

## OVERVIEW

Decontamination of individuals after a biological event is a lesser concern than after a chemical event. Most biological agents are not dermally active with the exception of the tricholhecene mycotocins; however, decontamination remains an effective way to decrease the spread of infection from potential secondary aerosolization. Individuals who have been exposed to a biologic, chemical or radiological agent with continued risk to the victim or with risk of secondary contamination to others are to receive at least gross decontamination.

Firefighters in Alameda County are all trained to the level of First Responder Operations (FRO), which includes decontamination training. Every fire engine and truck is pre-plumbed to set up the Emergency Decontamination Corridor System (EDS); however, most of the equipment for full decontamination is carried on the Hazmat units; however, there are a few Hazmat Units that are not so equipped. The primary responsibility for decontamination lies with the Hazardous Material Team. The role of public health is to identify the causative agent and order protective actions.

## OBJECTIVES

- !" To understand the health effects of biologic agents (See Appendix J1, Health Effects Biologic Agents).
- !" To define public health's role with decontamination
- !" To provide reference sources for comprehensive decontamination policies and protocols

## DEFINITIONS

- !" Decontamination is defined as disinfection or sterilization of infected articles to make them suitable for use (the reduction of microorganisms to an acceptable level).
- !" Disinfection is defined as the selective elimination of certain undesirable

TAB J

## BIOLOGICAL AGENT HEALTH EFFECTS & DECONTAMINATION

### FOR MORE INFORMATION

Tab C, Casualty Management  
Tab D, Quarantine/Isolation  
Tab F, Risk Communication  
Tab I, Personal Protective Equipment

#### References:

Alameda County Fire Chief HazMat Working Group **Patient Decontamination Guidelines** DRAFT 5/02

City of Oakland Metropolitan Medical Response Plan. Deliverable # 5 **Responding to a Chemical, Radiological, Nuclear or Explosive WMD Event.** 3/02

95<sup>th</sup> WMD-Civil Support Team. **Emergency Response Capabilities.** 510-264-5663

Environmental Health Department **Emergency Response Plan**

CDC: Interim Smallpox Response Plan & Guidelines Guide F Decontamination [www.bt.cdc.gov/DocumentsApp/Smallpox/RPG/index.asp](http://www.bt.cdc.gov/DocumentsApp/Smallpox/RPG/index.asp)

microorganisms to prevent their transmission (the reduction of the number of infectious organisms below the level necessary to cause infections).

!" Sterilization is the complete killing of all organisms.

## **STAFFING**

!" Alameda County Department Operations Center (DOC)

!" Alameda County Operational Area Emergency Operations Center (EOC)

!" Fire, HazMat, Law Field Response Teams

!" Hospitals

!" State and Federal Response Agencies

!" Communicable Disease Staff

!" Health Officer

!" Public Health Nursing Director

!" Information Systems

!" Laboratory

## **PRE-EVENT ACTIONS**

!" Health Officer (HO)/designee and Environmental Health (EH) Director/designee assesses hospital disaster plans and Haz-mat team procedures to assure policies and protocols are in place for decontamination of victims from a terrorist attack or other disaster.

!" Train staff and partners on decontamination appropriate to a terrorist event, or other disaster.

!" Assure appropriate Personal Protective Equipment (PPE) is available for public health and environmental health staff.

!" Assure Alameda County has the capacity to respond to the needs for decontamination of mass victims.

!" Assure a protocol is in place for decontamination triage.

