Mass Casualty Decontamination for Hospitals

Instructor's Guide

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Introduction

By Jerry Crow, RN, Hazardous Materials Technician
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In order to prepare hospital personnel to safely manage a mass casualty mass decontamination event, Los Angeles County Emergency Medical Services Agency has developed this training program. Funding for this project was made possible by grant number U3RHS03882 from the National Bioterrorism Hospital Preparedness Program. This course has been developed to assist in providing retraining for students who have already participated and have been certified in mass decontamination awareness and operational training. It must be noted and stressed that this program is not intended for primary training of the new decontamination team member, but should be used as a tool to help maintain competency of the previously trained and knowledgeable team member in accordance with State and Federal laws.

In order to adequately assess team member training needs, deficiencies, and competencies, the instructor must possess knowledge of each aspect of the hospital decontamination operation, not all of which is contained in this course. Course material does include Weapons of Mass Destruction (WMD) awareness, the Hospital Incident Command System (HICS), personal protective equipment (PPE) selection, donning and doffing procedures, and hospital decontamination operations. However, specific hospital emergency procedures and protocols such as the emergency response plan (ERP), standard operating procedures (SOPs), etc., for obvious reasons, are not part of this course but must be included in any primary or refresher training. Encompassing all aspects of hospital planning and response specific to a mass decontamination event into decontamination training provides students with an understanding of their role within the decontamination operation and how the team as a whole integrates and functions as a part of the entire hospital operation.

The instructor has great flexibility in how this course material can be conveyed to the student. All five video programs are included on one DVD. Each program can be accessed from the DVD menu.

The “Introduction to Weapons of Mass Destruction” video can be shown before large groups followed by a simple question and answer session. The HICS video can be viewed in large groups or individually but ultimately must be practiced as a tabletop exercise or during a functional exercise as knowledge of HICS increases. The instructor may choose a smaller setting in which to show the donning and doffing procedure video. During the hands-on PPE donning and doffing, it is recommended that the student/instructor ratio be no more that 10:1 and quite possibly 2 or 3:1 for those students who have retained little information from the primary training.

Donning and doffing of PPE is the most requested aspect to review by hospital decontamination team leaders. It is also one area in which consistent and excellent training can have a direct impact on the safety of the student in training or of the

team member during an actual mass decontamination event.

As an instructor, you are well aware of the time constraints regarding training. Decontamination team members have full-time duties elsewhere in the facility that require attention which obviously limits the amount of time to devote to decontamination training. It is therefore imperative that the instructor tailor the training content to the identified needs of the individual student in order to maximize the knowledge gained within a limited amount of time. Not all videos need to be viewed in their entirety at one sitting. Students might view one video, or sections of a course individually and present any questions to the instructor at a later time; flexibility is the key with the time constraints imposed on the student.

A safe, effective, and coordinated response to a mass casualty mass decontamination event by a hospital decontamination team is not possible without planning, preparation, and training. For those facilities that have received equipment and accepted grant funding for a hospital decontamination operation, training must be done quarterly and documentation of the type of training and who attended must exist.

Course Agenda

This course is designed to be presented in one of two ways, depending on the schedule of participants and the needs of the facility. The order of activities is slightly different for the two versions.

Four 2-hour segments:

Segment 1	Introduction, Welcome, Pre-Seminar Quiz and discussion Module 1, video and activities
Segment 2	Module 2, video and activities Module 3, video and activities
Segment 3	Module 4, video and activities Post-Seminar Test
Segment 4	Module 5, video Exercise Exercise critique/Wrap-up

Two 4-hour segments

Segment 1	Introduction, Welcome, Pre-Seminar Quiz and discussion Module 1, video and activities Module 2, video and activities Module 3, video and activities
Segment 2	Module 4, video and activities Module 5, video Exercise Exercise critique Post-Seminar Test Wrap Up

Module One

Introduction to Weapons of Mass Destruction

Weapons of Mass Destruction (WMD) are devices, usually chemical, biological, explosive, or radiological in nature, that are intended to cause death or serious bodily injury to a large number of people. In the hands of terrorists, WMDs are likely to be particularly deadly.

Emergency health care providers are important elements of the nation's first line of defense and response against terrorist attacks involving Weapons of Mass Destruction.

It is important that health care workers become familiar with the etiology and clinical symptoms of WMD agents, not only to be better prepared to assist victims but also to prevent exposing themselves and their facilities to the danger of cross contamination.

If victims are contaminated with liquid chemical agents, decon is necessary. If the chemical is in gaseous form, mass decon beyond the removal of clothing may or may not be necessary. If there is any doubt, decontamination should be carried out.

If victims are contaminated by radio-active materials, life-saving procedures may take precedence over decontamination. If available, radiation detectors may be deployed to triage victims, although it may take longer to carry out surveys, than it does to decontaminate. If readings are more than three times above background, victims should undergo decon. Following decon victims must be surveyed again to determine if the process was successful.

Usually victims of biological terrorism will not have to be decontaminated. Exceptions are those known to have had skin contact with aerosolized pathogens, powders, or droplets, or who may have the material on their clothing. Although these persons can be directed to decon themselves especially in the instance of suspicious substance calls, decon may have psychological benefits for victims, but at the same time raise concern in the community.

Note to the Instructor

It is suggested that you prepare thoroughly by watching the five videos which are included on the DVD and by reading this Guide ahead of time. Pay particular attention to the Objectives which are listed at the beginning of each module, as well as the Pre-Seminar Quiz discussion questions. As you lead this discussion, you will get a feel for the background of the students in relation to decontamination and Hazwoper training. Also pay attention to the Activities that follow each script, and which may need to be tailored to suit the specific class. Time spent doing this kind of customizing may result in a seminar that is more effective for each group.

Your most important roles as seminar Instructor are to serve as a catalyst for learning and to help the group meet its objectives. The seminar is presented in five modules, which should be followed in order:

1. *Introduction to Weapons of Mass Destruction*
2. *The Hospital Incident Command System (HICS)*
3. *Personal Protective Equipment*
4. *Patient Decontamination*
5. *Exercises*

By following the Agenda outlined on page 7, you will be able to provide at least eight hours of training in Operations Level competencies for hospital-based mass decontamination. You will notice that the class may be presented either as four two-hour sessions or two four-hour sessions, to accommodate differing training schedules. The order of activities is slightly different for the two agendas.

Each student should be provided with a Student Workbook. Included in the workbook is a Pre-Seminar Quiz which is intended to be get them thinking about the topic of terrorism response and mass decontamination. The workbook also includes objectives for each module; reference materials that will help them conduct mass decontamination at the Operations Level, a Glossary and a Post-Seminar Test.

Included in this Instructor's Guide (but not included in the Student Workbook) are suggested answers to the Pre-Seminar Quiz, copies of each script for reference, and an answer key to the Post Seminar Test.

To begin the seminar, introduce yourself and have all class members introduce themselves and provide a brief background that includes their previous training. Then, review competencies from Awareness training:

- An understanding of what hazardous substances are and the risks associated with them;
- 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 realize the need for additional resources and make appropriate notifications to the communication center

Next, have them open their workbooks to page 7, Pre-Seminar Quiz. Explain to participants that this quiz is designed to get them thinking about mass decontamination and to find out how much they know already. There is no passing grade, and they may find they know more than they realize. After 20 minutes, tell them that time is up and they should complete the answer they are working on. Review their answers, using the discussion beginning on the next page as a guide.

Pre Seminar Quiz Discussion

1. *What is decontamination and why is it necessary?*

   ANSWER – Decontamination is the physical process of reducing or removing contaminants from people or equipment. It is carried out to stop further injury to victims caused by contaminants, to stop the spread of contaminants, to prevent injury to rescuers and First Receivers, and to keep medical facilities free of contamination. It is also needed to protect other civilians and emergency personnel from being cross-contaminated and to help prevent contamination of ambulances and hospitals. If medical facilities become contaminated, they risk being closed.

2. *List some of the challenges that hospitals will face in mass decontamination situations?*

   ANSWER – The biggest challenge will be to set up the decon area and to move as many people as possible through it as rapidly as possible, so they will derive the greatest benefit from the process. Another challenge will be to provide information and on-the-spot instruction to victims regarding the decontamination process. Those in charge will have to be able to control the scene and show leadership so that victims – most of whom probably were not expecting to have to shower before treatment – don't leave the area and potentially spread contamination to other parts of the hospital or other locations in the community. Another challenge will be to deal with people who have been injured and people who are scared and potentially unruly. Casualties may include many different types of people, including the very young, the very old, people from diverse cultures and religions, and people who don't understand the local language. Because decontamination involves disrobing, there will be modesty issues that must be dealt with. If the weather is cold, there may be issues with hypothermia and providing warm shelter and clothing after decontamination.

3. *What are some basic safety precautions that First Receivers should take to avoid becoming contaminated?*

   ANSWER – First Receivers should try to minimize direct contact with victims. They should wear appropriate protective clothing – respirator, chemical protective clothing, boots and gloves. At the end of their shifts they should go through technical decontamination.

4. *What types of weapons might terrorists use?*

   ANSWER - The four categories of terrorist weapons are:

   - Explosives & incendiaries (pipe bombs, car bombs, mail bombs, hand grenades, molotov cocktails, handguns)
   - Chemical agents
   - Biological agents
   - Radiological agents

5. *What are some of the potential problems for First Receivers working in personal protective equipment?*

   ANSWER – Protective equipment can impede the body's ability to regulate heat. The special barrier fabrics used in protective garments prevent the inward penetration of hazardous materials, but at the same time, reduce the outward passage of body heat and humidity. The result can be heat cramps, or more

severe conditions like heat exhaustion or heat stroke. Other potential problems include limited visibility due to respiratory protection and limited agility due to the cumbersome nature of the ensemble.

6. *What are the four levels of personal protective equipment?*

ANSWER –

- Level A
  Highest level of respiratory, skin, eye, and mucous membrane protection
  - positive pressure SCBA or air line
  - fully encapsulated, vapor tight suit
  - chemically resistant gloves and boots
- Level B
  Highest level of respiratory protection and a lesser level of skin protection
  - positive pressure SCBA or air line
  - non-vapor tight encapsulated suit or 1 or 2 piece coverall-type suit
  - chemically resistant gloves and boots
- Level C
  Used when the type of airborne substance is known and a lesser degree of respiratory protection is required
  - air purifying respirator
  - non-encapsulated splash suit
  - chemically resistant gloves and boots
- Level D
  - Work uniform
  - Should not be worn on any scene where respiratory or skin hazards exist

7. *Why is it important to have an organized incident management system to deal with terrorist and other types of major incidents?*

ANSWER – An Incident Management System such as the Hospital Incident Command System (HICS) defines a consistent approach to incident management that enables all those involved to work off the same page. This leads to a more efficient and effective response. Because the roles are pre-defined, everyone knows what is expected when assigned to a HICS position.

Other advantages to using HICS:

- The chain of command is responsibility oriented;
- There is a wide acceptance with other emergency organizations through common mission and language;
- It has applicability to different types and magnitudes of emergency events;
- It provides for an expeditious transfer of resources (mutual aid) within a particular system from one facility to another;
- It offers flexibility in implementation of individual sections or branches of the organization;
- It leads to a minimal disruption to the existing hospital.

8. *List some of the equipment and other items needed in the decon area.*

ANSWER – For decon operations, First Receivers will need showers or hoses with low-pressure nozzles; soap or foam solution; towels and clothing – pre-packaged disposable clothing, hospital gowns, or even large opaque trash bags. There should also be plastic bags to hold contaminated clothing and personal items and identification tags or bracelets for victims. Decon team members will also need protective clothing and respiratory equipment.

9. *How do you determine that a victim presenting at the hospital requires decon?*

   ANSWER – Decon is necessary if it is determined that the victim has been exposed or contaminated with a substance, and that substance is causing the victim to exhibit symptoms of some type. Decon is also indicated if the person was in a large gathering where others were experiencing the same symptoms. It is not necessary to identify the substance prior to initiating decon.

10. *What are some ways of obtaining information about chemicals or WMDs?*

    ANSWER – In the event of a chemical or unidentified WMD event, information may be obtained by contacting the local poison control center, dialing the national poison control number (800) 222-1222, or through the local hazardous materials response team. Assistance and advice on patient decontamination and management concerns in the event of a radiological emergency may be obtained 24 hours a day from the Oak Ridge Radiation Emergency Assistance Center and Training site by calling (615) 576-3131 or (615) 481-1000 and asking for the REAC/TS team.

Objectives – Module One

Take a short break, then continue with a discussion of the objectives for Module One.

Following successful completion of Module One, the seminar participant will be able to:

- Define terrorism & recognize the impact that a terrorism event would have on their facility or community
- Characterize biological agents, chemical agents, radiological agents and explosive agents
- Discuss how biological agents, chemical agents, radiological agents and explosive agents could be used as a Weapon of Mass Destruction (WMD)
- Describe signs and symptoms that might indicate the use of a WMD
- Identify the need for specialized Weapon of Mass Destruction (WMD) training
- Discuss Occupational Safety and Health Administration (OSHA) regulations regarding emergency response to hazardous materials incidents

It is now time to view the first video on the DVD, *Introduction to Weapons of Mass Destruction*. The script that follows here is for reference purposes.

Introduction to Weapons of Mass Destruction

Script

NARRATOR

"Recent events prove that the U.S. is vulnerable to high casualty incendiary attacks by terrorists. We are also vulnerable to biological, chemical and radiological agent attacks, which have the potential to be even more deadly.

"Many agents that could be used for such attacks are easy to come by. Some are industrial chemicals found in every day use. Recipes for some homemade agents can be found on the Internet. Reports of arsenals of military chemical and biological weapons raise the possibility that terrorists might have access to highly dangerous agents which have been engineered for dissemination as small-particle aerosols. Such agents may be highly contagious or fatal.

"Healthcare workers risk occupational exposure to chemical, biological, or radiological materials when hospitals receive contaminated patients. Especially of concern are large numbers of contaminated patients from mass casualty incidents. Such incidents could be the result of an intentional terrorist attack, from an unintentional catastrophic release of a hazardous substance, or from a natural disaster such as Hurricane Katrina and the subsequent flooding. The contaminants could be from a wide range of hazardous substances—biological agents, chemical weapons, toxic industrial chemicals, or uncontrolled wastewater.

"Healthcare workers who provide initial care and treatment of contaminated victims at a hospital remote from where the hazardous substance was released, are often called First Receivers. The possible exposure of these First Receivers is due to the hazardous substance that remains on the victims and their clothing or personal effects. First Receivers play a key role in recognizing that the symptoms a patient is experiencing are due to a hazardous substance exposure. These personnel are the first line of defense against co-worker exposure and injury or a section of the hospital having to shut down because of contamination.

"First Receivers typically include clinicians and other hospital staff who have a role in receiving and treating contaminated victims as well as those whose roles support these functions, such as security, admissions personnel, and maintenance staff.

"This program is the first part of a series called "Mass Casualty Decontamination for Hospitals," designed to provide First Receivers with the information they need to safely and effectively manage patients who may pose a secondary contamination risk, and is called "Introduction to Weapons of Mass Destruction."

"The program will present the threat of terrorism and describe the types of agents that may be used as Weapons of Mass Destruction. It will list the symptoms of

exposure to those agents and describe how the response differs between overt and covert attacks. The training requirements for personnel who may be called into action during these events will also be explained.

“Weapons of Mass Destruction are usually divided into four types: chemical agents, biological agents, explosive and incendiary weapons, and radiological and nuclear weapons.

“Terrorists may cause the deliberate release of a chemical substance or agent with intent to cause injury. Some recent uses include the Sarin nerve agent attack in the Tokyo subway system and the use of chemical agents by Iraq during its war with Iran.

“Chemical agents are usually man-made through the use of industrial chemical processes. The agents are typically classified by their intended effects: Nerve agents, Blood agents, Blister agents, Choking agents, Riot control agents and Incapacitating agents.

“Nerve agents include Tabun, Soman, Sarin, and VX. These are the most deadly of the chemical agents since they disrupt the way nerves communicate with other nerves, muscle, glands or organs similar to organophosphate-based pesticides. Nerve agents are extremely toxic whether they are inhaled, ingested or absorbed through the skin. Victims exposed to an aerosolized release would experience immediate symptoms. Skin contact by liquid nerve agents may result in high lethality and a delayed onset of symptoms up to eighteen hours after exposure. Symptoms of mild exposures can include miosis, runny nose, drooling, vomiting, and shortness of breath. More severe exposures can result in loss of consciousness, convulsions, cessation of breathing, and paralysis. With the Tokyo subway attacks, the First Receivers at the hospitals became symptomatic after being exposed by off-gassing from patients and their clothing.

“Blood agents include arsine, hydrogen sulfide, cyanogen chloride, and hydrogen cyanide. Blood agents interfere with the blood's ability to transport oxygen or the body's ability to utilize oxygen transported at the cellular level. Exposure to blood agents may occur by inhalation, ingestion, or skin contact. Mild to moderate exposures can produce nausea, dizziness, weakness, anxiety, and headaches. Exposure to large concentrations can result in cyanosis, unconsciousness; convulsions, and cessation of breathing.

“Blister agents include mustard agents and Lewisite. Blister agents, or vesicants, cause a blistering of the skin and mucous membranes. Used as effective weapons during World War I, they are toxic through inhalation, ingestion, or skin contact. Exposure can produce blistering of the skin, necrosis and wounds that resemble second to third degree burns as well as reddening of eyes, sore throat, hoarseness, dry cough and vomiting. Lewisite will produce immediate blistering as opposed to Mustard agents which will produce blistering anywhere from 3 to 24 hours after exposure.

“Choking agents include chlorine, phosgene, diphosgene and ammonia. These agents are commonly known as toxic industrial chemicals and are frequently found in manufacturing and industrial facilities. Choking agents, which were also used in

World War I, irritate the lungs, causing them to fill with fluid. Exposure is primarily by inhalation, but can also result in skin irritation and chemical burns. Symptoms begin with shortness of breath, then extreme respiratory distress, which progresses and is accompanied by coughing, frothy sputum, nausea and vomiting. Symptoms may occur immediately or may be delayed for hours depending on the agent and amount of exposure.

“Riot control agents include capsaicin, mace, and tear gas. These agents are commonly used by law enforcement agencies for crowd control and can cause an intense but temporary irritation of eyes and the respiratory tract. While riot control agents may be an annoyance for the general public, hospital patients with pre-existing conditions can be significantly affected if exposed to these chemicals from secondary contamination.

“Incapacitating agents are chemicals which produce a temporary disabling condition that may persist for hours to days after exposure to the agent has ceased. They produce their effects mainly by altering or disrupting the activity of the central nervous system. Incapacitating agents usually don't produce permanent injury or death except when used in high doses.

“Terrorists may use biological agents to deliberately introduce living organisms into an environment with intent to cause disease. The varying incubation periods and initial manifestations will make a covert attack hard to recognize. The after effects of an attack using Bio weapons can last weeks to months compared to explosives, chemicals, and radiation contamination. Some Bio agents such as smallpox, plague and viral hemorrhagic fevers are transmissible from person to person.

“Biological agents are divided into four major categories: Bacteria, Rickettsia, Toxins, and Viruses.

“Bacteria are single-cell organisms that can cause illness or death. Some examples are anthrax, brucellosis, cholera, plague and tularemia. Onset of symptoms generally occur within several days.

“Rickettsia are microorganisms that resemble bacteria but are intercellular parasites that can reproduce inside animal cells. Q fever, Rocky Mountain spotted fever and typhus are some examples.

“Toxins are chemicals that are produced by some plants, animals or microorganisms. Some examples are botulinum, ricin, staphylococcal enterotoxin B, saxitoxin and T2 Mycotoxin. Botulinum toxin is many times more toxic than VX, the most lethal of the nerve agents.

“Viruses are small, simple organisms that live as parasites within cells. Some examples are smallpox, ebola, yellow fever, marburg and Venezuelan equine encephalitis. Onset of symptoms may be several days from the time of exposure resulting in illness that ranges from mild sickness to death.

“Terrorists may use a radiological device to cause widespread destruction or radioactive contamination. A radiological dispersal device may be set off using

conventional explosives to disperse radioactive material causing extensive contamination. This is commonly called a "dirty bomb". A stolen nuclear weapon may be detonated with devastating effect. Finally, terrorists may attack a nuclear power plant, releasing radioactive material.

