Weapons of Mass Destruction
Professional Curriculum—
Performance-level Course for Physicians

MASS CASUALTY
Event Recognition

• Incident Identification
  – Obvious incident: most hazard impacts are evident at the outset, though it should be recognized that in some instances the hospital may not be formally notified and may not recognize the incident is occurring until the presentation of patients or identification through other means such as the media.
  – Surreptitious incident: some incidents have a very subtle onset of impact, and particularly in biological events, may not be immediately obvious at the start of a major casualty event. Recognition of the incident, including its magnitude and cause, may not come from the usual EMS resources. Instead, it may be directly from an astute medical practitioner, hospital staff or from another healthcare facility.

(Jane’s Mass Casualty Handbook: Hospital, Emergency Preparedness and Response, pg. 96-97)
Event Recognition

• High index of suspicion on the part of clinical providers and an epidemiologic surveillance system that is rapidly responsive, sensitive, and specific are important to early recognition of an event. If a communications network exists that allows free exchange of information, a variety of clues may promote such early recognition. These clues include the following:
  – Large numbers of patients with similar symptoms of disease
  – Large numbers of patients with unexplained symptoms, diseases, or deaths
  – Higher than expected morbidity and mortality associated with a common disease and/or failure to respond to traditional therapy

Event Recognition

– A single case of a disease caused by an uncommon agent
– Multiple unusual or unexplained clinical syndromes in the same patient
– Disease with an unusual geographic or seasonal distribution
– Unusual grouping of patients with similar presentations
– Unusual disease presentation
– Similar genetic type among pathogens from temporally or spatially distinct sources
– Unusual, atypical, genetically engineered, or antiquated strains of pathogens
– Endemic disease with a sudden unexplained increase in incidence

Event Recognition

- Simultaneous clusters of similar illness in noncontiguous areas
- Pathogens or toxins transmitted through aerosol, food, or water contamination, suggestive of sabotage
- Ill persons presenting at nearly the same time from a point source (e.g., a tight cluster of patients meeting case definition), with a compressed epidemiologic curve (the rate of change of new cases is significantly higher than predicted based on historical or modeling data)


MCP 1.0
Event Recognition

- No illness in persons not exposed to common ventilation systems when illness is observed in those in proximity to those systems
- Death or illness among animals that may be unexplained or attributed to an agent of bioterrorism that precedes or accompanies illness or death in humans


MCP 1.0
Event Recognition

• A chemical terrorism event is likely to be discovered in one of two ways: the local discovery of the environmental release or exposure incident or the diagnosis of the resultant patient cases. Emergency responders may provide critical on-scene assessments and patient examinations that constitute an informal passive surveillance system. These nationwide monitors could report potential events in a fashion timely enough to allow for rapid intervention.
Event Recognition

• Many of the diseases associated with biological agents present as a flu-like illness. In our society, many individuals would attempt self-medication and the first few who visit their physicians might be sent home with analgesics and forced fluids and told to get bed rest.

• In prepared cities with surveillance systems in place, case numbers or pharmacy sales would probably first trigger suspicion of a biological terror attack, depending on the time of year. Local physicians might meet casually or call a friend to describe an unusual grouping of patients. Because of education and press coverage, once suspicion was triggered, local and state and then national public health authorities would be notified. Law enforcement would be called in quickly, and a formal response would begin.

(Disease-a-Month: Biological Terrorism: Understanding the Threat, Preparation, and Medical Response; February 2000, p.174)
Event Recognition

• Radiologic events are characterized by:
  – Large recognized exposures, such as a nuclear bomb or catastrophic damage to a nuclear power station
  – Small radiation source emitting continuous gamma radiation producing chronic intermittent exposures (such as radiological sources from medical treatment devices or environmental water or food contamination)

Event Recognition

- Healthcare facilities may be the initial site of recognition and response to terror events. If a terrorism event is suspected, local emergency response systems should be activated. Notification should immediately include local infection control personnel and the healthcare facility administration, and prompt communication with the local and state health departments, FBI field office, local police, CDC, and medical emergency services.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 3-4)
Event Recognition