## **EVENT ACTIONS**

1. If First Responders suspect an event is related to terrorism they are to notify:

!" Communications/Dispatch Center

!" Health Officer/designee

!" EMS Director

!" FBI

2. HO/designee notifies EH Director/designee of potential bioterrorist event.
3. HO/designee activates the CD Response Team utilizing the ERC System (See Tab N for more detail).
4. First Responders collect samples if applicable to identify the agent. The FBI may direct these samples to be taken to the State Lab in Richmond for testing.
5. If a terrorist event is confirmed the HO/designee, Director Public Health Department of Director DCDCP convenes the DOC (See Tab A for detail).
6. The HO/designee notifies the Agency Director and Board of Supervisors and requests an Emergency Declaration and activation of the EOC.
7. HO/designee notifies DHS of event and the involved agent.
8. HO/designee in collaboration with DOC determines appropriate protective actions to be taken such as treatment, prophylaxis, immunizations and or/ biologics. (See Tab B for detail).
9. HO/designee advises field staff, law enforcement, first responders, pre-hospital care providers, hospitals, other medical facilities, health care workers and Community Based Organizations (CBOs) of appropriate PPE to be used, if they have not done so already. If PPE measures have already been activated HO/designee confirms that the PPE instituted is adequate/appropriate.
10. HO/designee advises hospitals, other medical facilities and health care providers of need for decontamination of victims, level of decontamination required and decontamination triage protocol. If decontamination procedures have already been instituted the HO/designee confirms the decontamination procedures being used are adequate/appropriate. Types of decontamination will be dependent on the agent used. (See Appendix J 2, Methods of Decontamination and J 3, Types of Decontamination).
11. Decontamination triage is done in the following order:
  - !" Ambulatory patients
  - !" Conscious non-ambulatory patients
  - !" Unconscious non-ambulatory patients
  - !" Deceased (if appropriate)
  - !" Patient decontamination procedures are outlined in detail in Appendix J 4.
12. The DOC communicates decontamination needs to the Operational Area EOC. The DOC and EOC keep each other apprised of actions taken.
13. The EH Director/designee in collaboration with the HO/designee, DHS, CDC and EPA develop guidelines/protocols for decontamination of homes, equipment, supplies, facilities, bedding etc. as necessary/appropriate.
14. The HO/designee requests the PIO to send alerts to hospitals, other health care facilities, medical care providers, morgue staff, morticians, emergency transportation providers and others informing them of the need for decontamination of facility, equipment, bedding, supplies etc.

15. The PIO develops public health alerts to inform the public regarding need for decontamination and appropriate procedures to follow.
16. The EH Director/designee in collaboration with the HO/designee, DHS, CDC and EPA develop criteria for safe re-entry of homes and other facilities contaminated with a terrorism agent as needed/appropriate.

## HEALTH EFFECTS OF BIOLOGICAL AGENTS

AGENT	CLINICAL MANIFESTATION	LABORATORY DIAGNOSIS	ISOLATION	TREATMENT	PROPHYLAXIS
<p>Anthrax</p>	<p>~Can be transmitted by inhalation, ingestion, or inoculation.</p> <p>~Not transmitted from person to person.</p> <p>~Incubation Period 1-5 days</p> <p>~Inhalation Anthrax presents as acute hemorrhagic mediastinitis.</p> <p>~Flu like illness followed by acute respiratory distress and toxemia.</p> <p>~Mediastinal widening in absence of trauma</p>	<p>~Testing should be done in a Level 2 facility.</p> <p>~Gram positive bacilli.</p> <p>~Distinguishing characteristics on culture:</p> <p>Non-hemolytic</p> <p>Non-motile</p> <p>Capsulated bacteria</p> <p>~Susceptible to gamma phage lysis.</p>	<p>~Standard barrier isolation.</p> <p>~Does not require isolation room</p>	<p>~Ciprofloxacin 400 mg IV q 12 hrs antibiotic of choice for penicillin resistant anthrax.</p> <p>~Anthrax vaccine should be given to all victims if available.</p> <p>~Antibiotic treatment continued until 3 doses of vaccine is administered (day 0, 14, 28).</p> <p>~If vaccine not available antibiotic treatment continued for 60 days.</p>	<p>~All exposed persons should be vaccinated with 3 doses of vaccine at day 0, 14, 28. ~Ciprofloxacin 500 mg po q 12 hrs or Doxycycline 100 mg po q 12 hrs until 3 doses of vaccine administered.</p> <p>~ If vaccine unavailable continue antibiotics for 60 days</p>
<p>Smallpox</p>	<p>~Highly infectious if aerosolized.</p> <p>~Person to person transmission and spread through clothing, linens etc.</p> <p>~Incubation period 12-14 days (range 7-17 days)</p> <p>Maculopapular rash begins on mucosa of mouth and pharynx, face, hands, forearms and spreads to legs and centrally to trunk.</p> <p>~Lesions more predominant on face and extremities than on trunk.</p> <p>~Lesions progress simultaneously from macules to papules to vesicles to pustules to crusty scabs.</p>	<p>~Examination of vesicular fluid harvesting fluid with cotton swabs.</p> <p>~Swabs and scabs to be placed in vacutainer sealed with tape and placed in 2<sup>nd</sup> durable watertight container.</p> <p>~Specimens to be sent to level 4 lab (CDC) for exam.</p>	<p>~Strict isolation in a negative pressure room. ~Laundry and waste autoclaved before laundered or incinerated.</p>	<p>~ Supportive Care</p>	<p>~Smallpox vaccine for all persons exposed or anyone with close personal contact.</p> <p>~Vaccine most effective if given before or within 3 days of exposure.</p> <p>~All exposed individuals should be placed in quarantine for 17 days after last contact with a smallpox case.</p>

