

Initial Management of WMD Casualties in the Emergency Department

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Introduction

A mass casualty incident (MCI) is defined as “any large number of casualties produced in a relatively short period of time, usually as the result of a single incident such as an aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistical support capabilities.”¹

Patients injured during a hazardous materials incident or a terrorist release of a Weapon of Mass Destruction can have a negative effect on the healthcare system by causing secondary contamination of both caregivers and facilities. The aim of the medical management team in disasters is to provide the greatest benefit to the greatest number of casualties, in order to achieve a critical reduction in mortality and morbidity. This can only be possible if the facility or community utilizes a good emergency management plan and practices it routinely. Protection of the facility and staff is a high priority.

Safety Officer

An essential component of every healthcare facility is to offer the capability to assess, decontaminate and treat victims of chemical incidents safely. This capability is most often in the emergency department of the facility. The question is how many contaminated patients can efficiently and safely be accommodated at one time? Can ambulatory and non-ambulatory patients be accommodated simultaneously? When critically evaluated, most systems can accommodate only 3-5 patients at one time. This is where the Safety Officer (SO) comes into play. The Safety Officer is a role that many healthcare facilities may not be familiar with,

but it is a critical role in the safety of the employees and the facility, particularly during events involving nuclear, biological or chemical weapons.

In a WMD event, the Safety Officer’s responsibilities are to monitor all phases of the operation and advise the Incident Commander of procedures that can reduce the risk to facility and employees. Medical personnel have the mindset that they need to get in there and care for victims; WMD events require a different, more cautious mindset. Prior to any staff making close contact with patients, their protective equipment must be cleared by the Safety Officer. It is also the SO’s role to monitor staff and see that they are given relief when needed. Before filling this role, the SO must have knowledge of all of the following:

- (1) Hospital policy and procedures related to WMD;
- (2) OSHA safety regulation 29 CFR 1910;
- (3) Infectious Disease Control Procedures, OSHA 29 CFR 1920.1030;
- (4) The Hospital Incident Command System (HICS);
- (5) A demonstrated proficiency in the identified PPE and decontamination units; and
- (6) A thorough understanding of all processes.

The Safety Officer should have the authority to stop any operation that becomes life threatening to personnel.

PPE Selection

The selection of Personal Protective Equipment (PPE) is also a subject that relates to safety. Choosing appropriate PPE is not an easy task. Selection should not be based on an uneducated guess, but rather made after research by the facility in conjunction with a vulnerability analysis. The fit testing program is also a part of the decision making process.

Depending on the extent of the contamination, health-care workers caring for chemically contaminated patients should use Level C protection (i.e., full face mask and powered/non-powered canister/cartridge filtration respirator) or Level B protection (i.e., supplied air respirator or self-contained breathing apparatus) (See Figure 1).



Figure 1

The type of canister/cartridge should be appropriate to the agent; if the agent cannot be identified, an organic vapor/HEPA filter is recommended². There is no one cartridge for every type of agent; again this requires an educated and informed decision prior to use of PPE. New WMD or domestic preparedness cartridges are designed to provide protection against a wide range of biological/radiological/chemical threats.

According to OSHA, “types of PPE range from gloves to chemical protective clothing to a self-contained breathing apparatus (SCBA) when the highest level of respiratory protection is required”.

Another consideration in the selection process is that communication is difficult while wearing PPE. Many facilities plan for this by using small communication boards and other communication systems placed in the “pre-decontamination area”, or they research respirators that have internal communication systems.

Decon units

Once PPE is chosen and initial training and fit testing has been completed, training on the decontamination process can begin. Decontamination is the process of removing accumulated contaminants and is critical to the health and safety of healthcare providers by preventing secondary contamination.

Location and choice of decontamination (decon) units has become as complicated as choosing the correct PPE. All facilities that have the potential to receive contaminated patients must provide an area for decontamination (See Figure 2).



Figure 2

There are many architectural qualifications to take into consideration before developing an

adequate decontamination room in a facility. For example, if the ventilation system is not separate from the rest of the facility, then contamination of the entire facility becomes a real possibility. This would result in closing down part or all of the hospital. Separate entry and exits must be in place that do not interfere or interface with other populations entering or exiting the facility.

Run off from the decon operation must be contained separate from the regular facility drainage system (unless the Environmental Protection Agency (EPA) has declared a catastrophic emergency or unless a true mass casualty incident occurs). This self-contained tank must be accessible for drainage and must be able to handle the run-off from multiple victims from a MCI.

Most interior decon rooms in hospitals are capable of handling only 1 or 2 patients at a time. Therefore, a lot of facilities are currently looking at portable units that can take the decon process away from the building or complement the internal unit. The most attractive decon units are portable ones that can easily be set up in the hospital parking lot by assigned personnel. (See Figure 3)



Figure 3

These portable units provide shelter from the elements and protection of the victims from the public eye. Whether the unit is internal or external, it must have access to a warm water tap or have a portable warm water heater available. Warm water must be accessible even in warm weather climates for contaminated patients who

are scared and in shock.

Decontamination Process

The decontamination plan should establish procedures and educate employees about decontamination procedures, identify the equipment needed, methods to be used, and establish methods for disposal of contaminated materials. All staff that may participate in the decon unit need to be trained in the decon process and available equipment capabilities while using their PPE.

The extent to which decontamination is performed is dependant on the exposure situation. Removing and bagging the victims' clothing can remove much of the contamination and minimizes the risk of spreading the contaminant.

There are many principles and theories surrounding decontamination of a patient. Most authorities agree that to be effective, decontamination must include a minimum of two steps. The first step is removal of the clothing and jewelry and then rinsing the patient with water. The second process involves a mild soap and clean water rinse. This will complete the decon procedure for most patients.