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(CDC. THE PUBLIC HEALTH RESPONSE TO BIOLOGICAL AND CHEMICAL TERRORISM: INTERIM PLANNING GUIDANCE FOR STATE PUBLIC HEALTH OFFICIALS. July 2001)
Event Recognition

• The acute radiation syndrome follows a predictable pattern after substantial exposure or catastrophic events.
  – Thermal burn-like skin lesions without documented exposure
  – Immunological dysfunction with secondary infections
  – Bleeding from the nose, gums or petechiae
  – Marrow suppression
  – Hair loss

Event Recognition

• Conventional terror events are often obvious and identified by bystanders, law enforcement and EMS personnel.
• Healthcare providers should notify appropriate hospital administration according to the prearranged disaster/terror response plan for each facility. The plan should include rapid notification of Law Enforcement, local and state public health officials, and the public.
• Combined or secondary events require a high index of suspicion and the first event should alert the service providers, especially in hospitals.
Event Recognition

- Clear, consistent, understandable information should be provided (e.g., via fact sheets) to patients, visitors, and the general public. During bioterrorism-related outbreaks, visitors may be strictly limited. A well-designed healthcare facility Bioterrorism Readiness Plan should clarify the lines of authority and flow of communication. To minimize the anticipated responses of fear, confusion and anger, healthcare facilities should plan in advance the methods and channels of communications to be used to inform the public.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 10)
Event Recognition

- IC professionals working with the IC committee and administration should coordinate in advance with state and local health agencies, local emergency services, and local broadcast media systems to decide how communication and action across agencies will be accomplished. Failure to provide a public forum for information exchange may increase anxiety and misunderstanding, increasing fear among individuals who attribute non-specific symptoms to exposure to the bioterrorism agent.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 10)
Event Recognition

• Confirmation of cases
  – Contact your local poison control center
  – Contact your local industrial hygienist or safety officer
  – Department of Justice (DOJ) Domestic Preparedness National Response Hotline (800-424-8802)
  – If you need further help in clinical diagnosis, call DOJ Chembio Help Line (800-368-6498)
  – Review US Army Chemical Casualty Care handbook (http://ccc.apgea.army.mil/)

Event Recognition

- **Institutional Reporting**
  - If reasonable suspicion of chemical attack, contact your hospital leadership (Chief of Staff, Hospital Director, etc)
  - Immediately discuss hospital emergency planning implications

- **Public Health Reporting**
  - Contact your local public health office (city, county, or State)
  - If needed, contact the FBI office (for location of the nearest office, see [http://www.fbi.gov/contact/fo/info.htm](http://www.fbi.gov/contact/fo/info.htm))

Event Recognition

- First responders entering an area where radiation is detected should notify their command authority to request additional radiological support. If possible they should then establish an initial control point to limit further access to the site of the emergency. This control point should be considered temporary pending evaluation by appropriate radiation health personnel. If there is a likelihood of significant casualties, a pressing need to take actions to avoid further threats to public safety or any other compelling reason, the first responders may proceed beyond the initial control point.


MCP 1.0
Response Support

• First responders and others involved in out-of-hospital patient transport will be in closer proximity to the agent, the site of the event and the patient during transport. They should comply with infection control radiation exposure and/or chemical protection guidelines including PPE. They should also remain aware of the potential for secondary events as well as combined attacks.
  – Run the ambulance ventilation system on its highest setting using outside air circulation, which will maximize air changes in the vehicle

(The Public Health Response to Biological and Chemical Terrorism: Interim Planning Guide for State Public Health Officials, DHHS, CDC, July 2001)
Response Support

- Responders at all levels, from the EMS personnel to the ICU nurse to the emergency physician will require appropriate shelter, nourishment and a bidirectional flow of information. The incident command center should assess these needs with feedback from providers where possible acting according to a well developed response plan.
Response Support