“Terrorists may use radiological weapons to cause fear, disruption, and widespread contamination. The use of radiological agents can result in patient exposure by irradiation or internal, and external contamination. The effects will depend on the type of agent, the dose of radiation emitted, the duration of exposure and the nature of the attack.

“Improvised explosive devices, or IEDs and incendiary devices have been used in more than 95% of terrorist attacks. Explosive may be concealed in almost any kind of package or vehicle, or may be conveyed to the point of attack by a suicide bomber. Explosive devices instantaneously release large amounts of energy resulting in a blast wave and wind with destructive force. Shrapnel, chemicals, radiological substances, or biological agents can be added to increase the potential for injured victims. Incendiary devices are designed to start and spread a fire. The most notorious example is the 9/11 use of aircraft loaded with jet fuel. The most popular incendiary device throughout history has been the Molotov cocktail.

“Many victims of explosions will have multiple injuries. There may be burns and wounds from flying debris. Victims may sustain injury after being thrown by the blast wind. Overpressure may cause trauma to air-containing organs such as lungs, GI-tract and the middle ear. In some cases, victims may also be contaminated.

“A terrorist attack using a WMD may be overt or covert. In an overt attack, usually involving explosive, radiological, or some chemical agents, the effects are immediately obvious. The first responders to an overt attack will be police, fire, and EMS personnel. Hospitals and public health agencies will work in support of the response to the incident.

“In a covert attack, if a biological agent, toxin or radiological agent were used the effects would be delayed. Covert attacks are more insidious and harder to identify. County and city health officials, primary care providers, hospital staff, and outpatient staff or home health care clinicians may be first to identify that an attack has taken place as victims seek medical help days or weeks after the attack. Although victims may have been contaminated in a common location, they will seek treatment in disparate locations, different cities, maybe even out of state. “Clues of a covert biological incident might include large numbers of victims with similar signs and symptoms, disease outbreaks that occur at unusual times, or the unexpected appearance of large numbers of dead animals. Often, victims present with symptoms that are similar to the common flu such as cough, fever and muscle aches. These symptoms may progress rapidly if unrecognized or left untreated.

“Proper training is essential in order to safely and effectively deal with patients from these types of incidents. Most hospital personnel have little or no experience wearing the protective equipment designed for hazardous materials operations or carrying out decontamination. The training indicated for First Receivers depends on the individual’s roles and functions, the areas to which they are assigned during an incident, and the likelihood that they will encounter contaminated patients.

"Awareness Level training is required for those employees who work in a contaminant-free area such as a clean area patients enter after they have gone through decontamination. They might also be in a position to recognize a contaminated victim who arrives unannounced. This group includes emergency department clinicians, clerks, and triage staff who would be responsible for notifying hospital authorities of the patients arrival, but would not be expected to have direct physical contact with the contaminated victims, their belongings, or contaminated waste. The group also includes the decontamination system set-up personnel and patient-tracking clerks who work from a location outside of the decontamination area. Contaminated patients will likely attempt to access the facility through entrances other than the Emergency Department. Other personnel within the hospital such as receptionists and volunteers should be trained if they may have initial contact with contaminated victims. This level of training also is required for hospital security officers who work away from the Hospital Decontamination Area.

"Awareness Level First Receivers should know what hazardous materials and Weapons of Mass Destruction are. They should understand the risks and potential outcomes when hazardous materials or WMDs are present during an emergency. They should be able to recognize the potential for contamination of patients. Awareness Level First Receivers should understand their roles during an incident, know how to use basic references, recognize the need for additional resources, and know how to implement their assigned procedures.

"The acronym RAIN can be used to summarize Awareness Level activities. Recognize that a patient may present a contamination danger, Avoid contact with the patient, Isolate the patient, and Notify appropriate personnel. For example, a victim seeking assistance has something on his or her clothing, it could be solid or liquid or the victim may have been exposed to a gas. Whatever the substance is, it appears to be causing the signs and symptoms that the victim is experiencing. The victim may be coming from a location where large numbers of people gather such as a shopping mall or sporting event. Early recognition is the key to preventing hospital staff from becoming victims and preventing secondary transfer of the contamination to the healthcare facility.

"First Receivers who are expected to decontaminate victims or handle victims before they are thoroughly decontaminated must receive a higher level of training. This is commonly known as Operations Level training and is necessary for anyone with a designated role in the patient decontamination process. This includes all hospital personnel who provide triage, treatment, decontamination, or other services to contaminated individuals or who may come into physical contact with contaminated individuals arriving at the hospital. Security staff who are assigned roles in the decontamination area are also included.

"Operations Level personnel should be familiar with the hospital's emergency operations plan and understand their roles in the decontamination team response. They should know the requirements for site safety, including risks to receiving personnel; hazard recognition, such as signs and symptoms of contamination or exposure; decontamination procedures; the appropriate selection and use of

personal protective equipment; and special concerns for treating contaminated patients.

"We are at risk of terrorist attacks involving the use of Weapons of Mass Destruction. These can include chemical agents, biological agents, radioactive substances, explosives and incendiary devices. Large numbers of patients may become contaminated by the accidental catastrophic releases of hazardous materials. Natural disasters may also result in large numbers of contaminated people. Hospital First Receivers who deal with patients from these incidents must be able to recognize contaminated patients, isolate them, make appropriate notifications, and carry out appropriate decontamination procedures.

"An awareness of the possible threats and the training necessary to conduct patient decontamination will enable Hospital First Receivers to provide optimal care in a safe and efficient manner."

Credits

Activities – Module One

The purpose of the activities which follow each module are to relate the lessons taught in the video to the roles that the students will play as decon team members at their own facilities. The following are some suggested activities that apply to this part of the seminar; you might think of others.

- Discuss potential WMD or hazmat scenarios in your catchment area. How would you identify patients that need decontamination? Discuss the symptoms you would expect to see for different types of WMD agents or chemical exposure.
- Depending on the nature of the incident, how could your approach to the situation be different?
- Tour the hospital to identify entrances that will have to be secured to prevent facility contamination. Discuss how this will be accomplished.
- Make lists of appropriate actions that Hospital First Receivers trained to the Operations Levels should take. Also discuss actions that would be beyond the scope of the Hospital First Receiver.

Instructor Resource

Teaching Points for Module One

General Competencies for First Responder Operations Level Training

PROCEDURE	
Skill Component	**Teaching Points**
1) Demonstrate an understanding of what hazardous substances are, and the risks associated with them in an incident	Hazardous substances can be released through either covert or overt means and can include any material (solid, liquid, or gas) that is man made or naturally occurring. These materials can produce death, disease, or injury to humans, plants, or animals. Associated risks during a decontamination event include injury to victims or team members, secondary transmission of the product to first receivers and the treatment facility resulting in potential loss of service.
2) Demonstrate an understanding of the potential outcomes associated with an emergency when hazardous substances are present	Injury and loss of life to those who have been exposed or contaminated with a hazardous substance. Disruption or termination of critical health services due to secondary contamination of one or more facilities.
3) Demonstrate the ability to recognize the presence of hazardous substances in an emergency through signs and symptoms of exposure	Victims may seek treatment with one or more of the following: • Contamination with or exposure to a substance that appears to be causing illness or injury. • Nerve agent signs: SLUDGE (salivation, lacrimation, urination, defecation, gastrointestinal upset, emesis), diaphoresis, shortness of breath, seizures, etc. Odor of fish if VX, fruity odor if Sarin nerve agent is present. • Pulmonary or choking agent signs: Shortness of breath or dyspnea, cough, hoarseness of voice, chest pain, headache, dizziness, burning of throat, skin, and mucous membranes. Odor of new mown hay if Phosgene. • Blood agent (i.e., cyanide) signs: Headache, dizziness, shortness of breath, confusion, tachypnea, or hyperpnea, seizures, etc. Odor of bitter almonds for cyanide (undetectable in 40% of the population). • Vesicants or blister causing agent: Redness or burning to exposed skin, blisters, vesicles, redness and burning of eyes, throat pain, shortness of breath, chest pain, or gastrointestinal discomfort or pain. Odor of garlic or horseradish for mustard agent, geranium odor for Lewisite. • Biological agent after incubation period: flu-like symptoms (fever, headache, muscle aches), shortness of breath, rash, etc. • Radiological dispersal device (dirty bomb): Gamma, Beta, or Alpha monitors on scene or at hospital registering levels higher than background radiation.

PROCEDURE	
Skill Component	**Teaching Points**
4) Demonstrate the ability to identify the hazardous substance, if possible	Initially, identification will most likely be attempted through observation of signs and symptoms. HazMat teams and health department may use sophisticated monitoring devices. Information gathered from victims in the safe refuge area (sights, smells, etc.) may be helpful in identification of agent.
5) Demonstrate an understanding of basic hazardous materials terms	HAZWOPER: Hazardous Waste Operations and Emergency Response (the laws in which industrial personnel, first responders, and first receivers operate when there is potential for exposure to hazardous substances. IDLH: Immediate danger to life and health PPE: Personal protective equipment APR: Air purifying respirator PAPR: Powered air purifying respirator HAZMAT: Hazardous material WMD: Weapon of mass destruction HICS: Hospital Incident Command System

Instructor Resource

Sample Procedure for Activating the Decon Team

SUBJECT: Decontamination for Hazardous Material Exposure

APPLICATION: Emergency Department, Code Decon Team, Protective Services, Plant Operation and Engineering Personnel, CBX, Environmental Services

PURPOSE: To provide an organized response and Decontamination Team to deal with patients suspected of being exposed to and/or contaminated by a hazardous substance.

POLICY: The hospital will provide a safe environment for staff, patients, and visitors

PROCEDURE:

1. If a patient presents to the hospital and is suspected of being exposed to/contaminated by a hazardous substance the following steps will occur:

    1.1 The patient will be escorted outside to reduce the risk of exposing others. The patient will be instructed to remove clothing to decrease their exposure to the hazardous material.

        1.1.1 If there are multiple victims, consider calling the local Hazardous Material Squad to respond to the Hospital to assist in the decontamination process, if available.

    1.2 A Code Decon will be overhead paged by CBX

    1.3 Any member of the Code Decon Team that is on duty will respond to the Emergency Department

        1.3.1 The situation will be assessed and it will be determined what level of decontamination is required, if any.

    1.4 Protective Services will respond to the Emergency Department

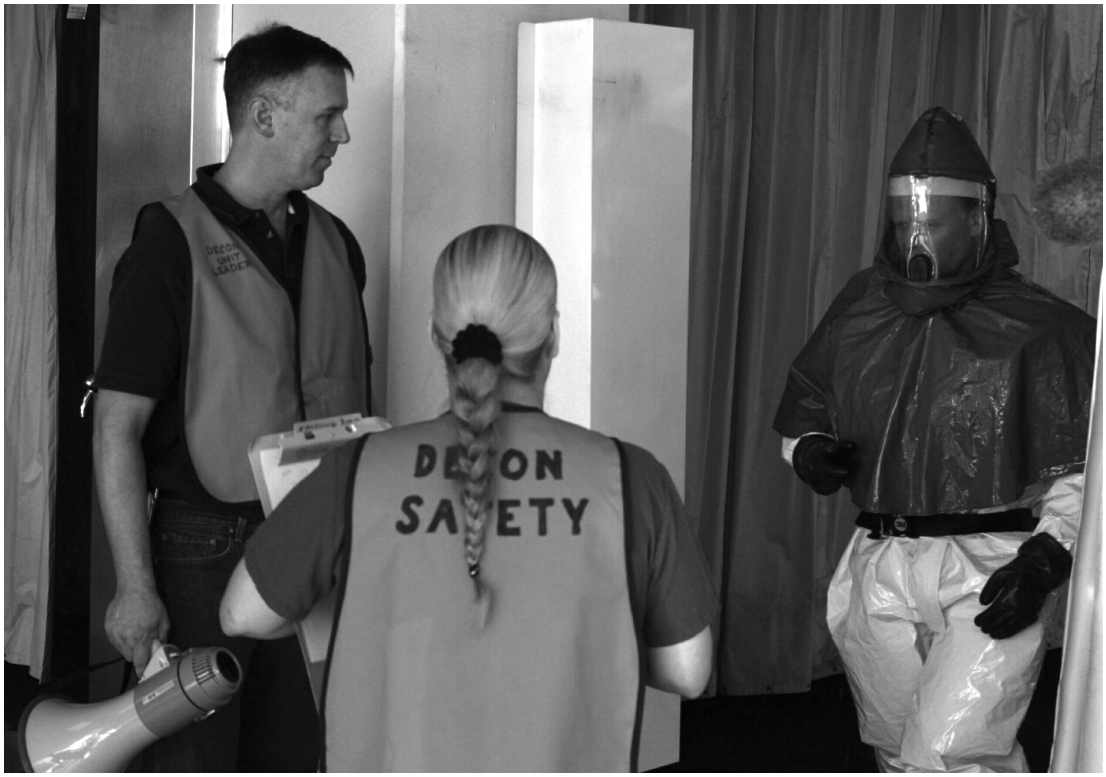
        1.4.1 If decontamination procedures must be performed, Protective Services will be advised by the Code Decon Team to secure the area for decontamination

    1.5 Those employees identified as being members of the Decon Team will respond to the Emergency Department

        1.5.1 If decontamination procedures must be performed, those assigned will assist in setting up the decontamination area including access to tank air, water and electricity.

2. If multiple patients present that would require decontamination procedures consider activating the Emergency Management Plan (External Disaster).

Module Two
Hospital Incident Command System



A terrorist incident, flood, earthquake or other incident with mass casualties will overwhelm any community, especially the hospitals. Therefore, it is important for hospitals to develop a plan to work together and with local government agencies to meet the challenge of this type of situation.

The Hospital Incident Command System, or HICS, has been developed as a way to organize a medical facility's response to incidents that could cause a disruption of services and safety. HICS is the health care industry's version of the Incident Command System, which is used by fire departments, law enforcement and other emergency agencies. Using terminology and organizational structure the same as these organizations permits medical facilities to more easily coordinate response activities.

Because it is modular in design, HICS is designed to be flexible enough to meet any type of emergency situation, large or small. Only those portions of the plan that are needed to effectively meet the immediate and short-term needs of the incident are activated.

Key positions in the structure have roles that are pre-defined. 'Job Action Sheets' are prepared as a part of the Emergency Plan to identify the roles, responsibilities and tasks for each position. Throughout the incident, the responsibilities of any given position remain the same even if the person holding that position changes.

Note to the Instructor

Take a short break, then turn your focus to Module Two. Students have a diagram of the HICS structure in their workbooks, as well as sample job action sheets for some of the key positions for decon. To introduce the topic, you might present some actual case studies of HICS in action.

Before viewing the video, introduce and discuss some of the following features of HICS:

- Predictable chain of management
- Accountability of position function
- Organizational chart allows flexible response to specific emergencies
- Common language to facilitate outside assistance
- Prioritized response checklists
- Required for public hospitals in the State of California

Objectives – Module Two

Following successful completion of Module Two, the seminar participant will be able to:

- Understand the impact that disasters have on hospital facility and personnel
- Describe the need for controlling and organizing personnel during a disaster
- Describe the essential components of an Emergency Management Plan
- Understand the HICS model and its integration into the current hospital organization
- Describe the three steps of implementing HICS during hospital emergency response
- List the responsibilities of each branch of HICS
- List the benefits of HICS during an internal and external disasters
- Explain where the decon operation fits in the HICS structure in your facility

It is now time to view the second video on the DVD, *The Hospital Incident Command System*. The script that follows here is for reference purposes.

Hospital Incident Command System (HICS)

Script

NARRATOR

"In a mass casualty incident a large number of victims is produced in a relatively short period of time. The casualties are usually the result of a single incident such as an aircraft accident, a hurricane or flood, an earthquake, or an attack with Weapons of Mass Destruction. Such an incident may exceed local logistical support capabilities.

"Healthcare facilities are required by the Occupational Safety and Health Administration, the National Institute for Occupational Safety and Health, and Joint Commission on Accreditation of Healthcare Organizations to adopt emergency management plans to handle any number of victims for any type of incident. The plan must provide for maintaining the overall operations of the facility and managing a mass casualty incident at the same time. Part of the plan is receiving multiple patients and carrying out decontamination procedures

"This program is the second part of a series called "Mass Casualty Decontamination for Hospitals," designed to provide First Receivers with the information they need to safely and effectively manage patients who may pose a secondary contamination risk. It is called "Hospital Incident Command System."

"The program will explain how the Hospital Incident Command System, often called HICS, was developed; describe the organizational concepts behind HICS; explain the roles of the Hospital Incident Commander and the Command staff; illustrate how the Command Center operates; and depict the position and composition of the Decon Unit in the command structure. The program will show the role that the hospital emergency plan, department kits, and job action sheets play in an effective and organized response to an emergency.

"Disasters can disrupt normal, day-to-day hospital operations and services. Patient care, staff functions, and finances can all be adversely effected. In order to deal with such potential disasters, hospital emergency management plans must be realistic, user-friendly, and frequently tested. HICS was developed to address emergency management issues and the development of incident action plans during a mass casualty incident or other disaster. HICS provides hospitals with an organized, all hazard management structure that has been tested during crisis and has become the standard for hospital disaster management.

"HICS is a guide for personnel actions during an emergency. The system provides a logical, predictable management structure with predetermined reporting channels, and clearly defined roles and responsibilities. It is designed to promote accountability by prioritizing and pre-assigning duties. It establishes lines of communication for decisions that are outside familiar day-to-day activities. It facilitates effective interaction by using common language to ensure clarity of

communication. The system also provides a vehicle for a thorough documentation of actions taken during a hospital wide emergency.

"HICS is modeled after the fire service's Incident Command System or ICS. ICS was adapted into a model specifically for hospitals in 1987 by the Hospital Council of Northern California. The model was tested in Orange and Los Angeles Counties in 1991 & 1992; and it has been used extensively in actual crises since that time.

"Following the attacks of 9/11, the Department of Homeland Security promulgated the National Incident Management System, or NIMS. It is a management structure that establishes standard protocols and procedures for incident managers and responders at the local, state and federal level. Through NIMS, these groups can work together to prepare for and respond to incidents of all kinds, including natural disasters and acts of terrorism. The deadline for full compliance with NIMS is by the end of 2007. HICS should be compliant with NIMS, particularly those portions of NIMS which address ICS.

"HICS provides flexibility in its organization. It is adaptable so that it can be used by facilities of all sizes for emergencies of all types. It is position-driven, not person-driven so that anyone who is trained and experienced is capable of filling the position without having to rely on a specific person being available.

"HICS can be used for any type or size of an emergency event that threatens to challenge the hospital's normal operations. The organizational structure may be fully mobilized in the event of a terrorist attack using a weapon of mass destruction or an earthquake. Or it may be partially activated for smaller emergencies such as a multiple car accident with numerous patients or a large fire. The extent of activation depends on the nature of the emergency and its impact on the hospital. The only positions activated are those that correspond to incident objectives that must be carried out.

"Certain concepts are vital for the efficient use of HICS. Unity of Command means each person within the ICS organization reports to only one designated superior, ensuring a clear line of supervision. Chain of Command means that positions of authority and responsibility within an organization are ranked in a clearly understood and agreed upon order. Span of Control refers to the number of personnel who report to one supervisor – not more than seven, with five considered the optimum span of control.

"Another important concept is Unified Command. This is a team approach that allows the leaders of participating agencies that have jurisdictional responsibility for an incident to manage the response by establishing a common set of incident objectives and strategies. For example, the hospital may be plagued by social unrest following a flood, or threatened by a fire. In these cases, law enforcement or fire officials may join with the hospital's Incident Commander to establish Unified Command.

"The HICS organization determines the key positions and functional responsibilities. The model HICS organization chart lists eight key positions. The Hospital Incident Commander is the first position to be filled for all HICS activations. However, only the positions that are required in each individual

emergency incident are utilized. HICS may be fully activated for a catastrophic mass casualty incident, such as an earthquake or terrorist attack, but many incidents will require the activation of far fewer positions.

