Mass Decontamination: Why Re-Invent the Wheel?

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Hospitals, hazmat teams and fire departments have been trying to develop mass decontamination procedures and specify equipment required to manage a major chemical, biological or radioactive event. Are these and other agencies wasting valuable time, effort and resources preparing for mass decon, considering the United States Army Soldier and Biological Chemical Command (SBCCOM) has developed guidelines for handling mass decontamination of victims?

Three Historical Events

Bhopal, India

During the midnight hours of December 2, 1984, 40 tons of methyl iso-cyanide and hydrogen cyanide were released from the Union Carbide plant in Bhopal, India creating a deadly gas. The gas spread over an area of 40 square kilometers and hung close to the ground for about 4 hours. Estimates are that over 500,000 people were exposed to the gases, with 6,000 dying the first week after the release (most died within the first few hours). In the years since the release, over 16,000 people have died from causes that have been directly attributed to the deadly gases. To this date rumors are still circulating that the release was a result of sabotage.

This event provided a rude awakening to emergency services on the importance of preparing for a potential chemical plant accident involving a major chemical release. In the case of Bhopal though, few people received medical attention during the early hours/days of the event. Those who did make it to one of the hospitals in the region were still contaminated by traces of the gas left on their clothing and skin. In addition, no one was evacuated even though warning signs were evident for over an hour prior to the release

Goiania, Brazil

While dismantling a cancer clinic, workers found a radiotherapy unit that still had a source containing cesium-137. The source was opened and contamination spread through out the community especially in the homes of the workers. Over 250 people were exposed to the cesium with 28 people showing signs of radiation sickness and another 104 people having internal contamination.

Since symptoms associated with radiation exposure are slow to develop, they usually become evident hours or days after the exposure, the victims of the radiation exposure were not immediately diagnosed. Once the information about the radioactive material

release became common knowledge, the area hospitals were overwhelmed by the number of victims, including those that were truly exposed and those that were not exposed but were scared that the were contaminated (coined "worried well"). As a result of the overflow, an area soccer stadium was used to congregate everyone seeking medical attention. In all, 112,800 people were evaluated for radiation contamination or exposure. Only 120 of these people had contamination on their clothing or shoes.

Tokyo, Japan

During the rush hour on March 20, 1995, terrorist belonging to the Aum Shinrikyo cult released sarin, an organophosphate nerve gas, at several points in the Tokyo subway system. The liquid was hidden in soft drink containers, thermoses and lunch pails and terrorist released it as they left the train. The liquid rapidly vaporized and spread throughout the trains and the train stations. The trains were packed with thousands of commuters and over 5,500 were injured in the attack either directly from the sarin or as a result of the hysteria caused by the sarin.

Initially, Tokyo hospitals were informed by the fire department that they were about to receive a number of victims from a “gas explosion” in the subway. Over 131 ambulances and 1,364 emergency medical personnel were eventually dispatched. At least 641 victims (some were decontaminated others were not) were transported to hospitals by emergency medical and fire department authorities. More than 4,000 people found their own way to area hospitals. The lack of emergency decontamination facilities, poor to nonexistent decontamination protocols and insufficient personal protective equipment resulted in secondary exposure of 110 hospital staff and 135 EMT’s and Paramedics.

Mass Decontamination

In all three of these historical events the number of victims was extremely high; higher in fact than what most hospitals and communities consider in their planning process. Hospitals and communities must plan for decontaminating both small numbers of victims and very large numbers. SBCCOM's guidelines indicate that during a terrorist event the community should expect to decontaminate five non-contaminated victims for every one victim that truly requires decontamination.

Once victims arrive at the medical facility, there will be no easy way (unless radioactive materials are involved) to determine who has been contaminated and who is just one of the “worried well”. The hospital must be able to decontaminate all of the victims so as to provide for their peace of mind and limit liability to the hospital.

Once a hospital accepts the responsibility of being able to decontaminate a large number of victims, the next issue is to determine the rate that decontamination can be performed and the required resources to sustain that rate. If a hospital has four shower stations and is capable of decontaminating one victim every five minutes per shower station, the hospital’s rate of decontamination is 48 victims per hour. In the case of St. Luke’s International Hospital in Tokyo, if they could have sustained a rate of 48 victims per

hour, they would have had to sustain that rate for 15 hours to decontaminate the 688 victims they received.