Appendix J 1

AGENT	CLINICAL MANIFESTATION	LABORATORY DIAGNOSIS	ISOLATION	TREATMENT	PROPHYLAXIS
Plague	<p>~Highly infectious after aerosolization.</p> <p>~Persons to person and animal to human transmission can occur with pneumonic plague.</p> <p>~Incubation period 1-3 days (ranges up to 7 days).</p> <p>~Pneumonic plague presents with acute onset of high fever, chills, headache, malaise and productive cough initially watery before becoming bloody.</p>	<p>~Testing should be done in a Level 2 lab.</p> <p>~Wright, Giemsa or Wayson stain show gram negative coccobacilli with bipolar "safety-pin" appearance.</p> <p>~Organism grows slower on standard blood and MacConkey agar.</p> <p>~Immunofluorescent staining for capsule (F 1 Antigen) is diagnostic.</p>	<p>~Strict respiratory isolation with droplet precautions (gown, gloves, eye) until patient has received 48 hours of antibiotic therapy.</p>	<p>~Streptomycin (1gm IM Bid) or Gentamicin 5 mg/kg IM or IV qd. Tetracyclines or Flouroquinolones are alternative choices.</p> <p>~Co-Trimoxazole recommended for pregnant women and children between ages 2 mo. and 8 yrs.</p> <p>~Chloramphenicol should be used for plague meningitis</p>	<p>~Tetracyclines or Flouroquinolones recommended for 7 days for all persons exposed or in close physical contact with a confirmed case from date of last exposure.</p>
Botulism	<p>~Botulism Neurotoxins can be transmitted by aerosol and used to contaminate food and water supplies.</p> <p>~Botulism is not transmitted from person to person.</p> <p>~Incubation period 12-36 hours (range can be several days).</p> <p>~Early symptoms include blurred vision, diplopia and dry mouth.</p> <p>~Later symptoms include dysarthria, dysphagia, dysphonia, ptosis, development of symmetrical descending progressive paralysis and respiratory failure.</p> <p>~Patient usually alert and afebrile.</p>	<p>~Spinal protein normal and characteristic findings seen on EMG.</p> <p>~Toxin can be detected in serum and stool by mouse neutralization bioassay.</p>	<p>~Standard precautions.</p> <p>~No isolation room required.</p>	<p>~Supportive care.</p> <p>~Ventilatory support often required.</p> <p>~Botulism anti-toxin for A, B, and E toxins.</p> <p>~Only available from DHS Division of CD.</p>	<p>~None</p>

Appendix J 1

AGENT	CLINICAL MANIFESTATION	LABORATORY DIAGNOSIS	ISOLATION	TREATMENT	PROPHYLAXIS
Tularemia	<p>~Highly infectious after aerosolization.</p> <p>~Person to person transmission does not occur.</p> <p>~Incubation period 3-6 days (ranges 1-21 days)</p> <p>~Aerosolization could result in typhoidal tularemia with pneumonic involvement characterized by: fever, headache malaise, non-productive cough.</p>	<p>~Organism is difficult to culture and grows poorly on standard media.</p> <p>~Cysteine-enriched media is required.</p> <p>~Cultures should only be handled in Level 3 facility.</p> <p>~Serology most commonly used for diagnosis.</p>	<p>~Standard precautions.</p> <p>~Respiratory isolation not required.</p>	<p>~Streptomycin (7.5 mg/kg IM q 12 hrs x 10-14 days) Or Gentamicin (3-5 mg/kg/day) IV or IM qd in 3 divided doses x 10-14 days.</p> <p>~Tetracyclines are alternative choices but associated with a higher relapse rate and must be continued for at least 14 days.</p>	<p>~Tetracyclines recommended for 14 days and most effective if started within 24 hours after exposure.</p>
Viral	<p>~ Highly infectious</p>	<p>~ Viral isolation</p>	<p>~ Isolation</p>	<p>~ Ribavirin (30)</p>	<p>~ Licensed vaccine</p>
Hemorrhagic Fevers	<p>~after aerosolization.</p> <p>~Risk of person-to- person spread depends on virus.</p> <p>~Incubation period 4-21 days depending on virus.</p> <p>~Clinical presentation varies by viral agent but dominant features are: fever, myalgia, prostration evolving to shock, generalized mucous membrane hemorrhage, neurologic hematopoietic or pulmonary involvement.</p>	<p>~should only be done in Level 3-4 facility.</p> <p>~May take 3-10 days.</p>	<p>~ Room with contact precautions</p>	<p>~ mg/kg IV x 1 then 15 mg/kg. IV q 6 hrs x 4 days, then 7.5 mg/kg IV q 8 h x 6 days).</p>	<p>~ available only for yellow fever.</p>