"The Hospital Emergency Management Plan should indicate who initiates HICS. This usually is the responsibility of the highest level administrative official on duty. The activation plan may be dependent upon the type of emergency and the impact it is having on the organization. Once HICS is activated, the Hospital Incident Commander should assign appropriate personnel to the seven other key positions as necessary – the Hospital Incident Commander has the responsibility for any position that is not filled.

"During the initial activation of the HICS plan, one person may fill a number of positions and other positions may not be established. As the incident continues and more trained personnel are available, positions can be assigned to others and more positions can then be utilized. As the crisis is controlled, the number of positions can be reduced until finally command is demobilized and the HICS activation is terminated.

"There are eight key positions in HICS. The Hospital Incident Commander has a command staff consisting of the Public Information Officer, the Liaison Officer, and the Safety Officer. There is also a General Staff made up of the heads of the four sections often established at complex events: the Planning/Intelligence Section Chief, the Operations Section Chief, the Logistics Section Chief, and the Finance/Administration Section Chief.

"The Hospital Incident Commander has the overall responsibility for the emergency response. This person defines the mission and ensures its completion. The highest-ranking administrative official on duty usually fills or designates this position at the time of the emergency. The Hospital Incident Commander develops a plan to manage the incident, decides what objectives must be carried out in what sequence, and assigns people to corresponding positions to address those needs. On the Command Staff, the Public Information Officer serves as the central point for information dissemination about the incident; the Safety Officer monitors incident operations anticipates, detects, and corrects unsafe conditions; and the Liaison Officer functions as the contact person for representatives from other outside assisting and cooperating agencies. Each position should have a checklist of tasks that are grouped by priority: immediate, intermediate and extended. Any person who is available, trained and capable can fill a position. For example, a nursing or house supervisor may initially assume the role of Hospital Incident Commander until relieved by a more senior or experienced person.

"The Planning Section collects and analyzes information to prepare an Incident Action Plan and to anticipate future needs. They also monitor the status of the current situation and track patients. The Planning Section is also responsible for scheduling and credentialing both clinical and non-clinical staffing. Finally, Planning maintains incident documentation, and prepares a demobilization plan. Consistent with NIMS, the Planning/Intelligence function may also interact with various sources to gather intelligence – often official but non-public or security-related details and appraisals – about a current law enforcement, public health, or public safety situation.

"The Operations Section is responsible for carrying out the goals set by the Hospital Incident Commander by organizing and supervising the various units that are needed to handle the situation. This includes the major requirements of the organization: clinical, clinical support, and human services. When many units are operating, to maintain span of control the Operations Section Chief may divide the section into subdivisions called Branches or Groups. Section Branches or Groups could include a Medical Care Branch, an Ancillary Services Branch, a Human Services Branch, and a Hazmat or Decontamination Branch.

"The Logistics Section is responsible for acquiring and maintaining the resources – other than personnel – necessary for the incident, organizing and directing activities associated with maintenance of the facility and the Command Center, providing adequate levels of food, shelter, and supplies to support incident operations as well as the hospital's medical mission.

"The Finance/Administration Section is established when the hospital requires financial reimbursement or administrative services relevant to managing the emergency incident. The Section tracks finances so Command can forecast the need for additional funding and to ensure cost recovery. The Section keeps records of personnel time, administers contracts, interacts with vendors, and prepares cost estimates.

"When there is a potential need for mass decontamination of patients, the Hospital Incident Commander or the Operations Section Chief will establish a Decon Branch which will operate under the direction of the Decon Branch Director. At the same time a Decon Safety Officer may be appointed, who will report to the Safety Officer on the Hospital Incident Commander's staff. The Decon Safety Officer will have the specific duty of monitoring decon operations to prevent unsafe practices.

"The Hospital Command Center, sometimes known as the Emergency Operations Center or EOC provides a designated, central location, promoting ease of communication and decision-making. An alternate Command Center should also be identified in case the primary site cannot be used for any reason. The space should be large enough for the Command Staff, Section Chiefs and their support staffs. The Command Center should be in an area that can be secured, near to bathroom facilities, accessible to food service, and away from emergency activities. There must be communications to ensure that decisions are based on accurate and up to date information – telephones, computers, radios, alphanumeric pagers and extra staff to serve as runners.

"An extremely useful tool is the Department Kit. Department Kits should be prepared and stored in each unit. These should contain emergency operations information, stationery supplies and clipboards, pocket directories that include Job Action Sheets, and important telephone numbers, HICS charts and forms, and identification vests.

"A Department Emergency Operations Plan should be posted in every department to ensure that everyone knows what to do when the organization's emergency management plan is activated. This should include the mission statement,

leadership structure, immediate first steps, status reporting, non-essential functions, and staff utilization.

"Accurate record keeping during an incident is vital. Everything should be documented and reported properly up the chain of command. This includes such things as patient movement, use of supplies, collection of patient valuables, evidence collection, and personnel hours. Enhanced documentation increases the probability of financial recovery and decreases liability. HICS forms are tools that are vital for accomplishing this task. The importance of accurate and complete documentation during a crisis cannot be overemphasized.

"Forms provide clear written instructions on actions to be taken and staff responsibilities. They also provide a clear way to track what is being accomplished. There are multiple HICS forms including Activity Logs, Section Personnel Time Sheets, Facility System Status Reports, Resource Accounting Records, Patient Tracking Sheets, HICS Action Plans, and Emergency Incident Message Forms. Probably the most important of the forms are the Job Action Sheets. They are written descriptions of responsibilities for each position. Job Action Sheets provide a concise mission statement and clear written instructions so that everyone involved in the emergency response knows their duties and to whom they report.

"For example, the Decon Safety Officer's Job Action Sheet taken from the Hazmat for Healthcare program shows that the officer's mission includes monitoring the safety of decontamination operations and hazardous conditions. Immediate duties include receiving an incident briefing, donning an identification vest, establishing communications with the Decon Unit Leader and the incident Safety Officer, ensuring that proper PPE is selected and donned correctly, and monitoring Decon Team members for heat stress. The Job Action Sheet also indicates appropriate forms to be used. Although the Job Action Sheet provides effective guidance for a specific position, every incident will be different. Responders/ Receivers should read their entire Job Action Sheet upon assignment. The tasks undertaken may differ from those listed on the sheet or may need to be accomplished in a different order but should be consistent with the Job Title and Mission.

"During a hospital wide emergency it is extremely important for all involved in the incident to be able to immediately recognize who is responsible for each function. During a HICS activation, staff often are assigned command roles which may be different from their daily work assignments. Having a visible means of rapid identification ensures that accurate information is given to the correct person and orders and tasks are being issued within the Chain of Command. Identification vests provide a way to easily identify the people filling the key positions in the HICS command structure. All officers should be identified by a vest. The job title of the officer is best placed on the back as well as the front of the vest.

"Healthcare facilities must be prepared to receive multiple patients and be able to carry out decontamination procedures. The Hospital Incident Command System, or HICS, provides hospitals with an organized, all hazard management structure that has been developed to address issues of emergency management and incident action planning during the response to a mass casualty incident or other emergency. HICS is an emergency management system that guides personnel actions during an emergency by providing: a logical, predictable management structure with

predetermined reporting channels, and clearly defined roles and responsibilities. HICS can be used for any type or size of an emergency event that threatens to challenge or impact the hospital's normal operations.

"A thorough understanding of the hospital's Emergency Incident Command System, the Chain of Command, and the role each member of the hospital staff plays in the organization will help the hospital prepare for and respond to emergencies of any nature. HICS must be used as frequently as possible, practiced, and incorporated into drills and exercises to ensure that the hospital will function at its maximum efficiency during any emergency."

CREDITS

Activities – Module Two

The following are some suggested activities that apply to this part of the seminar; you might think of others to include as well.

- Review the HICS organizational chart in the Student Workbook. Discuss where on the chart decon activities fall for that facility. Also discuss who in the hospital has authority and responsibility for pertinent decon positions.
- Introduce miscellaneous incident scenarios both large and small, and discuss how the HICS would develop for each. Include a scenario that would require Unified Command.
- Tour the hospital's Hospital Command Center (HCC) and the alternate Hospital Command Center. Describe how the decon team will communicate with the HCC.
- Inspect the hospital's Department Kits.
- If possible, make copies of the appropriate sections of the hospital's Emergency Operations Plan that relate to decon for students to keep.

Instructor Resource

Teaching Points for Module Two

General Competencies for First Responder Operations Level Training

PROCEDURE	
Skill Component	**Teaching Points**
1) Demonstrate an understanding of your role in the hospital's emergency response plan, including site security and control, and decontamination procedures	This may depend on what your day-to-day position is in the hospital. A registration clerk will be depended on to recognize early that a victim has been contaminated and therefore should be instructed to go outside for further evaluation or decontamination. Security will be responsible for securing the perimeter of the facility to prevent contaminated victims from entering before decontamination has taken place. A nursing supervisor may be responsible for activating HICS and assembling the decon team, etc.
2) Demonstrate the ability to realize the need for additional resources and to make appropriate notifications to the communication center	Know the capabilities of your decon team. Seek information regarding the potential numbers of victims. If additional resources are needed, know the location of telephone numbers of umbrella hospitals or Disaster Resource Centers.

Module Three
Personal Protective Equipment

Personal protective equipment (PPE) is the ensemble of chemical protective clothing plus respiratory protection designed to shield or isolate individuals from chemical, radiological, biological, environmental, and physical threats. Although clothing is available in many different types of materials, not all materials are appropriate for the response to all types of hazardous materials. Healthcare facilities should evaluate the chemicals that may be encountered in the community when determining what PPE to have available for a response.

The selection and proper use of personal protective equipment are core competencies required of Operations Level responders.

Note to the Instructor

Unprotected healthcare workers could experience skin and respiratory irritation from hazardous substances if they come into contact with contaminated victims. Begin this section by discussing why chemical agents pose the greatest risk to First Receivers. Display and discuss the different parts of the chemical protective clothing ensemble – respiratory protection, protective clothing, gloves and boots – and tell the class that after the video they will have the opportunity to practice donning and doffing. Also, find out how much the class knows about heat stress and discuss the different types of heat injuries. (Refer to the NIOSH document on page 50 for a discussion of the symptoms and treatment for the different types of heat injuries.)

Objectives – Module Three

Following successful completion of Module Three, the seminar participant will be able to:

- Discuss the role that pre-incident planning plays in selecting personal protective equipment (PPE)
- Correctly don, work in, and doff provided PPE
- Discuss how the use of protective clothing can increase the risk of heat stress
- Identify the types of and symptoms of heat related illness
- Identify measures that can be taken to reduce heat stress for personnel wearing PPE

It is now time to view the third video on the DVD, *Personal Protective Equipment*. The script that follows here is for reference purposes.

Personal Protective Equipment for Hospital-Based First Receivers

Script

NARRATOR

"Personal protective equipment is designed to shield individuals from chemical, radiological, biological and physical threats. Industrial workers who are exposed to chemicals in the workplace and hazardous materials response teams use personal protective equipment, often called PPE, to keep themselves safe.

"There have been several incidents involving victims of hazardous materials emergencies that have resulted in impacts to hospitals including secondary contamination of healthcare workers and the temporary closing of their emergency departments. The workers who experienced symptoms were typically unprotected and tended to have close, extended contact with the contaminated victims. In fact, according to OSHA, healthcare workers were the 11th most common group injured in hazardous materials incidents.

"Selecting the correct level and type of PPE is an important task. The type of protective equipment needed will depend on the hazards encountered and the type of situation. Under-protection can result in exposure or injury. Appropriate PPE, even correctly worn, can hinder physical dexterity and freedom of movement. An over-protective level of PPE can make certain tasks impossible to perform and increase the risk of physiological stress, heat stress, and physical hazards such as trips and falls. The potential for injury is particularly high for personnel who only occasionally use this type of equipment.

"This program is the third part of a series called "Mass Casualty Decontamination for Hospitals," designed to help First Receivers safely and effectively manage contaminated patients and is called "Personal Protective Equipment."

"The program will examine the different types of respiratory protection and the different configurations for chemical protective clothing. It will review the EPA's levels of protection and the national standards for protective clothing. Procedures for inspecting, donning, and doffing protective clothing and equipment will be outlined and issues relating to heat stress, its prevention and treatment will be covered.

"An important part of many personal protective equipment ensembles is respiratory protection. There are several different types available: the Air Purifying Respirator (APR), the Powered Air Purifying Respirator (PAPR), Self- Contained Breathing Apparatus (SCBA), and the Supplied Air Respirator (SAR). Each type of equipment has different protective capabilities and limitations.

"An air purifying respirator or APR consists of a mask with specialized cartridges or filters capable of removing specific contaminants from the surrounding air. They are light-weight and provide substantial mobility. The proper filter or cartridge must be selected for the expected contaminants. However, the device may not be effective against other contaminants. An APR will not provide protection in oxygen deficient atmospheres, when the level of contamination is considered immediately dangerous to life and health, or when the contaminants cannot be identified. An N-95 or P-100 particulate respirator mask, commonly used in healthcare facilities for management of patients with airborne communicable diseases, is an example of an APR used for biological and particulate hazards.

"APR facemasks come in a variety of configurations which must be fit to the user to provide the best protection. The filter medium causes some breathing resistance as the wearer tries to pull air through the filter, increasing respiratory effort.

"Powered Air Purifying Respirators or PAPRs are similar to the APR, but without some of the associated limitations. A battery-powered blower assembly pulls air through the filters and supplies it to a mask through a connecting hose or tube. This reduces breathing resistance, allows for cartridges designed for multiple hazards, and supplies a relative positive pressure inside the mask. Many hospitals use PAPRs with a hood instead of a tight fit mask. Hoods are less claustrophobic than tight-fitting masks and do not require fit-testing for use.

"Self Contained Breathing Apparatus or SCBA is similar to the SCUBA tank worn by divers. The SCBA provides the wearer with a supply of clean air from a cylinder worn on a backpack type apparatus. The airflow is under positive pressure, so that if the seal of the facemask is broken, a continuous flow of air will keep contaminants out of the mask. SCBA provides a high level of protection, but has its limitations. Medical responders will find it difficult to carry out some medical tasks while wearing the backpack. There is a limited amount of air in the cylinder and most people will get less than half the duration of breathing air for which the tank is rated. There is increased physical stress from the weight of the SCBA that could lead to heat stress and physical injuries.

"The supplied air respirator or SAR is similar to SCBA, except that the user is connected by an air hose to cylinders or a compressor in a clean area. Like SCBA, an air-supplied respirator provides positive pressure and a high level of protection, but without the heavy weight of the cylinder. However, a small escape cylinder is required to be worn when operating in IDLH atmospheres. SAR is limited by the length of the airlines, and has the added problems of air lines becoming tangled and trip and fall hazards.

"There are generally two different types of chemical protective clothing: liquid splash protective clothing and vapor protective clothing.

"Liquid splash protective clothing is usually designed as a one-piece coverall suit with hood, gloves and overboots, although some suits may be two pieces,

and some may be fully encapsulating. This type of suit, designed to be worn with respiratory protection, will provide protection from particulates and liquid splashes, but not from chemical vapors or gases.

“Vapor protective clothing is designed to provide protection against gases and vapors. It is typically a fully encapsulating, airtight suit. Respiratory protection, usually in the form of SCBA is worn inside the suit. This combination of equipment provides the highest level of skin and respiratory protection against particulates, liquids, gases, and vapors. This type of ensemble is rarely used in a hospital decontamination setting.

“The materials from which gloves and boots are constructed, the fabric used in the protective clothing fabric, the seams, and attached component parts all determine the level of protection provided by the ensemble. A given fabric will only provide protection against certain chemicals, and then only for specified lengths of time before the chemical agent will permeate the fabric. While there isn't one type of fabric that provides protection against all agents, manufacturers are designing multi-layer laminates that will provide protection against many common chemicals and most chemical and biological agents that may be encountered as Weapons of Mass Destruction. These fabrics are not designed to protect against fire and explosion hazards.

“Suitable chemical resistant gloves must be selected as part of the ensemble. For decontamination, personnel typically wear two pairs of gloves: nitrile examination gloves as an under-layer, with heavier Butyl rubber gloves as an over-layer to provide greater chemical and abrasion resistance. Two layers of gloves, much thicker than examination or surgical gloves, decrease manual dexterity, making it difficult to perform typical tasks. Therefore, personnel must practice decontamination tasks while wearing protective equipment

“To aid in the selection of protective equipment, the EPA has designated different protective levels for PPE ensembles, which include both respiratory and skin protection. Level D PPE is a standard work uniform, or for medical personnel, what would be considered standard precautions with no respiratory protection. Level D provides no special protection against WMD agents or hazardous chemicals.

“A Level C protective ensemble consists of chemical resistant liquid splash protective suit with hood, attached gloves and sock feet, chemical resistant overboots, and an APR or PAPR.

“Level B PPE provides the same level of liquid splash and particulate protection as Level C, but a higher level of respiratory protection. The Level B ensemble consists of coverall type protective suit with hood, attached or sealed gloves and sock feet, chemical resistant overboots and a SCBA or SAR. Level B suits are also manufactured as a fully encapsulating, non-vapor tight suit.

“Level A PPE provides the highest level of respiratory and skin protection. The Level A ensemble consists of: a fully encapsulating, vapor tight suit with attached gloves and sock feet, chemical resistant overboots and SCBA or SAR.

"Evidence in the U.S. and abroad shows that unprotected healthcare workers can be injured by secondary exposure to hazardous substances when they treat contaminated patients. However, PPE provides protection from a wide range of WMD agents and hazardous substances to which First Receivers most likely could be exposed.

"Adequate protection for hospital First Receivers faced with contaminated patients must be balanced against the physical hazards and heat stress associated with PPE use. This is especially important because WMD incidents may last for extended periods of time, exposing personnel to greater physical stress**.**

"OSHA has established guidance to limit First Receiver exposure to hazardous substances. It anticipates that the possible exposure is limited by the quantity of material that would remain on live patients that self present to the hospital, provided that the hospital itself is not the site of the release. It suggests that hospitals conduct a hazard analysis to determine what level of PPE is needed.

"The National Fire Protection Association sets performance requirements for protective clothing for First Receivers in *NFPA 1994: Standard on Protective Ensembles for Chemical/Biological Terrorism Incidents*. The Class 3 Ensemble set forth in the standard is either EPA Level B or Level C. It is intended for use after the release has occurred, at a distance from the point of release, or in the peripheral zone of the release for such functions as decontamination, patient care, crowd control, perimeter control, and clean-up. Because these ensembles are intended to be worn for longer periods, the use of air-purifying respirators with these suits is likely.

"From this guidance, Level C PPE has been established as the requirement for staff working in the potentially contaminated area, commonly known as the Hospital Decontamination Zone.

"This Level C ensemble includes a Powered Air Purifying Respirator. Although PAPRs are available with full facepiece masks, PAPRs with helmet and hoods are a practical choice for First Receivers. Hooded PAPRs require no fit testing, can be worn by employees with facial hair and eyeglasses, and are generally considered more comfortable than full-face masks or negative pressure APR. The PAPRs should be equipped with a combination organic vapor/high efficiency particulate air cartridge or the new "Domestic Preparedness" filters that protect against gases, vapors and particulates. If the suit does not have attached gloves, outer gloves should be attached to the suit sleeves with chemical resistant tape or bands. Chemical-resistant boots complete the ensemble.

"For staff in the clean area, also known as the Hospital Post-Decontamination Zone, normal work clothes and PPE, as necessary, for body substance isolation and infection control purposes are adequate. This includes gloves, gown, goggles, and appropriate respirator.

"The use of respiratory protection triggers the OSHA and Cal-OSHA Respiratory Protection Standard. Persons required to wear respiratory

protection or protective clothing configurations must have medical clearance including: a medical evaluation prior to using the equipment under working or training conditions. The licensed healthcare practitioner responsible for the evaluation should be made aware of personal risk factors that may affect heat tolerance. Medical conditions that can make symptoms worse include obesity, diabetes, hypoglycemia, anemia, hypertension, under active thyroid, and neurological and skin disorders.

"When hospital staff use respiratory protection, the hospital must have a formal respiratory protection program. Any respirator that has a tight-fit mask must be correctly fit to the user or contaminants may penetrate through any loose or improper fit. Tight-fitting masks cannot be worn by people with beards or other facial hair or conditions that prevent direct contact between the face and the edge of the respirator.