There are major drawbacks to decontaminating for15 hours. First, a victim who has been exposed is not going to wait for 15 hours to be decontaminated and may succumb to the chemical exposure. In addition, people waiting to be decontaminated will be milling around and eventually will become unruly and unrest could manifest itself into mob violence. One thing that is not needed at this juncture is a riot. Contaminated people also run the risk of exposing uncontaminated people the longer they remain contaminated. Hospital staff and emergency responders are not equipped nor are there sufficient numbers to sustain decontamination operations for 15 hours. More rapid decontamination is necessary.

Hospitals also continue to move in the direction of setting up portable decontamination facilities outside of their emergency departments. Setting these facilities up requires additional human resources and time. Even if the hospital begins setting up as the emergency occurs, the set-up time will usually take longer than the first victim to show up at the hospital. If decontamination facilities are not available when the patient arrives at the hospital, the patient is going to find a way to get into the emergency department and get the care he or she thinks they need! Holding a number of patients outside of the emergency department while staff is setting up tents, laying hoses and getting dressed in level B protective suits will incite the patients who may feel that “If the hospital staff needs protection, what is this stuff doing to me?” This is another opportunity for a mass hysteria or a riot to begin.

SBCCOM's solution to mass decontamination is to use fire apparatus and form a corridor. This includes parking two fire apparatuses about 15 feet apart in opposite directions with the officer’s side facing the other unit. Discharges are uncapped and large volume nozzles are placed on the discharges.

Auxiliary units and minimal staff are required to set up this corridor. Utilization of front line apparatus and multiple crews is unnecessary. Water pressure to the nozzles and elevated water distribution device should be kept at hydrant pressure, or 60 psi.

If a snozzle, squirt, or deck gun is available on one of the apparatus, it should be used with low pressure to spray water from its elevated position. These trucks can be set up in less than ten minutes and already have the crews in place to provide assistance. The biggest problem associated with this set-up is the time needed for the units to respond from their station to either the scene or the hospital. The benefit is that this does not take any special apparatus or crew, only the typical engine company found at your neighborhood firehouse.

Once the victims have been directed towards the corridor, they will be instructed to disrobe near the front of the fire apparatus. The victims will be told to bag their clothes into garbage bags and to write their names on the bags. Once unclothed, the victims will be directed to walk slowly through the corridor being sprayed from every direction. They will be instructed to raise their arms and spread their legs and to try to get every body

surface flushed by the flowing water. When they have reached the middle of the corridor, they will be instructed to turn around to ensure that the water flow has had a chance to rinse every body surface; gentle rubbing would be encouraged at this point.
After moving through the corridor, the victims should be provided paper gowns or tyvek paper suits to provide modesty and some protection from the elements. Then the patients will be evaluated to determine if additional evaluation or medical treatment is necessary.

The SBCOOM method would remove the most contamination from the most victims in the shortest period of time while utilizing the least amount of resources. While it will not get every victim 100% decontaminated (neither does the traditional methods), it would make most victims clean enough for hospital staff to evaluate more thoroughly. If a second decontamination is necessary, the more traditional decon methods can be employed. The information and guidelines provided by SBCCOM are available because Nunn-Lugar funds were set aside for the federal government to enhance the capabilities of local responders to terrorist threat. SBCCOM was assigned the mission of developing an Improved Response Program (IRP) for emergency responders. Under this program, SBCCOM studied and then recommended emergency management guidelines for actions to be taken in response to a terrorist attack.

A number of major cities including Washington, D.C., Philadelphia, Houston and Virginia Beach have accepted these recommendations and have made them part of their Weapons of Mass Destruction (WMD) decontamination strategy. Other communities need to consider their strategy in light of the SBCCOM guidance. Wasting valuable resources on tent systems, portable showers and personnel expenditures seems somewhat foolish when the SBCCOM system is an acceptable option.

These guidelines are available on the web in PDF format at the following locations:

Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident,
http://hld.sbccom.army.mil/downloads/cwirp/cwirp_guidelines_mass_casualty_decon.pdf

Guidelines for Cold Weather Mass Casualty Decontamination During a Terrorist Chemical Agent Incident,
http://hld.sbccom.army.mil/downloads/cwirp/cwirp_cold_weather_mass_decon.pdf

Mass Contaminated Fatalities During a Terrorist Chemical Agent Incident,
http://hld.sbccom.army.mil/downloads/cwirp/guidelines_mass_fatality_mgmt.pdf.