- During mass casualty incidents demand for supplies, equipment, treatment space and facility support may exceed supply.
- A well developed community response plan with clear lines of communication and authority is essential for the distribution of limited resources.
Response Support

- The use of an incident command center to coordinate the response to a mass casualty event is essential as the use of all resources available as efficaciously as possible is the goal of the community mass casualty plan.
- Healthcare providers are an integral part of any such plan and tight security must be available to institute such measures a quarantine, withholding treatment, reverse quarantine and vaccination of select members of the population for containment.
Response Support

- Limiting continuing threats and the capacity to contain terror attacks requires that the response team engage law enforcement.
- Along with other civic leaders, law enforcement should have a plan in place to secure essential facilities, equipment and personnel such that the community can be best served.
Response Support

• The most important decision is when to activate the disaster/mass casualty response plan.
• The community response should include identified resources, personnel and materials needed to respond.
• If these resources are overwhelmed, then local reciprocal aid agreements are engaged, followed by state systems and finally national level assistance should be utilized.

MCP 2.0
Response Support

- Triage and management planning for large-scale events may include:
  - Determining availability and sources for additional medical equipment and supplies (e.g., ventilators) that may be needed for urgent large-scale care.
  - Planning for the allocation or re-allocation of scarce equipment in the event of a large-scale event (e.g., duration of ventilator support of terminally afflicted individuals).
  - With assistance from the Pathology service, identifying the institution’s ability to manage a sudden increase in the number of cadavers on site.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 8-9)
Response Support

• Patient registration surge process
  – This type of registration must provide enough initial information to maintain patient accountability and allow systems (computerized or manual) to be used for ordering patient laboratory studies and X-rays and tracking patient's medical data.
  – Pre-numbered charts for victims should be prepared ahead of time.

(Jane’s Mass Casualty Handbook: Hospital, Emergency Preparedness and Response, P 133.)
Response Support

- Patients sign up (or are signed up) on a registration log that has simple/limited information:
  - Name
  - Another identifier (date of birth, social security number)
- Pre-prepared chart assigned to patient with the chart number designated on the registration log. The chart must stay with the patient throughout their treatment process (on stretcher or in patient’s hands). Documentation of patient care on the chart is limited and occurs at the bedside.
- Follow-up definitive registration into the hospital system occurs at a later time.

(Jane’s Mass Casualty Handbook: Hospital, Emergency Preparedness and Response, P 133.)

MCP 2.0
Response Support

- Disrobing and clothing/valuables accountability for disasters of all types
  - Patient receives a plastic necklace or easy to apply wristband with a unique identifier number corresponding to the patient’s disaster log number and/or disaster chart. A necklace is preferable during incidents involving decontamination, since it is difficult for hospital personnel wearing PPE to place a bracelet on patients.
  - Patient receives large clear bag with a closure, and a second smaller zip-lock bag, both with the same pre-printed identifier number (waterproof ink) as on the necklace.
  - Valuables are place in the small bag and clothes into the large bag.

(Jane’s Mass Casualty Handbook: Hospital, Emergency Preparedness and Response, P 134.)
Response Support

- Valuables and clothing are secured by the security function. The chain of custody of patient belonging must be considered in the event that a perpetrator is one of the patients presenting for care.
- Transfer to a designated treatment area: major, moderate, and minor (which may include a separate area for asymptomatic/observation patients after exposure to an unusual chemical, biological or radiological agent). In all area, periodically re-triage patients awaiting care until they are fully evaluated.

(Jane’s Mass Casualty Handbook: Hospital, Emergency Preparedness and Response, P 134.)

MCP 2.0
Response Support

- Chain of Custody
  - The policy developed to maintain a chain of custody for evidence must adhere to legal requirements. The procedure for hospitals will best be handled by security personnel, requiring close integration with clinical experts in developing and implementing effective processes, including training security personnel to operate in PPE. Local law enforcement and prosecutor’s offices may provide expertise during the process development.