"PPE must be stored properly and inspected at least monthly and just prior to use. For respirators this is so important that OSHA has made it a requirement. Visual inspection of the PAPR should include the blower unit, hood, connecting hose, belt or vest, and turbo unit. The battery should be attached, the PAPR turned on, and the flow rate checked prior to attaching the connecting hose from the hood. The unit must have sufficient flow of air volume and pressure according to manufacturers' recommendations. Then all connections should be made and double-checked.

"The protective suit and gloves should also be inspected prior to use. Each team member must have the proper size equipment. If the clothing is too small, it will restrict movement, thereby increasing the likelihood of tearing the suit material and as well, accelerating responder fatigue and heat stress. If the clothing is too large, the possibility of snagging the material is increased, and dexterity and coordination may be compromised. The suit, gloves and boots should be visually inspected for any cracks, deformities, perforations or other damage.

"A pre-entry physical assessment must be administered to personnel who will work in protective clothing. At a minimum, temperature, heart rate, and blood pressure should be evaluated and recorded. Policy should establish vital sign limits that must not be exceeded for a person to dress in PPE.

"A routine should be established and practiced periodically for donning PPE. Assistance should be provided because donning is difficult to perform alone, and a solo effort may increase the possibility of suit damage or fatigue. Inner gloves are donned first. Then the suit is donned, but is zipped up only part way. Then the chemical-protective boots are donned. The respirator belt or vest is donned and the battery is attached and turned on. Then the respirator hood is donned. The inner collar of the hood is tucked inside the suit before it is fully zipped up. Then the suit is zipped to the neck with the outer collar of the hood on the outside. The outer gloves are then donned and sealed with tape or bands. Once the equipment has been donned, its fit should be evaluated. A safety check should be conducted before personnel enter the Hospital Decontamination Zone. Suit closures, glove and boot seals, and respirator function should be checked. The assistant should make eye and voice contact

with the person in the suit to determine readiness to proceed to the Decon Zone.

“While wearing PPE, responders should immediately report any perceived problems or difficulties. There may be a decrease in respirator airflow, a change of pitch in respirator noise, a perceived odor or taste, or an obvious failure of a glove, boot, or suit. During the incident, decon team members may wear PPE for forty-five minutes to an hour without a break. However, individual capabilities will vary depending on physical fitness, health issues, and environmental factors.

“Protective equipment can impede the body's ability to regulate heat. Heat combined with physical exertion can generate a very humid microclimate inside a protective ensemble. The special barrier fabrics used in protective garments prevent the inward penetration of hazardous materials, but at the same time, reduce the outward passage of body heat and humidity. When heat exceeds the body’s ability to cope, heat stress, or heat illness follows. The result can be heat cramps, or more severe conditions like heat exhaustion or heat stroke.

“Signs and symptoms of heat stress can include: fatigue and weakness, headache, nausea and vomiting, vertigo and giddiness, thirst, muscle cramps, profuse sweating and fainting.

“One way to reduce heat stress is to stay in good physical condition. Prior to donning protective clothing, responders must pre-hydrate. Water is the key to keeping the blood volume high, allowing oxygen, vitamins, and minerals to move to the working muscles. Personnel should drink sixteen to thirty-two ounces of fluid prior to donning PPE. Coffee, tea or caffeinated soda should be avoided. The Decon Safety Officer or Decon Unit Leader should monitor the time team members are suited up, to ensure that they are properly relieved without over-exertion. If the incident is likely to last for some time, additional personnel will be required to alternate with those working in the hot environment. Rehabilitation areas can be set up with ventilation fans, misting systems, or air conditioning, and fluids for hydration. Decon team members must be trained to recognize and report signs of heat stress.

“With safety measures in place, proper monitoring of team members, hydration, and frequent training, most severe forms of heat stress can be avoided. However, if a staff member experiences severe heat stress, the first action should be to remove the affected person from the hostile environment. Decontamination may be required prior to removal of the protective clothing. The victim then should be provided with immediate cooling procedures and medical treatment. Heat stroke is a life threatening condition!

“Exact procedures for removing PPE must be established and followed to prevent contaminant migration from the decon area. Before doffing, decon team members should themselves pass through decontamination, assisting each other to ensure that all contaminants are removed from their protective ensembles, especially in hard-to-reach areas such as the back and shoulders. A suitably attired assistant should assist with doffing. Respiratory protection and

inner gloves should always be the last pieces of PPE removed. This will provide protection for the responder's respiratory system in case any contaminants that remain on the suit become airborne as the suit is removed. If there is any indication that the PPE failed, the responder should remove all clothing garments and immediately shower. In all cases personnel should shower and change into clean clothing at the end of the incident.

"Once personnel have doffed personal protective clothing, their condition must again be evaluated. A post entry assessment should be carried out while personnel are resting in a cool area and re-hydrating. If water loss is not replaced, fatigue, soreness, cramps, headache, confusion, and weakness may result.

"There have been incidents involving victims of hazardous materials emergencies that have resulted in secondary contamination of unprotected healthcare workers. Personal protective equipment can shield individuals from chemical, radiological, biological and physical threats. Staff must be trained in the use of PPE and the equipment must be in correct working order. In all cases, PPE use must be supported by proper work procedures and heat stress management practices.

"Respiratory protection matched with chemical protective garments appropriate for the event will help to provide protection during mass decontamination operations."

CREDITS

Module Three - Activities

The following are some suggested activities that apply to this part of the seminar; you might think of others to include as well.

- Have the students examine the different types of Respiratory Protection and Chemical Protective Clothing, making sure to include the types of equipment they are most likely to use during terrorist or hazmat incidents.
- Referring to the Medical Monitoring Worksheet on page 43, have students take their vital signs. Then have them practice donning PPE, simulate working in it, then doffing it correctly. Pages 41-42 depict the proper order of donning and doffing. These instructions also appear in the Student Workbook.
- Have students inspect equipment and practice putting it away properly.
- Invite someone to come in to talk to the class about medical/safety issues related to working in PPE, including heat stress, and how to avoid problems.

Instructor Resource

Teaching Points for Module Three

General Competencies for First Responder Operations Level Training

PROCEDURE	
Skill Component	**Teaching Points**
1) Demonstrate how to select and use proper PPE	See instructor donning/doffing skills sheet

Donning Procedures for Personal Protective Equipment

Note: Assistance should be provided because donning is difficult to perform alone

Step 1 – Inner gloves

Don inner gloves first.

Step 2 – Suit

The suit is donned and zipped to the level just above the beltline.

Step 3 – Boots

Don the chemical-protective boots.

Step 4 – PAPR belt

Don the respirator belt or vest. Don the battery and turn it on.

Step 5 – Hood inside suit

Zip the suit to the neck with the outer collar draped over the shoulders. Seal the adhesive strip over the zipper.

Step 6 – Outer gloves

Don the outer gloves and seal with tape or bands. Once the equipment has been donned, its fit should be evaluated and a safety check conducted before personnel enter the Decon Zone.

Doffing Procedures for Personal Protective Equipment

Step 1 – Stand in bag

Step 2 – Remove outer gloves

Both gloves should be removed simultaneously to avoid contaminating inner gloves. Pull fingers half way, then let drop into bag.

Step 3 – Remove PAPR

Assistant holds PAPR while the suited First Receiver first unclips the belt then unzips the suit.

Step 4 – Step out of suit

Assistant helps push suit down from the inside to the level of the boots. Suited First Receiver steps out of the suit, away from the shower area towards the clean zone.

Step 5 – Remove hood

From the outside, remove the hood keeping hands away from face. Drop in bag.

Step 6 – Remove inner gloves

Drop gloves in bag. Secure bag and place in designated location.

Instructor Resource

Sample

Hazardous Materials Decontamination Medical Monitoring Worksheet

Date: _____ Time: _____

Name:_____ Age:_____ Department: _____

Outside Temperature F:_____ Outside Humidity %: _____

Donning of personal protective equipment may be denied to any person with: Temperature > 99.2 F Respirations > 24 Pulse > 110 Blood Pressure > 150/90

Pre-Mission Vital Signs ***(measure prior to donning PPE)***

BP: _____Pulse: _____Respiration: _____ Weight: _____ Temperature: _____

Post-Mission Vital Signs ***(measure after doffing PPE)***

BP: _____Pulse: _____Respiration: _____ Weight: _____ Temperature: _____

Rest Periods for every 20 minutes of work

Ambient Air Temperature	Rest Period
< 70 °F	30 minutes
70 – 85 °F	45 minutes
> 85 °F	60 minutes

Return to work is permitted when the following guidelines have been met:

Vital Sign	Minimum Guidelines
Temperature	A return to within .5 degrees of pre-mission vital sign
Body weight	A return to within 1.5 % of pre-mission body weight
Pulse	A return to within 5% and < 90 beats per minute
Blood Pressure	< 150/90

Replenish lost fluids with cool drinking water

Instructor Resource

Donning Procedure for Level "C" Personal Protective Equipment (PPE) with the 3M™ Breathe Easy 10 Powered Air Purifying Respirator

PERFORMANCE OBJECTIVES	**EQUIPMENT**
The examinee will demonstrate proficiency in assembly, layout, and donning of level "C" PPE.	Chemical protective suit, outer boots, inner and outer gloves with bands and respirator (3M™ Breathe Easy 10 powered air purifying respirator)
CONDITION	**PERFORMANCE CRITERIA**
The examinee shall don level "C" personal protective equipment ensemble with help from one or two assistants.	100% accuracy on all items.

PROCEDURE	
Skill Component	**Teaching Points**
Equipment assembly: Assemble entire level "C" ensemble and lay it out in the order that each component will be donned 1) Inner gloves 2) Chemical protective suit 3) Outer boots 4) Powered Air Purifying Respirator (PAPR) 5) Outer gloves with bands or chemical resistant tape	• Equipment is laid on the floor or tarp in the order that it will be donned. This area is contaminant free, out of view of the victims, and sheltered from the elements. • PAPR should be fully assembled with battery attached and ready for use. • The layout of equipment provides the decon unit leader with the ability to quickly determine (through visual inspection) that each team member has the required equipment, thereby allowing those in PPE to enter the decon area as a team (it is easier to monitor how long team members have been in PPE if team members don equipment simultaneously). • Team members should know their correct suit and boot sizes prior to donning or assembling equipment.
Donning the PPE: With one or two assistants, the participant will don PPE 1) Team member dons inner gloves 2) Team member steps into chemical protective suit 3) Assistants help with donning of outer boots 4) Assistants help with donning of powered air purifying respirator (PAPR) a. Assistant holds turbo pack, battery, and hood and places it against team member's back	1) Inner gloves are preferably nitrile, which offer greater chemical protection than latex. 2) Prior to donning PPE, remove jewelry (watches, ear rings, etc.) to prevent snags or tearing of the suit. While sitting, pull on suit, zip up suit just past the belt line. Seal adhesive strip of suit to the level of the zipper. 3) Place toes to the end of the inner booties prior to donning outer boots. This prevents folding of the inner booties which will reduce space for the feet. Assistant will place boots on feet (this prevents fatigue for person in PPE). It is not necessary to secure boot straps since feet are protected from hazards by inner booties. 4) Team member will now stand. a. Assistant lifts respirator (holding turbo pack and battery) and slings the hood over one shoulder. While standing behind the team member orient the flat portion of the turbo pack

PROCEDURE	
Skill Component	**Teaching Points**
	to be positioned against the back of the team member (the breathing tube will be pointed up towards the head).
b. Team member attaches belt around waist and tucks in excess length of belt	b. The team member reaches behind to grab the belt, adjusts it as necessary, secures the clasp, then tightens the belt (with a thick chemical protective suit, many times the belt is not tightened enough to prevent the turbo pack from sagging, thereby creating a potential hazard). Excess dangling belt is folded and tucked in as a safety measure.
c. Assistant attaches battery to belt and turns battery to "on" position	c. Assistant attaches the clip of the battery to belt and turns the battery to the "on" position. Check that battery clip is fully "seated" on the belt.
d. Assistant places hood onto team member's head	d. Prior to donning the hood, assistant assures readiness of team member ("are you ready"?). The hood is slipped over team members head.
e. Assistant tucks inner collar of hood under suit, raises zipper to level of neck, applies adhesive strip of suit over zipper	e. Assistants tuck inner collar over team member's clothing and under the chemical protective suit. Material must not be bunched to create an effective seal. Adjust hood as necessary to provide maximum visual field for team member. Assistant raises the zipper up to the neck and the adhesive strip of the suit now completely covers the zipper and is sealed.
5) Assistants help with donning of outer gloves with bands or chemical resistant tape	5) Two assistants help with donning of outer gloves. One assistant folds arm material of suit allowing 2nd assistant to slide glove onto hands and arm. Team member braces self to prevent being knocked over due to pushing and pulling from assistants due to tight gloves. Thick rubber bands or chemical resistant tape is applied to the end of the gloves. When bands are used, the last 1" of the gloves is folded over to create a gutter to catch water when the team member raises an arm during decon.
Safety check: Assistant performs a safety check prior to team member entering decontamination zone.	Consistency in how the safety check is done is key to team safety. The health and safety of those who are suited is in the hands of the persons doing the safety check. The safety check is the last thing to be done prior to entering the decontamination zone.
1) Check breathing tube connections (both ends)	1) Breathing tube should swivel easily at the hood connection if properly attached. Attempt to tighten the metal hose clamp at the turbo pack connection point.
2) Check filters for tightness, cross threading, and that no caps are blocking the air inlet	2) Attempt to tighten all filters (clockwise); they can't be checked visually or just by touch. Absence of caps is best checked by placing finger into each air inlet hole.
3) Check that battery is secured to belt and that it is in the "on" position	3) Check that clip on battery rests securely on belt.
4) Check that excess belt material is tucked in and that PAPR is not riding low	4) Excess belt is tucked and folded as a safety measure (to prevent material from

PROCEDURE	
Skill Component	**Teaching Points**
	"catching" on nearby objects.
5) Check that exhalation valve is pointing down and that it is secure to face shield	5) Exhalation valve should point down to prevent water from collecting inside. A loose valve can be tightened by placing one hand outside the hood and one hand inside grasping the valve and tightening in opposing directions.
6) Check that suit is completely zipped to the neck and that adhesive strip of suit completely covers the zipper	6) The zipper must have been zipped to the neck and the adhesive strip must be applied to complete the seal. Otherwise, respiratory protection is compromised.
7) Check that outer gloves with bands (or chemical resistant tape) are on, boots are on	7) A wide rubber band must be approximately 1" from the end of the gloves and a 1" gutter folded over. If boot straps are secured, this makes it more difficult to remove boots.
8) Check that team member inside suit is feeling well and is ready to enter decontamination zone	8) The tendency is to focus only on equipment during the safety check and not to check personnel in the suits. Make eye contact, assure alertness/readiness, and wait for "thumbs up" sign prior to entry into the decontamination zone.

Instructor Resource

Doffing Procedure for Level "C" Personal Protective Equipment (PPE) with the 3M™ Breathe Easy 10 Powered Air Purifying Respirator

PERFORMANCE OBJECTIVES	**EQUIPMENT**
The examinee will demonstrate proficiency in doffing of level "C" PPE.	Chemical protective suit, outer boots, inner and outer gloves with bands and respirator (3M Breathe Easy 10 powered air purifying respirator)
CONDITION	**PERFORMANCE CRITERIA**
The examinee shall doff level "C" personal protective equipment ensemble with help from an assistant in the post decon zone or from another suited decon team member.	100% accuracy on all items.

PROCEDURE	
Skill Component	**Teaching Points**
Doffing steps:	
1) Team member removes outer gloves	1) After decontamination is complete, outer gloves are removed. Grasp the fingers of one glove and pull it half way off. Grasp the fingers of the other glove and pull it halfway off. Both gloves should now fall off into a safe container. This prevents potential contamination of inner gloves if contaminant was not completely removed during decon process.
2) Assistant in clean area holds PAPR and battery then team member unclips PAPR belt	2) Prior to unclipping belt, assistant holds battery and turbo pack of PAPR and notifies suited team member "I've got the PAPR, unclip the belt". This prevents the turbo pack and battery from hitting the floor.
3) Team member unzips chemical protective suit	3) Expose zipper by removing the adhesive strip. Care must be taken to avoid inner gloves from getting caught in the zipper.
4) Team member pushes suit down to level of boots	4) The farther the suit is pushed down, the easier it is to step out of. Gloved assistants in the clean zone can assist as necessary.
5) Team member steps out of boots and suit towards the post decontamination zone	5) Always move from dirty to clean (stepping out of the decontamination zone, over the line and into the post decontamination zone). Stepping out of the suit requires good balance; gloved assistants should offer a hand to prevent falls. Another solution is to provide a chair to sit down while removing suit and boots.
6) Team member grabs PAPR hood and places in container for isolation or disposal	6) Grasping the hood from the outside prevents potential contamination from contacting the face or body.
7) Assistant steps to the side of team member then places turbo pack and battery in container	7) While team member is removing hood, assistant steps to the side to avoid dragging wet turbo pack over the back of team member.
8) Team member removes inner gloves and places them in container	8) Gloved assistant secures container in a safe location.

Instructor Resource

3M™ Breathe Easy 10 Powered Air Purifying Respirator
Monthly Equipment Inspection

PERFORMANCE OBJECTIVES The examinee will demonstrate proficiency in checking all components of the respirator.	**EQUIPMENT** 3M Breathe Easy 10 PAPR components, including the disposable and rechargeable batteries, and flow meter.
CONDITION The examinee shall identify and check for functionality all components of the respirator and completely assemble to a state of readiness.	**PERFORMANCE CRITERIA** 100% accuracy on all items.

PROCEDURE	
Skill Component	**Teaching Points**
Identify all components of the respirator and check each component for functionality	
Hood:	**Hood:**
1) Check all material for color changes, stickiness, gritty texture, tears/cracks	1) There is a lot of material to inspect (both sides of the inner and outer collars).
2) Check seams on outer collar and inner collars (no light should be visible through seams of outer collar) Note: the inner collar seams are not sealed and light will be visible	2) Seams on the outer collar have been 'painted' with a chemical resistant material that appears sloppy. Also check the seams around the face shield.
3) Check face shield for cracks, discoloration, and deformity which could distort vision	3) To prevent distortion of the face shield during storage, stuff the inner and outer collars up inside the hood.
4) Check one-way exhalation valve (the opening should be facing down and the valve should be tight and not easily rotated	4) The one-way exhalation valve can become loose with time. To tighten, simply place one hand inside the hood and the other outside and tighten pieces in opposing directions.
5) Check breathing tube inlet port	5) Look closely for cracks where plastic bends or folds, these will occur over time in older hoods.
6) Check neck band for elasticity	6) This band does not fit tight around the neck. OSHA states that elasticity must be present.
7) Check headband for elasticity	7) Check that headband is present and that no foreign matter (i.e., cob webs, etc.) exists.
8) Identify serial number for documentation	8) OSHA Code of Federal Regulations (CFR) 1910.134 mandates monthly inspection of each emergency respirator and the documentation of that inspection.
Turbo Pack:	**Turbo Pack:**
1) Check overall condition of casing (no missing screws or bolts, look for cracks)	1) Gently shake turbo pack as internal screws may have come loose.
2) Check that o-rings are present and are not cracked	2) O-rings are black and can be difficult to

PROCEDURE	
Skill Component	**Teaching Points**
	assess for cracks.
3) Check that red and white wires are visible and intact	3) Red and white wires should be visible and not protruding past o-rings.
4) Battery wire is without frays, 3 prongs are present and straight	4) Also check that battery wire is securely attached to turbo pack.
5) Belt slides easily along the pack, is without frays, belt clip is intact and slides easily along belt	5) Belt can and does frequently fold upon itself under the clip making adjustment impossible during donning.
6) Identify serial number for documentation	6) OSHA Code of Federal Regulations (CFR) 1910.134 mandates monthly inspection of each emergency respirator and the documentation of that inspection.
Filters:	**Filters:**
1) Three FR-57 filters are present in unopened foil pouches with current expiration dates	1) If training filters are currently attached, they must be removed to inspect the turbo pack. During an incident, fresh FR-57 filters will be removed from their foil pouch. Thin training filters are not to be used during an actual incident.
Batteries:	**Batteries:**
1) Lithium Ion battery (disposable with 10 yr. shelf life) is present.	1) Stress the difference between disposable and re-chargeable batteries. The disposable battery should be used only for an actual event so that its full capacity can be assured. Never attempt to charge a disposable battery or an explosion may result.
2) Re-chargeable battery is connected to cord and checked for function.	2) To check the battery capacity and function, three filters (with caps off) must be attached to turbo pack. Remove breathing tube from turbo pack by loosening the hose clamp. Insert flow meter. Make sure that nothing is obstructing filters (i.e., caps, filters resting directly on table, etc.). Turn on battery, the center of the clear ball of the flow meter should be at or above the 6 cubic feet/minute (cfm) mark. To assure that the re-chargeable battery will maintain a full charge, leave unit on for 8 hrs., if flow meter continues to read 6 cfm or greater, then battery is good, but must now be re-charged.
	After battery function is checked, the breathing tube must be securely attached to the turbo pack with the metal hose clamp.