The pre-planning phase must determine where the pre-decon area, decon area and post decon areas will be established. Separate areas may be required for ambulatory victims and the non-ambulatory victims. In general terms, the pre-decon area is contaminated and requires the use of PPE. The decon area zone is where decontamination takes place and also requires the use of PPE. After decon, victims will pass into the post-decon area. Personnel with hazmat experience will recognize these as the "Hot Zone" (pre-decon area), the "Warm Zone" (decon area) and the "Cold Zone" (post-decon area).

The first step of the process is to clearly delineate three areas and not allow crossing back and forth between the pre and post decon areas. The pre decon area is where the ambulatory victims get undressed and put their belongings

into individual bags. It is important to remember that a majority of the contaminants will be removed with the disrobing of the victims, as contaminants cling to the clothing.

It is crucial to control the pre decon area and give direction to the victims. This is where internal and external security and others assigned to this area become an integral part of the process. The first staff assigned to the pre decon area will be there to control the crowd and provide direction to the victims and incoming EMS towards the triage area.

It is expected that everyone will demand direction and require information upon entry into the system. If the facility is not yet prepared to administer decon for the waiting victims, staffers must provide distractions. Begin with a general triage system and identification instructions. Passing out pre-decontamination kits will also provide a distraction. This kit will provide the victim with a temporary outfit (usually a large paper poncho) to wear after they disrobe, and a bag to put all of their clothes and valuables in. These kits can be purchased or pre-packed by the facility.

Initial triage begins in the pre decon area, to make sure that people are in the correct location. Triage will determine who might need to go through the decontamination line first. Initiation of victim ID bands and triage tags can take place at this time if the bands/tags can tolerate going through decon. A separate zip-lock bag for belongings such as jewelry and identification cards (driver's license) need to be provided if these items are not grossly contaminated. This enhances victim control and victim identification. Directions for bagging and labeling clothing and other belongings can be provided in many ways, for example, a pre-recorded message in different languages can be set up on a simple PA system to provide direction, or instruction sheets within the bag itself.

While they are disrobing, the decon area and staff can be readied. Once the decon unit is ready, the crowd will be instructed to move towards the decon unit.

Ambulatory decontamination

There are generally four steps to ambulatory decontamination. The first step is the removal of clothing, as described above. Bags containing belongings should be identified for each individual and left at the entrance of the decon area, as directed by staff. Victims will then step into the decon unit, remove the temporary outfit, and throw it in the individual trash bags.

The second step of the decon process is the soap/solution stage. First, there is an initial rinse, accompanied by application of a mild liquid soap or shampoo. The use of warm water, either from a hospital connection or a portable heating unit that supplies warm soap and rinse water will reduce the effects of hypothermia. Otherwise, soap solution can be placed in sprayers or small bars of soap or scrub packs can be handed to each patient. High volume, low-pressure water with 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. Soft brushes and sponges may be used. Patients should be careful not to abrade the skin, and use extra caution over bruised or broken skin areas, which 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 modify the shower time as necessary.

Once the victims have moved through the soap stage of the decon process, they proceed to the third step, the clean water rinse. The fourth step is dry off and redress when victims come out the other end of the decon unit (see Figure 4).



Figure 4

Patients will need some type of clothing to put on so that they can proceed into the facility for a second triage and possible treatment. Many facilities are stocking boxes of disposable ‘one-size-fits-all’ paper jump suits that have feet and hood attachments. Blankets should be available to minimize hypothermic concerns.

No medical treatment has been initiated up to this point. At this time, victims are now considered clean and can now enter into the facility. They will need to be guided to where they should go next – the post-decon area. This is where some type of decontamination efficiency check should take place. There are chemical agent monitors and radiological survey meters that can be used to check a patient to see if they are “clean” or free from the agent or chemical. It is a good idea for facilities in identified high risk/vulnerable geographical areas to acquire this equipment.

Non-Ambulatory Decontamination

In an area of the pre-decon area separate from the ambulatory victims, medical personnel need to get into place to do triage to identify critical non-ambulatory patients that need to go through decon first. The triage team will assist getting the victims to the non-ambulatory side of the decon unit. Decon personnel from the facility should be prepared to receive the victims and cut off their clothes, remove jewelry and assist them through the same decon process as described for the ambulatory patients, although

in a different line. Non-ambulatory victims should then be put on a clean gurney and transported into the facility. During this process, basic medical care can be provided based on the number of victims, and supplies available in the decon unit and capabilities of the decon staff. (See Figure 5).



Figure 5

This entire process for ambulatory and non-ambulatory decon is the critical process to practice extensively with staff and reviewed on a regular basis. It is important that drills be conducted with staff dressed in appropriate PPE.

Summary

It has become more evident that all workplaces and all communities are at risk to the threat of terrorism, hazardous materials incidents and natural disasters. Healthcare facility response to a mass casualty incident has been a source of discussion and planning over the past few years. With the help of OSHA, JCAHO, NIOSH and other regulatory agencies these plans are being refined into a workable format. Healthcare facilities, including hospitals and clinics, have realized the need for more extensive planning for MCI events involving WMD. A facility’s response to a mass casualty incident must be a well-executed plan. A detailed emergency management plan utilizing the Hospital Incident Command System is one path for success. Utilizing PPE and effective decontamination procedures is necessary for the

protection of the staff, patients and healthcare facility. If the facility does their research, repetitively practices their response, and revises

their Emergency Plans, when the MCI happens, processes will fall into place with little effort. Chaos will be the exception and not the rule.

References

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