water. An example of such a procedure would be to remove patients' clothing prior to bringing them into a controlled environment (heated tent or internal decontamination room) for tepid water decontamination. Removal of contaminated clothing can reduce the quantity of contaminant associated with victims by an estimated 75 to 90 percent.<sup>19</sup>
- A written waste management procedure within the hospital decontamination policy. During an emergency, first receivers should take all necessary steps to save lives, protect the public, and protect themselves from cross-contamination. Once imminent threats to human health and life are addressed, first receivers should make all reasonable efforts to contain contamination and avoid or mitigate environmental consequences (US EPA, 2000)<sup>20</sup>. A wide range of waste water management strategies are available to hospitals. Examples of some management methods are external containment, large underground storage tanks, portable waste water containment systems, and an MOU with the local municipal waste water treatment facility to notify them in the event of an intentional release of contaminated waste water into their system. To determine the appropriate waste water management practice hospitals should consult with their Local Emergency Planning Committee (LEPC), whose members can work together creatively using available resources to minimize the environmental impact of hazardous materials incidents.

---

<sup>18</sup> Many liquid soaps have good surfactant properties and are not excessively harsh on skin (e.g., major brands of hand dishwashing soap, such as Joy, Ivory, Dawn, and others). Non-tearing baby shampoo is another recommended soap.

<sup>19</sup> The percentage of contaminant reduction depends on the type of clothing the victim was wearing when exposed. Estimates may be somewhat lower (down to 50%) for victims wearing short pants or skirts (Macintyre et al., 2000; Vogt, 2002; USACHPPM, 2003a).

<sup>20</sup> According to the 2000 EPA Alert, first responders' liability under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for environmental damages occurring during a hazardous materials incident is limited when public health or welfare are in danger by the "Good Samaritan" provision contained in Section 107 (d) of CERCLA. To access a copy of the EPA Alert, see <<http://www.osha.gov/pls/oshaweb/owaredirect.html>>

The waste management policy should include provisions for contracting with hazardous waste management companies to test and dispose of waste that is considered hazardous. This would include solid materials such as patients' clothing. The waste management policy should recognize that in response to some incidents, authorities might request that certain types of waste be retained as evidence. In that case, the hospital will provide instructions for handling the waste material.

- A written procedure for decontaminating hospital surfaces and equipment. The hospital EMP should include procedures for cleaning surfaces and equipment after an incident. Cleaning should be performed by properly protected and trained personnel. Equipment that cannot be safely decontaminated should be processed for appropriate disposal.

### **NORTHWEST OHIO REGION HOSPITAL DECONTAMINATION TEAM RESOURCE TYPING**

One of the components of Homeland Security Presidential Directive (HSPD) #5 was to encourage the use of resource typing. Resource typing has many advantages as described in the NIMS 700 course. Resource typing should be based on the five factors previously discussed. With the minimum levels of training, PPE, and other decontamination system components defined, the next logical step is to define the decontamination capabilities by hospitals in the Northwest Ohio Region. The only remaining factors for resource typing of hospital decontamination teams are the number of members required for a particular type of team and the capability of each team type. As previously discussed, it is recognized that neither the NIMS Integration Center nor the Joint Commission have defined team types for hospital decontamination teams. The risk in defining team types prior to the NIMS Integration Center is that the Northwest Ohio Region definition may need to be modified at a later date. However, waiting for a federal or Joint Commission definition will not allow the NW Ohio Region to progress in hospital decontamination capabilities or planning. As most of the components of the hospital decontamination team typing used in this document are based on national standards, the eventual adjustments required after a federal/ JC definition are produced will likely be small. In making the recommendations for hospital decontamination team typing this document recognizes several factors/assumptions:

- Hospitals in the Northwest Ohio Region vary greatly in their patient bed capacity, which directly relates to their size. The size of a hospital determines the number of personnel available to participate in decontamination team efforts.
- The Hazard Vulnerability Analysis of regional hospitals indicates a low probability for a mass casualty incident involving hazardous materials. Hospitals vary greatly in their ability to handle these types of incidents. The HVAs indicate a higher probability for receiving patients from an external hazardous materials incident.
- All hospitals in the region, regardless of size, should have the capability to decontaminate the small number of patients expected from a "traditional" hazardous materials incident.
- In general, the smaller hospitals in the Northwest Ohio Region serve a smaller population than the larger metropolitan area hospitals. This is an important factor when considering the

potential numbers of patients expected during a mass casualty incident involving hazardous materials. Hospitals serving smaller populations could reasonably expect fewer patients during a mass causality incident.

- A mass causality incident involving hazardous materials will most probably be a local incident and therefore involve only local hospitals. (This assumes that a single chemical attack or incident will occur in the region)
- Most hospitals in the Northwest Ohio Region will be overwhelmed by a mass causality incident, regardless of their capability.