Instructor Resource

Working In Hot Environments

(NIOSH Publication 86-112)

Heat Stress Considerations

The Site Safety Officer or Site Safety Supervisor for the entire response should make heat stress determinations throughout the day. If it is determined that a heat stress hazard exists, an alert should be passed to all teams to implement mandatory rest periods. The Site Safety Officer/Supervisor should generally be guided by the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines in determining work/rest periods. Fluids should be available at all times and encouraged during mandatory rest periods.

Safety Concerns

Certain safety problems are common to hot environments. The frequency of accidents, in general, appears to be higher in hot environments than in more moderate environmental conditions. One reason is that working in a hot environment lowers the mental alertness and physical performance of an individual. Increased body temperature and physical discomfort promote irritability, anger, and other emotional states which sometimes causes workers to overlook safety procedures or to divert attention from hazardous tasks.

Health Concerns

Excessive exposure to a hot work environment can bring about a variety of heat-induced disorders.

- **Heat stroke**
  - Signs and symptoms. Heat stroke is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached. A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105º F or higher. The victim is mentally confused, delirious, perhaps in convulsions, or unconscious.
  - Medical attention. Unless the heat stroke victim receives quick and appropriate treatment, death can occur. Any person with signs or symptoms of heat stroke requires immediate hospitalization. SEND SOMEONE TO GET MEDICAL ASSISTANCE/EMT IMMEDIATELY! While waiting for medical assistance first aid should be immediately administered. This includes:
    1) removing the victim to a cool area,
    2) thoroughly soaking the clothing with water, and
    3) vigorously fanning the body to increase cooling.

- **Heat exhaustion**. Heat exhaustion includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt.
  - Signs and symptoms. A worker suffering from heat exhaustion still sweats, but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness, the skin is clammy and moist, the

complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

- Medical attention. General Treatment:

  1) notify the site EMT,
  2) have the victim rest in a cool place, and
  3) have the victim drink plenty of liquids.

  Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

- **Heat cramps**
  - Signs and symptoms. Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss.
  - Medical attention. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth.

- **Fainting**. A worker who is not accustomed to hot environments and who stands erect and immobile in the heat may faint.
  - Signs and symptoms. With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain.
  - Medical attention. Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

- **Heat rash**. Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where heat is not easily removed from the surface of the skin by evaporation and the skin remains wet most of the time.
  - Signs and symptoms. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance.
  - Medical attention. Workers can prevent this by resting in a cool place part of each day and by regularly bathing and drying the skin.

- **Transient heat fatigue**. Transient heat fatigue refers to the temporary state of discomfort and mental or psychological strain arising from prolonged heat exposure. Workers unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance.

Preparing for Work in the Heat

One of the best ways to reduce the heat stress of workers is to minimize heat in the workplace. However, heat is difficult to control while working outdoors and exposed to various weather conditions.

Humans are, to a large extent, capable of adjusting to the heat. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

Workers who return to work after vacation or extended illness may be affected by the heat in the work environment. Whenever such circumstances occur, the worker should be gradually reacclimatized to the hot environment.

Mechanization – Heat stress depends, in part, on the amount of heat the worker's body produces while a job is being performed. The amount of heat produced during hard, steady work is much higher than that produced during intermittent or light work. Therefore, one way of reducing the potential for heat stress is to make the job easier or lessen its duration by providing adequate rest time. Mechanization of work procedures can often make it possible to isolate workers from the heat source and increase overall productivity by decreasing the time needed for rest.

Work/Rest Periods – Rather than be exposed to heat for extended periods of time during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work-rest cycles or regular (and enforced) breaks. Work-rest cycles give the body an opportunity to get rid of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin.

Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. Rest areas should be as close to the work area as possible, and provide shade. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

Drinking fluids – In the course of a day's work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced.

Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst drive. A worker, therefore, should not depend on thirst to signal when and how much to drink. 5 to 7 ounces of fluids should be consumed every 15 to 20 minutes to replenish the necessary fluids in the body.

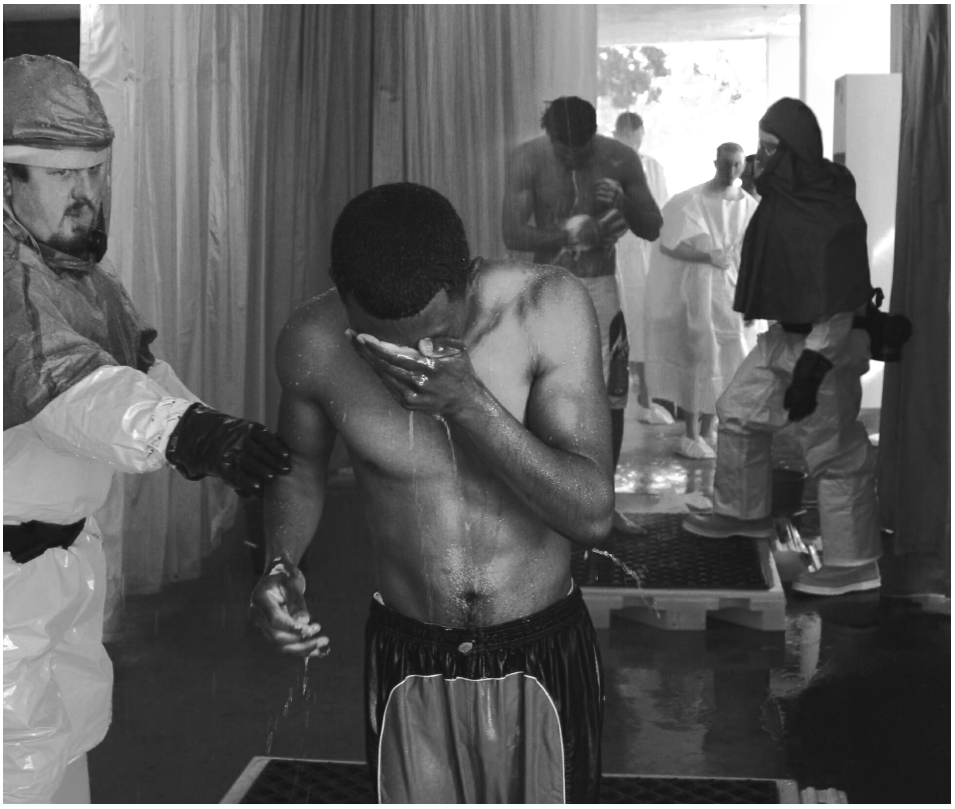
There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they will cool ones. Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets SHOULD NOT be used.

CAUTION–PERSONS WITH HEART PROBLEMS OR THOSE ON A "LOW SODIUM" DIET WHO WORK IN HOT ENVIRONMENTS SHOULD CONSULT A PHYSICIAN ABOUT WHAT TO DO UNDER THESE CONDITIONS.

Protective clothing and heat stress – Clothing inhibits the transfer of heat between the body and the surrounding environment. Therefore, in hot jobs where the air temperature is lower than skin temperature, wearing clothing reduces the body's ability to lose heat into the air. When air temperature is higher than skin temperature, clothing helps to prevent the transfer of heat from the air to the body. The advantage of wearing additional clothes, however, may be nullified if the chemical protective clothes interfere with the evaporation of sweat.

Module Four

Patient Decontamination



It is feared that future terrorist incidents may include the release of chemical, radiological or biological agents. Such an event would probably occur without advanced warning, and could result in substantial numbers of contaminated civilians.

Mass decontamination is the process of reducing or removing contaminants from large groups of people. It is performed when the sheer number of people in potentially life threatening situations overwhelms the resources available to decontaminate them by traditional methods.

Some agents such as nerve gas, blister agents or blood toxins are very dangerous in small amounts and act rapidly. It will be critical to quickly initiate decontamination procedures to limit injury to those affected and to prevent the spread of contamination to the hospital and other areas of the community.

As a part of their preparations for terrorism response, hospitals must train to set up and implement mass decontamination.

Note to Instructor

This module examines the actual process of decontaminating patients. Before airing the video, review some of the challenges that the students will have to address in an actual mass decon situation, including:

- Setting up the decon station
- Dealing with modesty issues
- What happens to patients' personal possessions
- Controlling run-off water
- Decon of non-ambulatory victims
- The post-decon process

Objectives – Module Four

Following the successful completion of this section, seminar participants will be able to:

- Discuss how the decontamination area is established
- Explain in detail how patient decontamination is carried out
- Describe the differences between ambulatory and non-ambulatory decontamination procedures
- Explain how patient decontamination procedures might be modified in cases of contamination involving radiation
- Identify the need for and process of equipment decontamination

It is now time to view the fourth video on the DVD, *Patient Decontamination.* The script is included for reference purposes.

Patient Decontamination

Script

NARRATOR

"In the event of a terrorist attack, emergency responders have been trained to decontaminate victims in the field. However, history has shown that large numbers of victims will make their own way to the hospital without adequate field decontamination. If the hospital is not prepared, injury to staff and contamination of the emergency department or the entire facility may result. All hospital personnel who are in a position to greet patients as they arrive at the hospital must be trained to recognize potentially contaminated patients, initiate protective measures for themselves and the facility and mobilize the proper response.

"Many hospitals have permanent decontamination rooms that can manage one or two contaminated patients, but not the large number that may occur from a terrorist attack.

"Some hospitals have agreements with fire departments to respond to the facility in the event mass decontamination operations are required. But following an attack, all available fire units may be committed to operations at the scene.

"Hospitals should have the ability to quickly mobilize a hospital decontamination team with necessary personal protective equipment and a mass casualty decontamination system.

"This program is the fourth part of a series called "Mass Casualty Decontamination for Hospitals," designed to help First Receivers safely and effectively manage contaminated patients and is called "Patient Decontamination."

"The program will show how patient decontamination is carried out. Patient decontamination techniques will be highlighted as well as the safety procedures necessary to protect First Receivers who must carry out these tasks. The program will demonstrate ambulatory as well as non-ambulatory decon procedures, discuss decontamination for the decon team itself, and describe termination procedures after the event is over.

"Hospitals should have the ability to mobilize a hospital decon team with necessary personal protective equipment and a mass casualty decontamination

system. The hospital's Emergency Management Plan should include decontamination procedures for small numbers of patients from industrial accidents as well as for large numbers of casualties. Recognizing that incidents can occur at any time of the day or night, sufficient numbers of trained staff should be available to provide relief and sustain decontamination activities for an extended period of time

“Hospital decontamination should be conducted outside the Emergency Department in a fresh air environment. Decon must be able to operate in any weather. A hospital may have installed fixed equipment or use portable units such as decontamination trailers.

“Safety zones and perimeters should be established to control patient movement and limit the possibility of contamination to the staff and facility. These zones are similar to the safety zones used by hazardous materials responders to control a hazardous materials scene.

“Hazard control zones help ensure that responders do not inadvertently cross into a contaminated area. These control zones are usually called the hot, warm, and cold zone. The Hot Zone is an area immediately surrounding a hazardous materials incident, which extends far enough to prevent adverse effects from the hazardous material. Usually there are dangerous concentrations of the materials in the area that could interfere with an individual’s ability to escape, or there are other hazards. The Warm Zone is an area where decontamination and Hot Zone support activities take place and includes control points for the access corridor. The Cold Zone is a safety control zone that contains the Incident Command post and other support functions.

“There is no corresponding Hot Zone for hospital operations since the hospital is usually remote from the location of the release. However, the intake or patient arrival side of the decon area should be treated as the Hot Zone, with appropriate signage, access controls, and PPE requirements for entry. It is vital that this area be controlled by personnel in proper protective equipment. In some hospitals this task is carried out by security officers.

“In hospital First Receiver operations, the Warm Zone is the Hospital Decontamination Zone. It acts as a buffer between the contaminated area and the clean area.

“The Cold Zone is often called the Hospital Post-Decontamination Zone, an area which must be contaminant free.

“Once an incident occurs, responders at the scene will attempt to control patient movement and establish field decontamination procedures. Depending on the level of response, two types of decontamination may be established at the scene. Emergency decon is designed to provide immediate decontamination to large numbers of patients. This procedure uses fire department apparatus or hoses to decontaminate large numbers of patients in a very short period of time. The idea is to dilute or remove the agent from the people as rapidly as possible. This can reduce or stop the agent's action on the victims.

"There are several ways to establish emergency decon in the field. One method is to use two Fire Department engines parked side by side with fog nozzles placed on the discharge gates. This establishes a corridor for ambulatory patients to walk through. An elevated stream providing an overhead shower is another variation.

"Emergency field decon presents some concerns. Cold water may cause hypothermia even in temperate weather. If victims remain clothed during emergency decon, contaminants on the clothing could be driven into the skin. Contaminated patients should strip off clothing before they enter the water spray, since this action will remove a significant percentage of the contamination. This will also release any vapors or gasses that may be trapped in the clothing. At a minimum, victims should strip to their underwear. Unless the underwear is physically impregnated with the substance, this will be effective. However, due to privacy issues, many patients may be unwilling to disrobe.

"Usually an attempt is made to set up a separate operation for non-ambulatory patients.

"Many teams in the field use decontamination trailers or special tents and patient roller systems or carts to establish a technical patient decontamination system. The problem with technical decon systems is that they take time to set-up. It is very possible that many victims will scatter and leave the scene before these units can get into operation. In a technical patient decon system, more detail and thoroughness is given to the decontamination process.

"Conditions at the scene may hinder complete decontamination. Due to the nature of the procedure and the number of people moving through the system, patients may not be totally clean when they arrive at the hospital. In past mass casualty hazardous materials incidents an average of 80 percent of the victims self-referred to local hospitals without undergoing any field decontamination. Before permitting a potentially contaminated victim to enter the emergency department, First Receivers should evaluate reports from the field and check each individual to ensure the patient was adequately decontaminated. Hospital staff should also consider the possibility that ambulances and crews transport contaminated people to the hospital may themselves be contaminated. Vehicles may have to be relocated to a contaminated vehicle staging area, and their crews may also require decontamination.

"In many events, the arrival of victims is the first notice to the hospital that an incident has occurred. This was seen during the 1993 World Trade Center bombing, the 1995 Oklahoma City bombing, the Tokyo sarin attacks, and the events of September 11th in both New York City and Arlington, VA.

"Hospitals will need time to set up the decontamination area. Hospitals can maximize their opportunities to receive useful and timely information by activating two-way communications between the Hospital Command Center and the community's emergency operations center, public safety dispatch center or field command posts. The more information a hospital can obtain

regarding the hazard, the better First Receivers will be able to protect themselves and treat the victims.

"Upon the arrival of victims, hospital staff might obtain valuable information regarding the nature of the contaminant, the route of entry, and symptoms of exposure. By passing these details to the Hospital Command Center, the hospital can be better organized to provide decontamination and patient treatment. Decon should be set up quickly or patients will attempt to enter the facility to seek care.

"The Hospital Command Center can then pass this information back to the emergency operations center or the Incident Command post, thereby providing first responders at the scene with information that could help them recognize possible signs of exposure, initiate life-stabilizing medical treatment, and adjust their PPE plan to provide better protection.

"Facility lockdown and appropriate routing of people arriving at the facility should be implemented as soon as possible. A safe refuge area should be set up outside the Emergency Department to gather and hold arriving patients. Triage or security staff wearing proper PPE should attend to the patients until decon is set up and operational. Since the decon team will be suiting up in PPE during this time, a separate team should set up the system. Decon should be operational within a few minutes.

"Triage points should be established in front of the decontamination system to determine decontamination priorities. The staff member managing the triage area must be a trained, experienced healthcare professional who has depth of knowledge about WMD agents and decon priorities, and can make rapid decisions. Patients needing immediate treatment or those with heavy contamination are processed first.

"Patient clothing removal is extremely important. A poncho type modesty garment should be provided that patients can use to cover themselves while they disrobe. There are commercially available garments or they can be readily constructed by cutting head and arm holes in opaque drum-size trash can liners. Once the ponchos are donned, patients can fully undress underneath the bag with modesty.

"Patients should be provided with clear plastic bags into which they can place their clothes and personal possessions. The bags should be sealed, then marked or tagged to identify the belongings. The bags should then be isolated in a secure area. If patients require glasses, hearing aids, prostheses, or other assistive devices these should be decontaminated during the process and kept with the patient if possible.

"Decontamination lines for both ambulatory and non-ambulatory patients should be established. The ambulatory side of the system will require minimal staff support but the patients will require supervision to assure adequate decontamination. Ambulatory decon procedures start with the patients entering the decon system. A demonstrator in the decon area can show patients what is expected of them. The ambulatory system should provide gender segregation.

Small children should walk if they are able and should be accompanied by a parent or guardian. Service animals should be decontaminated together with their owners. Consideration should be given to matching decon staff genders to patient genders.

“The decon set up should have a clean side from which fresh supplies and equipment are handed in. Isolation and disposal activities take place on the dirty side. Patients should move through a minimum two-stage, supervised self- decontamination process. The first stage should be a quick rinse followed by a wash and shampoo with a mild liquid soap. The soap solution may be delivered through the shower system, placed in spray bottles, or provided by small bars of soap or scrub packs. The next stage is a water rinse. Decontamination should start at the head and end at the feet. If possible, the water should be heated to 90-95°F to improve decontamination efficiency and reduce the effects of hypothermia. Hypothermia is a concern, even on warm days. High volume, low water pressures and a gentle spray should be used to avoid aggravating any soft tissue injuries. Special attention should be paid to areas of gross contamination, injured areas, hair, and opposing body surfaces such as the underarms and groin. Patients should be careful not to abrade the skin, and to use extra caution over bruised or broken skin areas, since damaged skin areas can enhance the dermal absorption of toxic products. Depending on the type of contaminant, patients should remain in the shower sprays for an average of three to five minutes. First Receivers should evaluate decontamination efficiency and adjust the shower time as necessary.

“Patients should then move into gender separated areas to don disposable clothing or patient gowns. After decontamination and redressing, all patients should be re-checked and triaged by medical personnel and treated or transferred to another area as necessary.

“Non-ambulatory patients require more extensive staff involvement. Non-ambulatory patients should be placed on a gurney, backboard or stretcher, then elevated to a convenient position. Some teams use roller systems to more effectively move patients through the decon process. The patient's clothing, jewelry, and shoes should be quickly removed and isolated for further decontamination or disposal. Plastic bags can be marked to identify the patient’s belongings.

“To reduce the possibility of internal contamination, the head and face should be decontaminated first. Brush or blot visible contaminants away from the eyes, mouth, and nose; then wash in the same manner. If eye irrigation is necessary, use gentle running water from the nose to the lateral face. If possible, contact lenses should be carefully removed and disposed of.

“The patient is then flushed with water and washed with a mild liquid soap. High volume and low water pressure and gentle spray nozzles should be used to control the spray and avoid aggravating any soft-tissue injuries. New sponges should be used for each patient. When the patient is rolled on their side to clean the back, the backboard or stretcher the patient is lying on should also be decontaminated. If necessary, spinal immobilization must be maintained

during the log-rolling procedure. The process is then repeated with a thorough warm water rinse.

"Trained and properly protected medical personnel may provide basic life saving interventions during the decon process.

"Soap, water, and plastic increases the potential for slip, trip, and fall injuries especially when combined with visibility and mobility impairment due to the use of PPE. Special care must be taken in these areas.