(Jane’s Mass Casualty Handbook: Hospital, Emergency Preparedness and Response, P 134.)

MCP 2.0
Response Support

For a legally acceptable chain of custody to be maintained, three general requirements must be met:

1. Evidence is accounted for at all time, either under direct control of identified individuals, or under secure lock with the identities of the person placing and removing the evidence recorded in a verifiable manner.

2. Passing evidence from one party to another is fully documented.

3. Passing evidence from one location to another is fully documented.

(Jane’s Mass Casualty Handbook: Hospital, Emergency Preparedness and Response, P 135.)
Safety and Protection

- As demonstrated by the SARS outbreak, hospitals can become major venues for contagious disease transmission. In Canada, as of July 11, the majority (77%) of probably SARS cases resulted from in-hospital exposures. In Taiwan, after the initial importation of SARS, almost all (94%) SARS infections were transmitted within hospitals. Past experiences with contagious diseases such as smallpox and measles have also shown that hospitals facilitate person-to-person disease transmission.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

• Hospitalized patents with contagious diseases can subsequently infect other patients and health care workers. Many patients in US hospitals today are highly susceptible to infection because of illnesses such as AIDS or due to therapeutic procedures such as transplants or chemotherapy. Health care workers that have contact with the skin, respiratory secretions, or body fluids of contagious patients may inadvertently spread the disease to themselves or to other patients.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

- Environmental controls such as air handling equipment, isolation rooms that are maintained at an air pressure less than surrounding work areas, and guidelines for proper cleaning (and/or decontamination) of facilities are of great importance in preventing the spread of contagious diseases. Also critical in preventing the spread of contagious disease is personal protective equipment (PPE) such as gloves, gowns and masks.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

• For contagious diseases, understanding the route of person-to-person transmission of disease is critical to preventing spread. The HICPAC guidelines organize infection control practices into four major categories, with Standard being the most modest category and Airborne being the most rigorous. Diseases are assigned to a category based on how they are spread.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

• **Standard Precautions:**
  *Use:* Recommended for diseases that can be spread by contact with the patient’s blood of body fluids (e.g. HIV, Hepatitis B/C). Not routinely used for most HCW-patient interactions.
  *PPE:* Face shield or surgical mask with eye protection (only for interactions expected to splash or spry body fluids), gown, and gloves.
  *Environmental controls:* None.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

• **Contact Precautions**
  
  *Use*: Recommended for diseases that can be spread by touching the patient or touching an object that the patient touched (e.g., herpes, scabies). Must be used during all patient-HCW interactions, even when HCWs are not expecting to have contact with the patient’s blood of body fluids.

  *PPE*: Face shield or surgical mask with eye protection (only for interactions expected to splash or spray body fluids), gown, and gloves.

  *Environmental controls*: Placement of patient in private room, limit movement and transport or patient, dedicated patient care equipment.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

- **Droplet Precautions**

  *Use*: Recommended for diseases that can spread via large-particle droplets (>5 um) in the air (e.g. influenza, mumps). Large-particle droplets do not travel over long distances; transmission is highest at short distances (<3 feet).

  *PPE*: Face shield or surgical mask with eye protection, gown, and gloves.

  *Environmental Controls*: Placement of patient in private room, limit movement and transport of patient.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

• **Airborne Precautions**

  *Use*: Recommended for disease that can be transmitted through air by small infectious particles (aka droplet nuclei) over long distances (e.g. tuberculosis, measles). Droplet nuclei may travel through ventilation systems endangering patients and HCWs that have no direct contact with the contagious patient.

  *PPE*: Gown, Gloves, and a N95 mask (a specific type of filtering mask) with eye protection or a powered-air-purifying respirator (PAPR)

  *Environmental controls*: Placement of patient in a negative pressure isolation room with 6-12 air changes per hour and discharge of air to outdoors or through a monitored high-efficiency filtration system, room door remains closed, limit movement and transport of patient.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

• Adherence to Airborne and Droplet precautions is influenced by many variables such as risk perception, physical comfort, familiarity with equipment and protocols, and perceived difficulty of adherence. In addition, it has been documented that HCWs are more likely to adhere to infection control precautions if those design the hospital’s protocols considered to have expert-level knowledge. Only 56% of infection control practitioners that responded to a recent survey report receiving any training in bioterrorism preparedness.