This document **RECOMMENDS** four levels of decontamination capability be developed in the Northwest Ohio Region:

#### **Type IV HOSPITAL DECONTAMINATION TEAM**

**A Type IV hospital decontamination team is capable of decontaminating a minimum of four (4) contaminated/exposed patients from a “traditional” known or unknown hazardous materials incident who are ambulatory or non-ambulatory.**

**This team type has the capability to decontaminate at least thirty-five (35) ambulatory patients and ten (10) non-ambulatory patients (45 total patients) from a mass casualty incident involving hazardous materials within a two hour operational period. This number of patients is based on the HRSA Hazard Mitigation benchmark for hospital preparedness and represents an average of 4 patients per minute.**

This level of capability **REQUIRES** a **MINIMUM** of **five (5) team members** trained to an Operations Level with annual competency review and suited in proper PPE. This number of team members allows for a triage/management position, two members to perform patient decontamination, and two backup team members. **The position of triage/management is filled by a person with Basic Life Support skills.**

The amount of PPE required for this level of team would be seven (7) PAPRs and sufficient number/sizes of chemically resistant suits, gloves, and boots to fit a variety of personnel on the team. It is recommended that each team member have a PPE kit assigned to them and placed in a storage area that is rapidly available at the hospital decontamination site along with a scalable number of reserve sizes.

A hazmat branch director, who does not wear PPE, but is rapidly available to direct the decontamination operations and act as Hazmat Safety Officer is required with this type of team.

Type IV Hospital Decontamination Teams are **REQUIRED** for hospitals that serve a population base of 000 – 55,999.

#### **Type III HOSPITAL DECONTAMINATION TEAM**

**A type III hospital decontamination team is capable of decontaminating a minimum of four (4) to eight (8) contaminated/exposed patients from a “traditional” known or unknown hazardous materials incident who are ambulatory or non-ambulatory.**

**This team type has the capability to decontaminate at least forty-five (45) ambulatory patients and fifteen (15) non-ambulatory patients (70 total patients) from a mass casualty incident involving hazardous materials within a two hour operational period. This number of patients is based on the HRSA Hazard Mitigation benchmark for hospital preparedness and represents an average of 4 patients per minute.**

This level of capability **REQUIRES** a **MINIMUM** of **seven (7) team members** trained to an Operations Level with annual competency review and suited in proper PPE. This number of team members allows for a triage/management position, three members to perform patient decontamination, and three backup team members. **The position of triage/management is filled by a person with Basic Life Support skills.**

The amount of PPE required for this level of team would be ten (10) PAPRs and sufficient number/sizes of chemically resistant suits, gloves, and boots to fit a variety of personnel on the team. It is recommended that each team member have a PPE kit assigned to them and placed in a storage area that is rapidly available at the hospital decontamination site along with a scalable number of reserve sizes.

A hazmat branch director, who does not wear PPE, but is rapidly available to direct the decontamination operations and act as Hazmat Safety Officer is required with this type of team.

Type III Hospital Decontamination Teams are **REQUIRED** for hospitals that serve a population base of 56,000 – 99,999.

#### **Type II HOSPITAL DECONTAMINATION TEAM**

**A type II hospital decontamination team is capable of decontaminating a minimum of four (4) to eight (8) contaminated/exposed patients from a “traditional” known or unknown hazardous materials incident who are ambulatory or non-ambulatory.**

**This team type has the capability to decontaminate at least ninety (90) ambulatory patients and thirty (30) non-ambulatory patients (120 total patients) during a mass casualty incident involving hazardous materials within a two hour operational period. This number of patients is based on the HRSA Hazard Mitigation benchmark for hospital preparedness and represents an average of 4 patients per minute.**

This level of capability **REQUIRES** a **MINIMUM** of **eleven (11) team members** trained to an Operations Level with annual competency review and suited in proper PPE. This number of team members allows for a triage/management position, six members to perform patient decontamination, three backup team members, and a hazmat branch director.

The amount of PPE required for this level of team would be fourteen (14) PAPRs and sufficient number/sizes of chemically resistant suits, gloves, and boots to fit a variety of personnel on the team.

A hazmat branch director, who does not wear PPE, but is rapidly available to direct the decontamination operations and act as Hazmat Safety Officer is required for this type of team. **The position of triage/management and two patient decontamination members participating in decontamination should be filled by persons with Basic Life Support Skills.**

Type II Hospital Decontamination Teams are **REQUIRED** for hospitals that serve a population base of greater than 100,000.

### **Type I HOSPITAL DECONTAMINATION TEAM**

A Type I Hospital Decontamination Team has the same capabilities as a Type II Team. In addition, this team has the capability of being mobile and arriving at another hospital within the Northwest Ohio Region within sixty (60) minutes of notification. A trailer with associated truck capable of transporting the trailer with the required PPE, decontamination tent, and other required decontamination supplies is required with this team type in addition to team members.

The purpose of a Type I team is to provide support to another hospital in the region during a mass casualty hazardous materials incident. A select number of hospitals need to be able develop this capability. Several assumptions are made with respect to a mass casualty hazardous materials incident:

- The risk for this type of event is much greater in areas with larger population bases. For metropolitan areas such as Lucas County, it is impossible to predict the location of a potential incident.
- This type of incident will be localized. Contaminated/Exposed patients will present to the closest hospital(s). Not all hospitals in a metropolitan area will be affected.
- All hospitals in the NW Ohio Region, regardless of type, will eventually be overwhelmed by the resources required to sustain proper decontamination and treatment during this type of incident.

With these assumptions in mind, it is **RECOMMENDED** that Type I team capabilities be developed as follows<sup>21</sup>:

- One hospital in Allen County
- Two-Three hospitals in Lucas County

---

<sup>21</sup> JC standards require cooperative planning among healthcare organizations that together provide services to a contiguous geographic area.