"In cases of covert biological agent release, the incubation period usually makes decon unnecessary. Since considerable time has passed from time of exposure until detection of symptoms, the patient has probably changed clothing and washed several times. In case of an overt release or where patients have been contaminated with a visible agent, decontamination can usually be accomplished by having the patients remove and isolate their clothing and wash exposed areas of the skin with soap and water, then follow with a full body shower as soon as possible. In cases of large numbers of patients in an overt release or dissemination by an explosive or aerosol dispersal device, standard mass casualty decontamination procedures should be followed.

"In cases involving mass casualties from a dirty bomb or other radiological dispersion device standard field and emergency department decontamination guidelines should be followed. In these cases, many victims will self rescue and will present to the nearest hospital. Decon must be carried out prior to entering the facility. Radiological monitoring devices can be deployed to determine the extent and location of contaminants on patients. Consideration should be given to issuing dosimetry measurement devices to staff assigned to the Decontamination Zone during a radiological event.

"Care should be exercised to keep contaminants away from areas of tissue damage and body cavity openings. Wounds should be rinsed from the center of the wound outward. Areas of soft tissue damage should be covered with an impermeable barrier to prevent recontamination.

"After decon, the patient should no longer pose a threat of secondary contamination and is now able to enter the hospital for medical care. Non-ambulatory patients should be transferred onto a clean plastic backboard or stretcher and moved to triage in the hospital by a clean transport team.

"All persons who have gone through decontamination should be identified, documented, and receive medical monitoring if practical. Law enforcement may wish to conduct interviews, and where available, social service personnel should be in attendance to provide support to those with logistical problems in transportation, housing, and re-uniting of families. Pastoral care, psychological support, and critical incident stress management should be available.

"Large quantities of water are required to decon mass casualties, resulting in large quantities of waste-water with dilute contaminants. The life safety of patients and personnel is always the primary mission and should never be compromised in order to contain runoff. Protection of the environment is a

secondary consideration. However, runoff should be collected if possible. Hospitals must work closely with water treatment facilities to plan for contaminated water.

"Once the decon operation is complete or at the end of work shifts, the decon team itself must undergo decontamination. All personnel, PPE and equipment leaving the hospital decontamination zone must be decontaminated. Decon procedures must provide an organized process to reduce contaminant levels as low as reasonably achievable.

"Then the chemical-protective clothing must be removed and isolated. First tape or bands securing gloves and boots to the suit are removed. Then, outer gloves should be removed, by pulling one glove by the fingers until it is halfway off, then grabbing the fingers of the other hand and pulling that glove. Both gloves should then fall into a container. This leaves the inner gloves uncontaminated. A gloved assistant can hold the turbo pack and battery of the PAPR. The Decon team member can then unclip and remove the PAPR belt and unzip the suit. The suit is then rolled down toward the boots allowing the wearer to step out of the suit and boots, over the clean line towards the post decon area. The decon member then grabs the hood from the outside and drops it into a collection bag. The assistant drops the turbo pack into the bag as well. Finally, inner gloves are removed and placed into the bag. The bag is sealed and set on the dirty side for later cleaning or disposal.

"The dirty area and all used equipment should be isolated until the level of contamination is established and the area is properly cleaned.

"Personnel should then move to a shower area, remove personal clothing, and place it in a plastic bag. All clothing should be double-bagged and labeled appropriately. Personnel should shower and redress in normal working attire and then report for medical surveillance.

"Decon Team members should undergo post incident medical monitoring and rehabilitation before being released from duty. First Receivers should participate in a debriefing. The signs and symptoms of exposure to the agent encountered should be provided and determination should be made about what equipment has been damaged and in need of replacement or further decontamination. Ways to improve future responses should be noted. A written record of the decontamination operation should be made.

"All equipment used for decon also must be decontaminated or disposed of in accordance with local, state, and federal regulations. The County Health Hazmat Team will monitor the area and take samples to determine if further decontamination will be required. Disposal will be handled by a licensed environmental contractor.

"Large numbers of victims of a terrorist attack will likely make their own way to the hospital without adequate field decontamination. Hospital staff must be able to recognize that victims have been exposed to a harmful substance and mobilize a hospital decon team. Decon should be conducted outside the emergency department using fixed or portable equipment. Both ambulatory

patient and non-ambulatory patient decontamination should be provided for. The decon team must safely utilize proper personal protective equipment and be able to decontaminate themselves following completion of their decon activities.

"A properly trained and equipped hospital decontamination team can save patient lives and limit hospital staff injury and facility contamination."

Credits

Module Four – Activities & drills

The following are some suggested activities that apply to this part of the seminar; you might think of others to include as well.

- Make a list of the supplies that must be on hand for a potential mass decon situation.
- Organize a decon team from members in the class. Assign the following positions:
  - Decon Unit Leader
  - Decon Safety Officer
  - Triage Leader
  - Decon demonstrators

  The remaining members of the class can be divided between decon team members and victims. Include some non-ambulatory victims. Working as a team and within their roles, and wearing PPE, go through every step of the decon process to see where any problems lie. Remind students to perform medical monitoring before donning and after doffing PPE.

  Practice each step until it runs smoothly:

  - Set up a decon area in the designated location
  - Establish safety zones
  - Test the water run-off and review the hospital's plan for control.
  - Provide ambulatory 'victims' with modesty gowns. Have them remove and bag their clothing. What is the plan for segregating men and women?
  - Walk ambulatory victims through the decon corridor. Are there adequate plans for providing soap, sponges and towels? What will be done with used sponges and towels?
  - How about non-ambulatory victims – are there any surprises?
  - Are provisions being made for non-English speaking victims?
  - How will you test the effectiveness of the decon operation?
  - What happens to post-decon ambulatory?
- Make arrangements with the hospital's Command Center to practice using the designated communication system.

Instructor Resource

Teaching Points – Module Four

General Competencies for First Responder Operations Level Training

PROCEDURE	
Skill Component	**Teaching Points**
1) Demonstrate knowledge of how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and PPE available	Control and confinement issues: • Victims: Directed toward a common holding area (safe refuge area); prevent from entering facility prior to decontamination; proceed from dirty to clean area (prevent contact between contaminated and decontaminated persons), etc. • Decontamination zone: Borders must be clearly delineated (barrier tape, cones, lines, existing barriers such as walls, etc.); zone bust be monitored to prevent contaminated victims from exiting prior to proper decontamination and to prevent "clean" persons from entering a "dirty" or contaminated area. • During an incident, decon personnel should take all necessary steps to save lives, protect the public, and protect themselves. Once imminent threats to life and health are addressed, first receivers should make all reasonable efforts to contain contamination and avoid or mitigate environmental consequences (U.S. EPA, 2000) Runoff from decontamination zone should be collected in tanks, barrels, or bladders, and if not contained, appropriate health officials should be notified.
2) Demonstrate knowledge of how to implement basic decontamination procedures	Basically, decontamination is the removal of harmful substances from the body to the extent necessary to preclude adverse health effects. Emergency or gross decon: Rapid decontamination to save a life usually done with water. Primary decon: Decontamination provided by HazMat teams or first receiver hospital based teams using detergent soap in addition to copious amounts of water. Secondary decon: Decontamination of a victim or team member after initial decontamination has already been provided (i.e., a victim transported to a facility by EMS that has received emergency decon in the field, but hospital personnel see a need for detergent soap to remove a non water soluble contaminant; or, hospital decon team members who take a post decontamination shower after doffing PPE). Mass decon: Either emergency or primary decon provided for a large number of victims. Decontamination will be done, for the most part, by the victims themselves. Supervision of those victims (to ensure adequate and complete decontamination) will be the primary job duty of the hospital team member in the

PROCEDURE	
Skill Component	**Teaching Points**
	immediate showering area. Decontamination will occur from top to bottom or in a head to toe manner using a flush, wash, and rinse process.
3) Demonstrate an understanding of the relevant standard operation procedures and termination procedures	Decontamination will occur in an out of doors environment such as a trailer, tent, or other open but sheltered showering area that can provide warm water to multiple victims with an element of privacy if possible. Decon team members that will have direct contact with contaminated victims will be provided appropriate PPE, and given the necessary initial training and ongoing education to maintain competency in the safe use of PPE. Upon termination of a decontamination operation, the decon zone will be made inaccessible to unprotected persons and appropriate signage will be displayed to convey this danger. Contaminated clothing and/or valuables and belongings will be secured as well. These patient items will be treated as evidence until directed otherwise by law enforcement personnel. Contracts with hazardous waste disposal companies should be in place prior to the incident. Staff debriefing will occur after the incident and documentation will be thorough utilizing the Hospital Incident Command System (HICS).

Instructor Resource

Decontamination Procedures

Excerpt from OSHA's *Best Practices For The Protection Of Hospital-Based First Receivers*

Decontamination procedures can have a large impact on First Receiver exposure to hazardous substances. All the hospitals interviewed agree that the basic steps include:

1. Activate the EMP.
2. Learn as much as possible (as soon as possible) about the number of victims, the contaminant, and associated symptoms. Previous arrangements with first responder organizations can improve the timeliness and quantity of information received.
3. Activate the decontamination system and assemble the decontamination team and site security staff.
4. Perform any medical monitoring (e.g., vital signs), if specified by the EMP.
5. Put on PPE.
6. Triage victims to determine which individuals require decontamination and provide critical medical treatment to stabilize them before decontamination (e.g., atropine).
7. Assist victims (ambulatory and non-ambulatory) in removing contaminated clothing and securing personal property as soon as possible (within minutes of arrival).
8. Place clothing and other contaminated items in an approved hazardous waste container that is isolated outdoors so the items are not a continuing source of exposure.
9. Wash victims using soap, with good surfactant properties, and water (preferably tepid water to improve victim compliance). This step should include copious rinsing.
10. Inspect victims to evaluate the effectiveness of decontamination and guide decontaminated victims to the medical treatment area (Hospital Post-decontamination Zone). Return inadequately decontaminated victims to the shower area and repeat cleansing.
11. Decontaminate equipment and the decontamination system (if not disposable).
12. Staff remove PPE and decontaminate themselves.

[*See Appendix A for an additional example of victim decontamination procedures*.]

All of the steps above can influence the extent of healthcare workers' exposure to the contaminant. However, certain steps should be highlighted for their direct impact on the concentrations of contaminant first receivers will encounter. For example, disrobing might remove as much as 75 to 90 percent of the contaminant arriving on a victim (Macintyre et al., 2000; Vogt, 2002; USACHPPM, 2003a).[69] By isolating (in an approved hazardous waste container) the contaminated clothing, staff prevent these materials from off-gassing into the work area. To minimize First Receiver exposure levels, these steps should be implemented immediately as victims arrive.

Non-ambulatory victims can require a substantial proportion of First Receivers time and efforts. First Receivers are likely to experience the greatest exposures while assisting these victims. Staff should take steps to identify possible sources of contamination and limit their exposure to those sources. For example, Hospital A uses specific procedures for removing victims clothing to minimize First Receiver and victim exposures. Assistants use blunt-nose scissors to cut away clothing, rather than pulling it off. Tugging on clothing can produce a wringing action that might distribute contaminant on the victim, healthcare workers, and the surrounding area. Once removed, the clothing is immediately placed into a sealed container.

Unless a hospital uses detection equipment with demonstrated accuracy and reliability, victim washing procedures and visual inspection offer the only practical way healthcare workers can conclude that victims are definitively decontaminated. Staff in the ED might become exposed if contaminated victims are permitted to enter the Hospital Post-decontamination Zone. All the hospitals interviewed for this project indicated that they currently require victims to soap and shampoo completely and spend 5 to 6 minutes under a flow of running water. Some hospitals time the individual victims' total wash periods, while others observe the victims to ensure they wash thoroughly. It may be advantageous to start the victim cleansing process with a full minute under a drenching shower to rinse away as much contaminant as possible, followed by subsequent soaping and rinsing steps, repeated as necessary (USACHPPM, 2003a). Hospital G has a progressive shower, in which each victim spends one minute at each of several wash stations.

Most of the hospitals interviewed also provide victims with written or pictorial instructions. In addition, tepid water, security of personal effects, single-gender facilities, shelter, and replacement clothing influence how quickly and completely victims comply with requirements to undress, shower appropriately, and wait for medical treatment until they are completely decontaminated. In cold climates, heated spaces and blankets might be necessary. Victim inspection provides a final check to ensure contaminant is not carried into the ED.

Victims from some incidents may arrive at the hospital after having been decontaminated at the incident site (Release Zone) or elsewhere. Before admitting a victim to the ED, First Receivers should evaluate each individual to ensure the patient was adequately cleansed.

The methods staff use to decontaminate themselves and doff PPE also impact their own exposure. ATSDR (2000) and Appendices K and L offer examples of procedures used by some hospitals. While there is little definitive published information available regarding optimal shower procedures (for victims or staff), the following sections summarize information provided by organizations with some expertise in this area. These procedures apply to a wide variety of contaminants and are appropriate for unknown contaminants that could arise from a release of toxic chemicals, biological agents, or radiological particulates. Decontamination procedures, like PPE use, can be modified once the contaminant is identified; hospitals that are cleansing victims to remove known contaminants can tailor procedures as appropriate. For example, a longer rinse might be beneficial for corrosive substances or contamination in the eyes. Organizations such as the Center for Disease Control and Prevention (CDC) and the Department of Homeland Security offer specific recommendations for decontaminating victims exposed to individual hazards, such as ionizing radiation (CDC, 2003; Department of Homeland Security, 2003).[70] After cleansing with soap and water, certain residual chemical warfare agents (sarin, mustard gas, and others) can be neutralized on the skin using a substance such as the reactive skin decontamination lotion (RSDL), used by the US Army and other military organizations.[71]

Shower Flush Time and Practices

Numerous agencies and organizations recommend a shower time of approximately five minutes for contaminated victims brought to a hospital. Despite the fact that there is no empirical data, operational procedures deem this time as adequate.

- The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) recommends one-minute rinsing from head to toe with tepid water (slightly warm, not hot) after removal of contaminated clothing, followed by a more thorough decontamination of washing with a soap with good surfactant properties (e.g., hand dishwashing detergent),

tepid water, and soft sponges. Avoid stiff brushes and vigorous scrubbing, which can damage the skin and increase the chance the contaminant would be absorbed by the victim. USACHPPM recommends these procedures for most classes of contaminants, except certain reactive metal dusts (USACHPPM, 2003a).

- The U.S. Army Soldier and Biological Chemical Command's (SBCCOM) Mass Casualty Decontamination Research Team (MCDRT) states that actual showering time will be an incident-specific decision but might be as long as 2 to 3 minutes per individual under ideal circumstances (SBCCOM, 2000b).
- The Agency for Toxic Substances and Disease Registry (ATSDR) recommends that patients contaminated with an unidentified chemical should flush exposed or irritated skin and hair with plain water for 3 to 5 minutes. For oily or otherwise adherent chemicals, mild soap on the skin and hair followed by a thorough rinse with water is also recommended (ATSDR, 2003).
- A technical expert for Hospital A's Emergency Mass-Casualty Decontamination Program stated that research regarding how long it takes to decontaminate an individual is scarce. This organization recommends a 5-minute shower time, based on operational experience. However, in some cases the total decontamination period could last longer than five minutes, depending on the agent, its viscosity, the quantity on the victim, and the amount of clothing removed.

Soap

Numerous agencies and programs recommend the use of water and a liquid soap with good surfactant properties (such as hand dishwashing detergent) to decontaminate victims during emergencies and mass casualties involving hazardous substances. Their recommendations are summarized here.

- SBCCOM's MCDRT recommends the rapid use of water, with or without soap, for decontamination. Using soap can marginally improve the results by ionic degradation of the chemical agent. Soap helps dissolve oily substances like mustard or blister agent. Liquid soaps are quicker to use than solids. However, the decontamination process should never be delayed to add soap (SBCCOM, 2000b).
- A multi-service effort of the U.S. Army, U.S. Marine Corps, U.S. Navy, and U.S. Air Force recommends that a contaminated individual use generous amounts of soap and water and scrub downward from head to toe. However, the decontamination process should not be delayed to due to a lack of soap (U.S. Army, 2001).
- A technical expert with Hospital A's Emergency Mass-Casualty Decontamination Program stated that this organization uses mild liquid (hand) dishwashing soap to avoid irritating the skin while still allowing, with enough water and friction, removal of the contaminant. He stated that the Department of Defense (DOD) has also suggested using mild soap for chemical warfare agents. USACHPPM suggests using mild (hand) dishwashing soap for removing a wide range of possible contaminants, including industrial chemicals, chemical warfare agents, biological agents, and radiological particles (USACHPPM, 2003a).

Notes

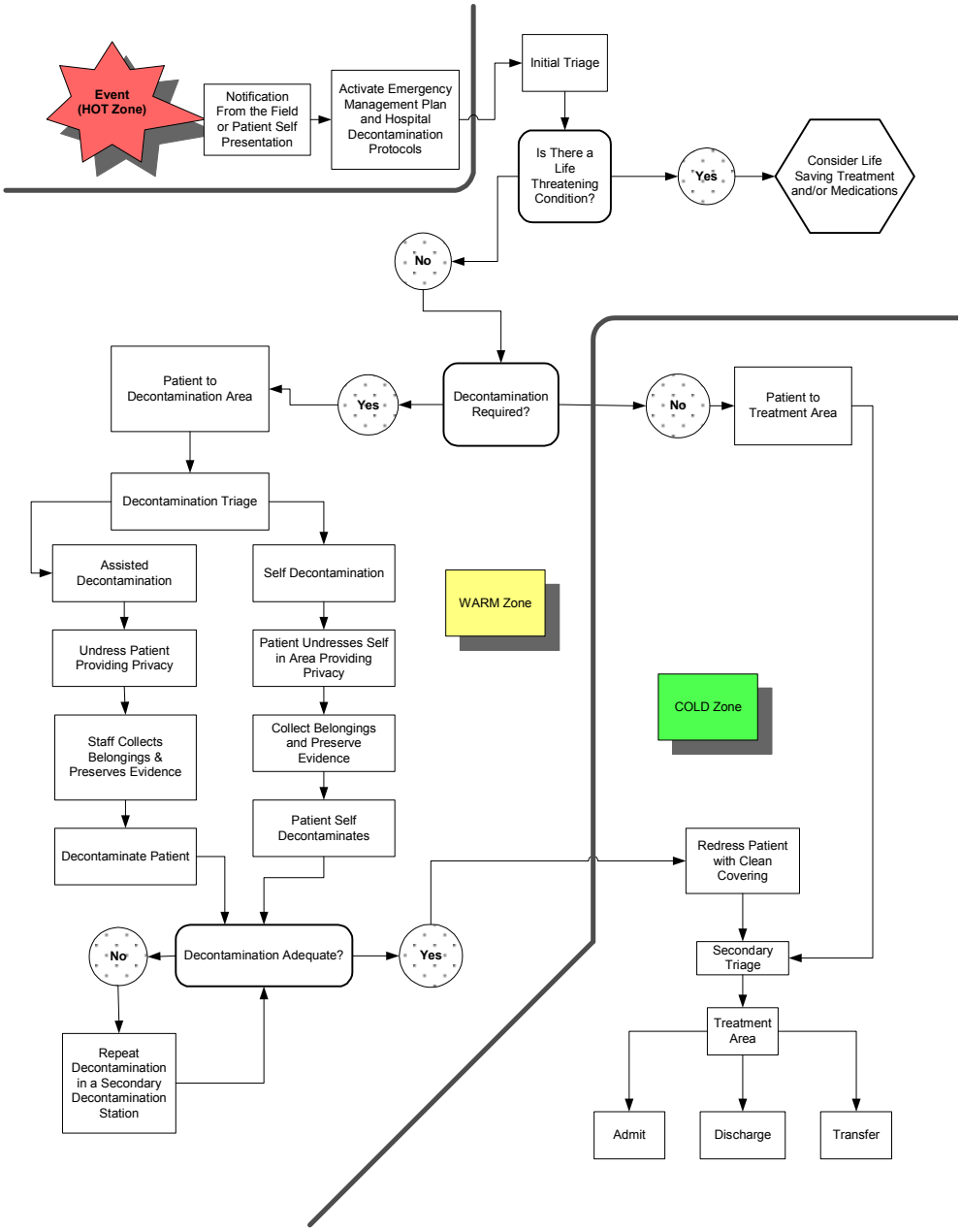
[69]The percentage of contaminant reduction depends on the type of clothing the victim was wearing when exposed. The estimates may be somewhat lower (down to 50 percent) for victims wearing short pants or skirts and higher (up to 94 percent) for victims exposed to biological warfare agents while wearing protective military uniforms (USACHPPM, 2003a).