## METHODS OF DECONTAMINATIONS FOR BIOLOGIC AGENTS

### ***CHEMICAL METHOD***

Chemical decontamination renders biological warfare agents harmless by the use of disinfectants. Dermal exposure to a suspected biological warfare agent should be immediately treated by soap and water decontamination. Careful washing with soap and water removes a very large amount of the agent population from the surface. It is important to use a brush to ensure mechanical loosening from the skin surface structures, and then to rinse with copious amounts of water. This method is often sufficient to avert contact infection. The contaminated areas should then be washed with a 0.5% hypochlorite solution, if available, with a contact time of 10 to 15 minutes. The solution should be applied with a cloth or swab or can be sprayed on. As with hypochlorite in chemical decontamination, this solution should not be used in the eyes, abdominal cavity, or on nerve tissue. It will neutralize and render nonhazardous any biological agent within approximately 5 minutes

For decontamination of fabric clothing or equipment, a 5% hypochlorite solution should be used. For decontamination of equipment, a contact time of 30 minutes prior to normal cleaning is required. Use of hypochlorite solution in this way is corrosive to most metals and injurious to most fabrics, so they should be rinsed thoroughly and metal surfaces should be oiled after completion.

An important point to remember is that soap and water washing followed by hypochlorite washing to decontaminate for biological agents should be prompt but should follow any needed use of decontaminants for chemical agents. Ampules of calcium hypochlorite granules are currently fielded in the chemical agent decontamination kit for mixing hypochlorite solutions. The 0.5% solution can be made adding one 6-ounce container of calcium hypochlorite granules to 5 gallons of water. The 5% solution can be made by adding eight 6-ounce containers of calcium hypochlorite granules to 5 gallons of water. These solutions evaporate quickly at high temperatures, so if they are made in advance, they should be stored in closed containers. The hypochlorite solutions should be placed in distinctly marked containers because it is very difficult to distinguish visually a 0.5% solution from a 5% solution.

### ***PHYSICAL METHOD***

Physical methods are concerned with rendering biological warfare agents harmless through such physical means as heat and radiation. To render agents completely harmless, dry heat requires 2 hours of treatment at 160°C. If steam is used at 121°C and 1 atm of overpressure (15 psi), the time may be reduced to 20 minutes, depending on volume. This last method is also known as autoclaving. The part of solar ultraviolet radiation that reaches the Earth's surface has a certain disinfectant effect, often in combination with drying. Ultraviolet radiation is effective but hard to standardize into practical usage for disinfection or decontamination purposes.

## TYPES OF DECONTAMINATION

All Hazardous Materials Teams (HazMat) have equipment for decontamination. In Alameda County, the following Fire Departments have HazMat Teams

Oakland

Fremont

Alameda County

Berkeley

Newark

Livermore/Pleasanton

East Bay Regional Parks

Lawrence Livermore National Laboratory

Lawrence Berkeley Laboratory

Oakland Fire Department identifies three types of Decontamination

**Emergency Decontamination (also known as Field Expedient or Gross Decontamination):**  
Rinsing victims down with water as quickly as possible. When Emergency Decontamination is expanded to accommodate large numbers of victims, it is also known as Mass Decontamination

**Full Decontamination (also known as Secondary Decontamination)** follows emergency decontamination and involves a more thorough process that includes scrubbing and may include soap or other cleaning agents.

**Primary Decontamination (also known as Technical Decontamination)** is similar to Full Decontamination, but it refers to the decontamination of responders, such as the HazMat Entry Team and Bomb Squad, as well as their suits and other equipment. Primary Decontamination is ideally performed in a separate area, away from the incident victims.