[70]The International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurement (NCRP) also offer guidance for radiological incidents.

[71]Neutralizing agents reduce toxic effects of agent already absorbed into the skin. RSDL won Food and Drug Administration (FDA) approval in 2003.

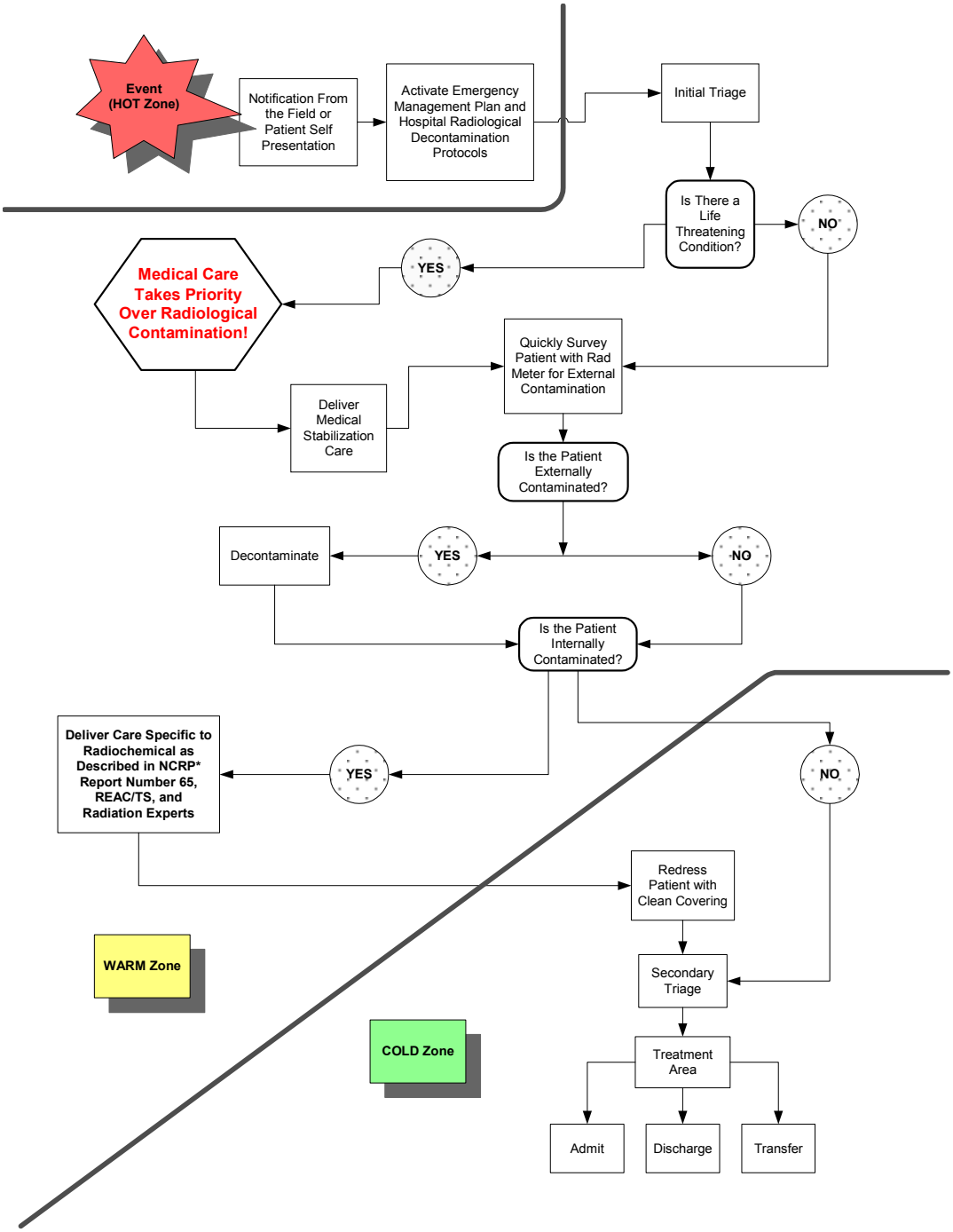
Instructor Resource

Algorithm for Chemical Decontamination in a Hospital Setting



Note: *This document is not intended to stand alone but is part of an overall emergency management plan for decontamination. This algorithm is a general decontamination guide and should be customized to meet unique decontamination needs of the facility and the CBRNE event.*

Algorithm for Treatment of Radioactive Contamination



Adapted from the University of California (Davis) Health System

Module Five

Exercises

There are a variety of different types of exercises that can be used as effective tools to help prepare hospitals and staff to handle large incidents. Discussion-based exercises such as seminars, workshops, and table-top exercises provide a forum for reviewing the adequacy of plans, policies, functions and interagency agreements. Operations-based exercises such as drills and full-scale exercises are designed to test personnel and equipment performance during a response.

A full-scale exercise is the most complex type of exercise, involving multiple agencies and multiple jurisdictions. Students participating in this seminar should don PPE and should participate at the Operations Level, putting into practice the skills and competencies for which they have been training.

Full-scale exercises are conducted in a real-time, stressful environment intended to mirror an actual event. Unlike drills, there are no 'do-overs.' The exercise continues to run regardless of the problems encountered. Although the planning of a full-scale exercise requires a large time commitment on the part of many people, the payoff is a community that is better protected in the event of a disaster.

Note to Instructor

Depending on your class schedule and whether you have elected to present the seminar in two- or four-hour segments, you may choose to give the class the Post-Seminar Test before devoting the final class to the exercise. If so, please skip to page 74 before moving forward with this section.

The skills that have been taught in the previous videos and drills will now be put into action, as students participate in an exercise that will test their competencies as well as the hospital's Emergency Plan. The final video presents two scenarios. After viewing the program, the class will select one of the scenarios and use it to test their new skills.

Here is a summary of each scenario:

1. An explosion at a local shopping mall has left many people with injuries and may have involved a chemical agent.
    - *Your hospital is one mile south of the scene*
    - *Weather: temp. 57° f. Wind 5 mph from the south*
    - *Hazmat team at the scene reports that detection devices indicate nerve agent contamination*

2. An explosion at a political event the local convention center has left people with burns. Firefighters are using Geiger Counters and picking up readings of radiation.
    - *Your hospital is six miles west of the scene*
    - *Weather: temp. 67° f. Wind 10 mph from the north*
    - *Ten (10) patients from the scene are now checking in to the emergency department*
    - *BLS units are en route from scene with patients*

Assign students to the roles they will perform once they have been certified at the Operations Level. Try to include as many emergency response organizations as possible in the exercise, especially law enforcement and fire departments. Enlist college students or actors to play the role of 'victims.'

Make the exercise as realistic as possible. Talcum powder can be used to simulate contamination. Working as rapidly as possible, set up the decon area and make sure you have all the items that would be used at a true incident. Have 'victims' congregate in a holding area(s) and go through triage to determine who goes through decon first. Make sure you are providing information to these people, and are soothing the 'casualties.' Use barrier tape to organize the site and direct people through the decon corridors. Set up separate corridors or use partitions or modesty screens for men and women. Separate out the non-ambulatory and have another line for these victims. At the appropriate time, take steps to control runoff.

As the Instructor, this is your opportunity to observe each seminar participant to evaluate whether he or she is eligible for certification at the Operations Level.

At the end of the incident, a debriefing is held to provide all involved in the response with the hazards and risks involved. This is different from the critique, which is held later. The critique should identify the following pieces of information:

- What hazardous substances were involved, and the signs and symptoms of exposure;
- Equipment that have been damaged and must be repaired or replaced;
- Equipment and supplies that must be decontaminated or disposed of;
- Any unsafe conditions that the clean-up crew and hospital;

maintenance teams must be made aware of;
- The point of contact for incident related issues.

The critique is a review of the lessons learned as a result of the incident. Its purpose is to develop recommendations for improving the Emergency Plan. It should be a constructive experience rather than an opportunity to lay blame. Ideally there should be a published agenda, so that all participants will know what to expect. Each key player should have the opportunity to make a statement relative to his or her actions, and as to what he or she feels are key issues. Positive things learned from the exercise should be emphasized as well as the problems.

Lessons learned must be translated into changes in the Emergency Plan, otherwise a valuable opportunity for improvement will have been wasted.

Objectives – Module Five

In the course of a training exercise, students will demonstrate their ability to:

- Establish the HICS;
- Identify which patients may be contaminated;
- Communicate with other agencies to determine the identity of the agent(s) that were used;
- Set-up the hospital decontamination system;
- Select, don, work in and doff personal protective equipment;
- Conduct heat stress monitoring and prevention for personnel wearing PPE;
- Decontaminate ambulatory and non-ambulatory mock victims;
- Decontaminate personal who are wearing PPE;
- Carry out demobilization activities.

Post Seminar Test/Answer Key

In addition to competencies demonstrated in drills and exercises, a written test should be part of the certification process. The Post Seminar Test can help the Instructor determine how much students have learned about decontamination. However it cannot necessarily accurately measure the skills they have developed. It is important to feel confident about each student's competency before issuing an Operations Level certificate.

Students have the Post-Seminar Test in their workbooks. All questions are multiple choice. Have them circle the correct answer. They should be able to complete this test within 20 minutes. At the end of that time, collect their papers. Afterwards, if you have time you can go over each answer.

1. Which zone is <u>not</u> part of the hospital decontamination operation?
   a. Hot Zone
   b. Warm Zone
   c. Cold zone
   d. Post-decontamination zone

   The correct answer is (a). The Hot Zone is the site of release of the hazardous substance which would not be near the hospital. The Post Decontamination Zone and Cold Zone are clean areas where treatment, triage, etc. would occur.

2. Which action <u>would not</u> take place in the "safe refuge area"?
   a. Observe victims for signs and symptoms of contamination
   b. Give instructions to victims regarding decontamination
   c. Provide clothing and blankets and refer victim to appropriate treatment area in the Cold Zone
   d. Gather information from victims that may guide the decontamination process

   The correct answer is (c). The safe refuge area is a contaminated area within the decontamination zone. Patients are provided with comfort items, re-assessed and treated in the Post Decontamination Zone, or Cold Zone.

3. Which is the <u>most</u> appropriate method for a hospital decontamination team member to determine if victim decontamination was adequate?
   a. Scan victim with a chemical monitoring instrument
   b. Observe for signs and symptoms upon exiting the shower
   c. Observe victims during decontamination and supervise as necessary
   d. Check the waste water for discoloration

   The correct answer is (c). Direct observation is the best method to determine effective decontamination. Victims left unsupervised may pass through decon too quickly thereby missing contaminated areas of the body. The use of chemical monitoring instruments requires constant training and is costly which is not practical

for most hospitals. Observing for signs and symptoms is good, but most patients will continue to show signs of illness after decontamination.

4. A team member dressed in Level "C" PPE in the decontamination zone suspects a respirator filter is clogged or may be malfunctioning. What should be done first?
   a. Change the filter immediately in the decontamination zone
   b. Remove the respirator hood to get fresh air
   c. Immediately proceed to the post decontamination zone, change the filter, then provide self-decontamination
   d. Obtain decontamination from team members, then proceed to post-decontamination area for a replacement filter

   The correct answer is (d). Filter cartridges must be changed or removed in a clean area, otherwise contaminated air will enter the respirator unfiltered. Before proceeding to the Cold Zone, each team member must first be decontaminated.

5. What advantage does a Level "C" hooded PAPR have over a tight fitting face sealed respirator?
   a. The hood can be worn by persons who require glasses
   b. The hood has a higher efficiency rating than a mask type respirator
   c. The hood requires annual fit testing to document adequate effectiveness
   d. The hood can be used in immediate danger to life and health atmospheres

   The correct answer is (a). Since the seal is provided by tucking the inner collar under the suit in a hooded PAPR, glasses can be worn and fit testing is not required. Level "C" PAPRs are not to be used in immediate danger to life and health atmospheres.

6. When donning Level "C" PPE, when should the safety check be done?
   a. After the respirator is donned
   b. After the battery has been turned on
   c. Before any piece of chemical protective clothing has been donned
   d. After donning the last piece of PPE, and before entering the decontamination zone

   The correct answer is (d). The safety check is the last thing to be done prior to entering the decontamination zone. Connections, seals, filters, etc. are checked. Make eye contact and communicate with the person inside the suit to ensure that he or she is ready and able to safely carry out the mission. The equipment will have been checked monthly and just prior to donning the PPE as well.

7. Communication is difficult while dressed in PPE and hand signals may be necessary. Which hand signals would be <u>best</u> to use during a mass decontamination event?
   a. Only OSHA approved signals
   b. Signals used by the local fire department
   c. Hand signals approved by local regulatory agencies
   d. Signals that were practiced by employees during drills

   The correct answer is (d). Redundant methods of communication must be practiced by team members. Teams can develop their own hand signals, but the signals should be known and practiced by all members.

8. Heat stress is a very real problem when wearing PPE. Which person is at most risk from suffering harm from overheating?
   a. Person who attended a big party the night before
   b. Person who was raised in northern (colder) state
   c. Someone who works independently and denies illness
   d. Person with a history of diabetes and smoking

   The correct answer is (c). A team member in PPE who does not feel well should immediately request help, decontaminate as necessary, doff the suit, re-hydrate, and obtain a medical evaluation.

9. While dressed in PPE and performing decontamination, which one of the following persons is best able to determine if heat stress has occurred?
   a. The safety officer for the decontamination operation
   b. The team member in PPE who is feeling ill
   c. The employee health physician in the support zone
   d. The unit leader for the decontamination team

   The correct answer is (b). It is difficult if not impossible to medically assess a person wearing PPE. A pulse cannot be checked through the thick outer gloves. Skin signs such as color, temperature, and moistness cannot be assessed through the chemical protective suit. Even thought there is a safety officer assigned to monitor the safety concerns of the team, the person best suited to make the determination of well being is the team member who is in PPE. You must admit that you are not feeling well early before heat stress progresses.

10. A wet victim arrives by ambulance and the attendant states that decontamination was performed in the field. What should be done before directing the victim to a treatment area?
    a. Nothing, the victim was obviously already decontaminated
    b. Have the victim proceed through the hospital decontamination process
    c. Assess the adequacy and type of field decontamination to determine if additional decontamination is necessary
    d. Send the victim to be evaluated with monitoring and detection equipment

    The correct answer is (c). (The hospital's decontamination team is the first line of defense against secondary contamination of co-workers in the rest of the facility. Just as we gather information from victims in the safe refuge area, we must also attempt to determine what kind of decontamination was provided on scene by first responders: was it emergency decon using only water from a fire hose for a few seconds when the contaminant was said to be "oily and sticky", or was a more formal decontamination using soap and water provided by a hazardous materials team. If field decontamination is determined to be inadequate or if there is a question as to its completeness, error on the side of caution and send the ambulance patient through hospital decontamination.

11. The "Warm Zone" in a hospital decontamination operation is the area where:
    a. Decontamination is performed
    b. Warming and comfort measures are provided
    c. The terrorist weapon was initially released
    d. Patients are stabilized

    The correct answer is (a). The Warm Zone, also known as the decontamination zone, is far from the Hot Zone and is where any contaminated victims are. The safe refuge

area is within the Warm Zone and decontamination is done in the Warm Zone. Patient welfare occurs in the Post Decontamination Zone or Cold Zone.

12. A Mark I kit is an antidote for which agent?
    a. Cyanide
    b. Nerve agent
    c. Mustard agent
    d. Phosgene

    The correct answer is (b). A Mark-I nerve agent kit is the antidote for nerve agents such as Tabun, Sarin, Soman and VX. This antidote is one of the few available treatments that can easily be given prior to decontamination if necessary. There is an antidote for cyanide, but it will most likely be provided in the treatment area after decontamination. There is no antidote for mustard agent or phosgene.

13. Effective hospital decontamination of hazardous substances is best done with tepid water and:
    a. Bleach
    b. Detergent soap
    c. Hydrogen peroxide
    d. Saline

    The correct answer is (b). Plain dishwashing soap and water is the most practical solution for decontamination of skin. Dilute bleach solutions work well on equipment but can abrade and harm the skin. Hydrogen peroxide and saline are not decontamination solutions.

14. Which of the following contaminants will likely be washed off a victim during decontamination prior to entering the hospital for treatment?
    a. Chemicals
    b. Biological agents
    c. Bacteria
    d. Viral agents

    The correct answer is (a). The effects of a chemical agent released on victims will most likely produce immediate signs and symptoms. Victims will seek immediate treatment and will be decontaminated prior to entering the hospital. Biological agents such as bacteria and viruses have an incubation period or delayed effect. These victims will present for treatment several days to a week or more later depending on the infecting organism. They will have showered and washed their clothing prior to entering the treatment facility, therefore decontamination is not necessary.

15. Expected to be released with a bomb blast, this type of terrorist contamination and exposure may not even be recognized until symptoms develop or unless specialized detectors are used:
    a. Industrial chemicals
    b. Military type weapons
    c. Ionizing radiation
    d. Inhaled small dust particles

    The correct answer is (c). Ionizing radiation must be detected using monitoring equipment. Signs and symptoms will develop well after the exposure depending on the dose.

16. Victims of a terrorist toxic release event will need to undress as part of the decontamination process. What happens to the clothing they have removed?
    a. It is bagged and returned to the victims after it is cleaned
    b. It is eventually destroyed by burning or burying at a specialized landfill
    c. Can be sent through hospital laundry
    d. It is bagged and held as evidence for law enforcement officers

    The correct answer is (d). Victim clothing should be removed, bagged and labeled with name, and kept in a safe location. The clothing is evidence of a crime and can potentially be used by law enforcement for investigation. Since the clothing is contaminated, no one should open the bag without first receiving clearance or guidance from the jurisdictional health authority.

17. Which of the following personal items could the patient wash and safely bring through the decontamination corridor?
    a. Paper money
    b. Eyeglasses
    c. Purse
    d. Family photos

    The correct answer is (b). Porous material such as paper or leather can absorb contaminants thereby making it difficult to decontaminate. Metal items such as eyeglasses can be washed by the victim.

18. To prevent secondary contamination of the facility, hospital personnel may have to do all of the following <u>except:</u>
    a. Secure all entrances to keep people out
    b. Set up a Decontamination Zone
    c. Separate "everyday" patients from those who are contaminated
    d. Provide victims with immediate in-hospital life saving treatment prior to decontamination

    The correct answer is (d). Contaminated victims, even those with life-threatening conditions, should not be allowed into a facility prior to decontamination. To prevent this, entrances must be secured while a decontamination team is assembled and the Decontamination Zone is set up. This is direct conflict on how a hospital runs on a day-to-day business. However, initially the safety of personnel and the security of the hospital are of the utmost concern.

19. Who <u>does not</u> enter the Decontamination Zone during the decontamination process?
    a. Decon unit leader
    b. Contaminated victims
    c. Safe refuge area officer
    d. Team members dressed in Level "C" PPE

    The correct answer is (a). Only contaminated victims and team members in PPE should be in the decontamination zone. A decontamination unit leader cannot effectively manage a decon operation while dressed in PPE, therefore this person would be in the Cold Zone.

20. Regardless of any contamination that was received, all freshly decontaminated victims will need:
    a. Extensive psychological counseling
    b. Antidotes appropriate to the exposure
    c. Dry clothing and foot protection
    d. Admission to the hospital for overnight observation

    The correct answer is (c). Decontaminated victims will be cold and will require comfort measures such as dry clothing and foot protection for safety.

21. Prior to wearing a respirator either for training or actual decontamination, what must first be done?
    a. Fill out a medical questionnaire per OSHA regulations
    b. Submit a note from a physician
    c. Exercise by doing push-ups and jumping jacks
    d. Demonstrate your physical fitness and agility

    The correct answer is (a). The employer shall provide a medical evaluation using a medical questionnaire or provide an initial medical exam that includes the same OSHA approved material contained in the questionnaire. Being in good physical condition or supplying a physician note stating the same does not meet the OSHA regulations in 1910.134.

22. All of the following actions can be done while wearing PPE **except:**
    a. Giving instructions to victims in the safe refuge area
    b. Self assessment for heat stress
    c. Hydration to prevent heat stress
    d. Giving Mark-I nerve agent antidote injections

    The correct answer is (c). Team members should drink water and hydrate prior to donning PPE. The hood cannot be removed while in a contaminated environment in order to drink.

23. Just before each person enters any hazardous area in protective garments they must have:
    a. A physical exam to detect health problems
    b. An explanation of the job that is to be performed
    c. Documentation of training to OSHA standards
    d. A final safety check of equipment

    The correct answer is (d). Equipment must be checked prior to donning but a final check must be done after donning PPE to ensure connections are tight, cartridges are in place and secure, etc. Do not forget to assess the team member in PPE that he or she is ready and feels "good to go" (i.e., comfortable, alert, without physical complaints, etc.)

24. Protective equipment worn by hospital staff is not the most protective type that can be worn by a person in a hazardous environment because:
    a. Hospital decontamination workers are working close to the treatment zone
    b. The most protective equipment is too costly to be used by hospital employees
    c. Hospital employees are at no risk of being contaminated by victims
    d. The hospital decontamination area will have lower levels of contamination than the release site

The correct answer is (d). Ambulatory victims in the hospital decontamination area are more likely to have received a lower dose of toxic material than incapacitated victims at the scene.

25. People exposed to nerve agents might be given an antidote (Mark I) before or during the decontamination process. This antidote comes in a:
    a. Glass container that is inhaled
    b. Syringe with a spring loaded needle
    c. Pill that must be swallowed with water
    d. Powder that is applied to the skin

    The correct answer is (b). The antidote kit for nerve agent exposure is called a Mark-I which contains two auto-injector syringes. This is one of the few medical interventions that can be given prior to or during mass casualty decontamination.

26. Which is the one HICS position that is always filled for every incident?
    a. Finance Chief
    b. Incident Commander
    c. Planning Chief
    d. Operations Section Chief

    The correct answer is (b). Every incident will have an Incident Commander no matter how large or small. HICS positions are only activated as needed. It is a rare incident that would require all positions to be filled.

Appendix A

Example of Patient Decontamination Procedure

Source: Northern Virginia Emergency Response Coalition. Available at: http://www.hazmatforhealthcare.org/download/ doc/misc/Patient_Decontamination_Procedure-complete.doc (Accessed September 2, 2003)

Ambulatory Patients

- Direct patient to Decon Sector. Children should be kept with their parents if at all possible; if no parent or older sibling is available then a Decon Team member should provide needed assistance to a child.
- Patient should be given Personal Decon set as soon as it is available and be given rapid instructions on its use – play the tape recorded set of instructions, if available. The kit stays with you as you proceed through the process.
- Open up the bag – it has three parts.
- Take out the plastic bags now. Patient should quickly remove all clothing, putting valuables into the clear plastic bag and clothing into the large bag, then put both bags into the 3rd bag and cinch tight w/ tag number in pack. Patient should put numbered tag around their neck and wear it through decon and treatment.
- The clothing bag should be set aside in a secure area. If staff is available, patient's name and number should be recorded on the Patient Decon Record.
- Patient should continue forward into the Decon Sector with remaining part of Personal Decon Kit.
- Patient should quickly rinse themselves from head to toe with water using either the hand held sprayer, garden hose, or shower head.
- Patient should next wash with soap and wash cloth or brush from the kit in a systematic fashion, cleaning open wounds first and then in a head-to-toe fashion for 5 minutes when the agent is non-persistent and 8 minutes when a persistent or unknown agent is involved. Discourage the patient from rubbing too vigorously while washing. Eye irritation may require the use of a topical anesthetic first before irrigating.
- The Decon Team should closely observe each victim to ensure they are thorough in washing themselves. Particular attention should be made to ensure they wash the axilla, creases, folds, and hair. Help should be offered as necessary.
- Once the washing is completed, each patient should thoroughly rinse themselves (this should require about a minute to complete). Decon soap, wash cloths, brushes, and sponges should be put into a nearby trash can and NOT carried into the Cold Zone.
- After the rinse/wash/rinse cycle is complete the patient should next proceed to the towel off area and complete drying off and leave the towel in the trash can. F
- Following drying off, the patient should put on the patient gown and proceed to the Triage Officer for rapid assessment and assignment to a Treatment Sector.

Additional treatment will be limited only to those interventions deemed life saving by the Decon Officer. Antidote administration should be done via the intramuscular (IM) route after cleaning the affected area first. Decon Team members should be alert to the possibility that an ambulatory patient may clinically deteriorate and require immediate removal to the Non-Ambulatory Sector via backboard, stretcher, or wheelchair.

Non-Ambulatory Patients

- Patient should be brought to the Decon Sector and tended to by a minimum of 4 decon personnel. Each patient should be put onto a backboard or EMS stretcher w/the

pad removed. All patient clothing should be removed and valuables put into the clear plastic bag and clothing into the large bag, then put both bags into the 3rd bag and cinch tight w/ tag number in pack.

- Clothing should be cut away where necessary. Attention should be paid to minimizing the aerosolization spread of particulate matter by folding clothing inside out as removal is being done and dabbing the skin with sticky tape and or vacuuming. Patient should have their clothing bag tag around their neck and wear it through decon and treatment.
- The clothing bag should be set aside in a secure area. If staff is available, the patient's name and number should be recorded on the Patient Decon Record.
- While resting the backboard on saw horses or other device or with the patient on an EMS stretcher, the patient should quickly be rinsed from head to toe with water using either the hand held sprayer, garden hose, or shower head; protection from aspiration of the rinse water should be ensured.
- Next the patient should be washed with soap and either a brush or wash cloth in a systematic fashion, cleaning airway first followed by open wounds then in a head to toe fashion for 5 minutes when the agent is non persistent and 8 minutes when a persistent or unknown agent is involved. Avoid rubbing too vigorously. The patient should be rolled on their side for washing of the posterior head, neck, back, buttocks and lower extremities by 2–4 personnel; attention to a possible neck injury should be given. Careful attention should be given to washing the voids and creases such as the ears, eyes, axilla, and groin.
- Topical eye anesthetic may be required for effective eye irrigation to be done.
- The patient should then be rinsed in a head to toe fashion that minimizes contamination spread for about one minute. Overspray or holding the rinsing devise too close so as to irritate the skin should be avoided.

Decon Team members should be alert to the probability that the non-ambulatory patient may require ABC's support (airway positioning, suctioning, O2 administration, spinal stabilization, etc.) and administration of life saving antidote administration by IM injection. If IV therapy is needed the extremity site for the IV should be deconned quickly before the IV is started. If IV therapy is needed the patient should be pulled out of line in the Decon Corridor but remain in the Decon Sector.

The patient should be dried off, put into a hospital gown, and transferred to a clean backboard (or clean off and dry the board they are on if additional boards are not available). Patients on an EMS stretcher should be transferred to a clean backboard. Decon soap, brushes and sponges should be put into a trash can and not carried into the Cold Zone. O2 material should remain in the Decon Sector.

The patient should be taken to the Triage Officer for rapid assessment and assignment to area in the Treatment Sector.

Patients with Special Needs

Glasses/Contact Lenses – Patients with glasses should keep them if they cannot see without them. They must be washed and rinsed thoroughly during the decon process before being worn. Otherwise, the glasses should be placed in the valuables portion of the clothing bag. Contact lenses should be removed and placed in the valuables portion of the clothing bag.

Canes/Walkers – Patients who use walking assist devices may retain them, but the device must be washed with soap and water during the decon process before being allowed into the Treatment Sector. Patients

who are unsteady standing and/or walking should be given a walker upon entry into the Decon Corridor. The walker should be used to assist with ambulation until they get to the end of the line when it should be retrieved, deconned, and returned to the front of the Decon Corridor for the next patient who needs it.

Percutaneous Lines/Saline Locks – Unless contaminated, percutaneous lines and saline locks should be covered with Tegoderm or Saran wrap before the area is decontaminated. Contaminated percutaneous lines or saline locks should be removed before being decontaminated. After the area is cleaned, a dressing should be applied until in the Treatment Sector where antibiotic ointment and a new bandage should be applied.

Hearing Aids – Hearing aids CANNOT be immersed or otherwise be soaked with water. Thus, they should either be removed and placed in the valuables portion of the patient's clothing bag or if they must be used by the patient because there is no hearing without them, they should be carefully wiped off with a slightly saline moistened 4x4 gauze, dried off, put into a clear plastic bag, and handed to the patient. The cleaned hearing aid is NOT to be worn until the patient has completed the decon process (including washing the ears) and is in the Treatment Sector.

Dentures – Unless the oral cavity is contaminated dentures should remain in place and no decontamination is necessary. If the oral cavity is contaminated, then the dentures should be removed, placed in a clear plastic bag with the patient's name or clothing identification number placed on it. The dentures should later be decontaminated in accordance with instructions received from the Poison Center and/or a dentist. The patient's mouth should be decontaminated with mouthwash or saline that is gargled and safely spit out into a bio-hazard bag. Note that, depending on the contaminant, it may not be possible to decontaminate plastic items, such as dentures.

Law Enforcement Officers with Weapons

In most cases law enforcement personnel who have been injured on the scene will have had their gun(s) removed before arrival and given to a fellow officer. However, if that is not the case, the weapon should be left in the holster and the gun belt removed by a Decon Team member and placed in a clear plastic bag labeled with the patient's name and/or clothing number. The bag should then be passed to the Treatment Sector where it should be given to a fellow officer or hospital Security Officer for safe keeping until it can be given to a representative of the injured officers department. The gun should be left in the holster if at all possible. If the gun must be removed, it should be handled by a Decon Team member familiar with firearms, rendered safe, placed in a clear plastic bag marked with the patient's name and/or clothing identification number, and given to a fellow officer or hospital Security Officer in the Treatment Sector.

Decon Team personnel should be aware that oftentimes an officer may have a backup weapon usually found in a holster near the ankle, in their pocket, in a ballistic vest, or near an armpit. The holster with the weapon in place should be removed and secured as described above. An officer's gun belt may also contain items that could prove dangerous if allowed to get in the wrong hands. Thus, the belt should be collected and separately bagged ASAP and passed to a fellow officer or hospital Security Officer in the Treatment Sector. Deconning of an officer's weapon and/or gun belt will be the responsibility of the police department.

Ballistic vests must be removed prior to undergoing decon. The vest is usually easily removed by loosening the Velcro straps and then pulling the vest apart and off the patient. It should then be placed in a large plastic bag identified with the patient's name and/or clothing number on it and passed to a fellow officer or Hospital Security Officer in the Treatment Sector.

Appendix B

Recommendations for Hospitals Addressing Water Containment and Run Off During Decontamination Operations

It is recognized that each facility has different capacities to manage varying numbers of contaminated victims. For example, based on a current Hazard Vulnerability Assessment (HVA), some facilities may plan for decontaminating a single victim and appropriately containing the waste water. In this case, two or more victims would exceed the capacity of the facility.

There is currently no legislative or regulatory mandate to describe the details on decontamination facilities' containment procedures and capacities. Each hospital facility, however, must establish water containment capacities based on a facility hazard vulnerability assessment (HVA) for determining the potential number of patients that may require decontamination. In addition, hospitals should consider community hazardous materials risks to identify potential numbers of victims that may present to the facility.

The intent of the attached matrix is to provide hospitals with planning guidance for managing the waste water and runoff generated by decontamination of victims presenting to the facility for emergency care and treatment.

Hospitals should plan for decontamination operations that will not exceed their capacity, but should also develop a contingency plan for mass decontamination when patient numbers do exceed their capacity. It is critical that hospitals develop decontamination and waste water containment plans in collaboration with proper local regulatory authorities (Publicly Owned Treatment Works (POTW) and Municipal Separate Storm Sewer Systems (MS4)). (See glossary for definitions of the POTW and MS4.)

This document was developed to assist hospitals in planning for the management of waste water runoff during decontamination of victims at the facility. A glossary is provided at the end of the document.

The State of California Water Resources Control Board and the Regional Water Quality Control Boards within the California Environmental Protection Agency recognize that the priorities for hospitals during a chemical, biological, radiological or nuclear event requiring decontamination are those of life safety, protection of the facility and finally protection of the environment. There is no exception to the letter of the law; however, circumstances are always a major consideration by the regulators when an emergency requires actions that technically violate the standards. All reasonable measures must be taken by hospitals to capture waste water runoff.

The California Hospital and Healthcare System Disaster Interest Group wishes to thank the State of California Water Resources Control Board and the Regional Water Quality Control Board (Region 5) for their guidance and collaboration in preparing and reviewing this document.

Addressing Water Containment and Run Off During Decontamination Operations

Tier	Description	Recommendations

Decontamination Operations for Planned Capacity	Decontamination operations for the planned capacity is the provision of patient decontamination and containment of waste water based on the facility hazard vulnerability assessment.
	
	Each facility must provide plans and procedures for:
	• Victim/patient decontamination
	• Waste water containment
	• Waste water disposal for planned facility capacity.
		Waste water from decontamination must be contained.
		
		Considerations to address in hospital policy and procedure include:
		• Identification of the agent
		  o Field/Fire/Haz Mat reports
		  o Laboratory testing of waste water
		• Waste water containment.
		• Waste water disposal that may include contracts with waste pumping and disposal companies.
		• Facility clean up and readiness for return to normal operations.

Mass Decontamination Operations	Mass decontamination is defined as an incident that involves increased numbers of victims exceeding the planned capability of the facility to decontaminate those victims. Attempts must be made to contain waste water.
	Life safety of victims, current patients and personnel is the primary mission. Protection of the environment is a secondary consideration. Local fire and/or hazmat resources may not be able to respond to the facility to assist in the decontamination efforts. The facility must anticipate decontamination requirements that exceed the planned capacity.
	Large quantities of water are required to safely and completely decontaminate victims, resulting in large quantities of waste water with dilute contaminants.
	The facility must work closely with the POTW or MS4 to plan for decontamination that exceeds the planned facility capabilities and investigate the options for containment of mass quantities of waste water and runoff during the process.
	In consultation with local authorities, berm the decontamination area and dike the waste water runoff to the extent possible as follows:
	• Containment
	• Diverting to sanitary sewer
	• Diverting to storm drains
	• Diverting to ground leaching.
	Notification of proper regulatory authorities when waste water cannot be contained should be in accordance with the Health and Safety Code, Chapter 6.95, Section 25500.
		Due to the location of the decontamination area and the large quantities of runoff produced, the sanitary sewer may not be an option to route the runoff of waste water and the storm drain or ground leaching may be necessary in an emergency.
		Considerations to address in hospital policy and procedure include:
		Involve the proper regulatory authorities (POTW/MS4) and first responders providing decontamination services in planning for mass decontamination and waste water issues. Make reasonable efforts to contain the excess waste water including the use of berms and dikes.
		• Ensure large quantities of water are available for decontamination to dilute the agent as much as possible.
		• Direct excess waste water to the sanitary sewer and immediately notify the POTW and/or MS4.
		• Should the sanitary sewer not be available, immediately notify the proper regulatory authorities (MS4, POTW, etc.)
		• Investigate procedures for containment and disposal of the contained waste water:
		  o Contracts with waste pumping and disposal companies
		• Agreements with the POTW/MS4 to allow waste water to flow into sanitary sewer.
		• Identification of the agent
		  o Field/Fire/Haz Mat reports
		  o Laboratory testing of excess waste water.
		• Establish procedures for facility clean up and readiness for return to normal operations.

References

APIC Bioterrorism Task Force, CDC Hospital Infections Program Bioterrorism Working Group, *Bioterrorism Readiness Plan: A Template for Healthcare Facilities*, 4/13/99

*Best Practices for the Protection of Hospital-Based First Receivers...*http://www.osha.gov/dts/osta/bestpractices/html/hospital_firstreceivers.html

Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response, MMWR. CDC:Atlanta, 4/ 00

Bioterrorism Preparedness and Response: A National Public Health Training Plan CDC. 9/7/00

Breathing Apparatus. Edgartown, MA: Emergency Film Group, 1995.

Center for Strategic & International Studies: *Contagion and Conflict: Health as a Global Security Challenge*: *A Report of the Chemical and Biological Arms Control Institute and the CSIS International Security Program* Washington, D.C.:2000

Centers for Disease Control and Prevention Bioterrorism Preparedness and Response Web Site http://www.bt.cdc.gov

Chemical Protective Clothing. Edgartown, MA: Emergency Film Group, 1997.

Currance, L. Phillip, Clements, Bruce, Bronstein, Alvin. *Emergency Care for Hazardous Materials Exposure 3rd Edition*, St. Louis: Mosby, 2005.

Currance, L. Phillip ed., et al. *Medical Response to Weapons of Mass Destruction*, St. Louis: Mosby, 2005.

Decon Team, Edgartown, MA: Emergency Film Group, 2003.

Developing Objectives, Content, and Competencies for the Training of Emergency Medical Technicians, Emergency Physicians, and Emergency Nurses to Care for Casualties Resulting from Nuclear, Biological, or Chemical (NBC) Incidents: Final Report, American College of Emergency Physician-NBC Task Force. 4/23/01

Fraser, Michael R., PhD & V. Scott Fisher, MPH *Elements of Effective Bioterrorism Preparedness: A Planning Primer for Local Public Health Agencies*, National Association of County and City Health Officials, Washington, DC, 01/01

Fell-Carlson, Terrorist Danger: *The Nurse's role in managing the radiological threat*
http://www.nursingspectrum.com/

Geiger, H. Jack, MD "Terrorism, Biological Weapons, and Bonanzas: Assessing the Real Threat to Public Health," *American Journal of Public Health*, Vol 91, No. 5, pgs 708-709 05/01

Hazardous Materials: Managing the Incident: Program 4 - Decontamination, Edgartown, MA: Emergency Film Group, 2004.

Hazardous Materials: Managing the Incident, Program 5- Protective Clothing & Equipment. Edgartown, MA: Emergency Film Group, 2005.

Heat! Working in Hot Environments. Edgartown, MA: Emergency Film Group, 2005.

HISSB National Electronic Disease Surveillance System web site http://www.cdc.gov/od/hissb/act_int.htm

Hospital Preparedness for Mass Casualties: Final Report. American Hospital Assn., March, 2000.

Mass Decontamination, Edgartown, MA: Emergency Film Group, 2005.

Mettler Jr, A. Fred, M.D., M.P.H., Voelz, George, M.D. "Major Radiation Exposure What to Expect and How to Respond,*" New England Journal of Medicine*, May 16, 2002, Vol.346, No. 20. pgs1554-1561

Model Emergency Response Communications Plan for Infectious Disease Outbreaks and Bioterrorist Events, Association of State and Territorial Directors of Health Promotion and Public Health Education, Washington, DC 5/00

NFPA 1994, Protective ensembles for chemical /biological Terrorism. Quincy: National Fire Protection Association, 2002.

Noll GG, Hildebrand MS, Yvorra JG: *Hazardous Materials Managing the Incident 3rd ed*., Chester, MD: Red Hat Publications, 2005.

Patient Decontamination Recommendations for Hospitals, California Emergency Medical Services Authority, 2005

Rega P. *Bio-Terry: A Stat Manual to Identify and Treat Diseases of Biological Terrorism.* MAS-CAP, Inc. Maumee, Ohio. 2001, revised 2006.

Rega P. *Chem-Terry: A Rapid Recognition and Response Guide for Chemical Agents of Terrorism.* MASCAP, Inc. Maumee, Ohio. 2005.

Terrorism - Biological Weapons. Emergency Film Group, Edgartown, MA 1999.

Terrorism - Chemical Weapons. Emergency Film Group, Edgartown, MA 2000.

Terrorism - Explosives and Incendiaries. Emergency Film Group, Edgartown, MA, 2003.

Terrorism - First Responder, *Version 2.0*. Emergency Film Group, Edgartown, MA, 2003.

Terrorism - Medical Response. Emergency Film Group, Edgartown, MA, 2002.

Terrorism - Radiological Weapons. Emergency Film Group, Edgartown, MA, 2004.

The Public Health Response to Biological and Chemical Terrorism, Interim Planning Guidance for State Public Health Officials. CDC, 7/01

US Department of Justice, Office for State & Local Domestic Preparedness Support web site http://www.ojp.usdoj.gov/osldps/ta/training