(Biosecurity and Bioterrorism: Biodefense strategy, practice and science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson.)

MCP 3.0
Safety and Protection

• **Routes of exposure to biological warfare agents**
  – Exposure to BWAs is most likely to occur by inhalation of biological aerosols. BWA particles of 1-5 μm in diameter are inhaled most efficiently into the pulmonary alveoli. Mucous membranes or abraded skin also are vulnerable and require protection against BWAs. Conversely, dermal contact does not pose a significant risk, since intact skin provides an effective barrier to all BWAs except trichothecene mycotoxins. Insignificant amounts of aerosolized BWA particles adhere to clothing or skin. Secondary aerosols are not generated efficiently. Ingestion is a minor route of exposure but inadvertently may occur with hand-to-mouth contact or by swallowing contaminated secretions.

(CBRNE - Personal Protective Equipment; Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

- **Routes of exposure to chemical warfare agents**
  - Exposure to chemicals and CWAs occurs by inhalation of chemical gas or vapor. Exposure also occurs by direct contact of the eyes or skin to chemical vapor or liquid. Mucous membranes are particularly vulnerable, since moisture promotes the absorption of many chemicals. Ingestion is a minor route of exposure.

(CBRNE - Personal Protective Equipment; Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.  
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

• **Routes of exposure to radioactive agents**
  
  - Patients exposed to beams of ionizing radiation (eg, patients receiving diagnostic x-rays) do not emit radiation and therefore pose no radiation danger to others. In the setting of an explosion, fire, or spill of radioactive material, victims can become contaminated with radiation-emitting material. External contamination occurs when radioactive material gets on a victim's clothing, skin, or hair. Victims also can become contaminated internally if radioactive material enters the body through the gastrointestinal tract, an open wound, or less likely, inhalation of highly radioactive dust. In any situation, the goal of PPE is to prevent the transfer of radioactive material from the victim to the rescuer until the victim is decontaminated.

(CBRNE - Personal Protective Equipment; Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.  
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)
Safety and Protection

- **HEAT STRESS WHILE WEARING PPE: DETECTION AND PREVENTION.**
  - Heat stress has been one of the greatest and most overlooked threats to workers cleaning up hazardous environments across the U.S. Department of Energy (DOE) complex. This threat is greatly increased for workers wearing personal protective equipment (PPE) such as chemical and radiation protective suits, a situation which is becoming much more common as DOE increases deactivation and decommissioning activities.
  - PPE may increase the risk of heat stress; therefore, chemical exposure risk must be balanced against heat stress risk. These results indicate that not all cooling vests work as designed, and some actually increase risk of heat stress. Additionally, these data indicate that relying solely on heat stress monitors for worker protection may not be prudent.

(A. Ondo, International Union of Operating Engineers National Hazmat Program, Morgantown, WV; B. Lippy, International Union of Operating Engineers National Hazmat Program, Baltimore, MD)

MCP 3.0
Safety and Protection

• Chemical protective clothing and gloves used for adequate protection are usually too expensive to be considered disposable. Decontamination is therefore essential before protective clothing is reused.

(P. Gao, N. EL-Ayouby, NIOSH, Pittsburgh, PA; R. Hall, S. Berardinelli, NIOSH, Morgantown, WV “EVALUATING REUSE OF CHEMICAL PROTECTIVE GLOVES BASED ON BREAKTHROUGH TIMES”.)

MCP 3.0
Safety and Protection

- Skin disorders resulting from hazardous exposures in the workplace account for 15% to 20% of all reported occupational diseases. Irritant and allergic contact dermatitis and burn injuries caused by chemicals account for about 50% of the skin disorders. A variety of protective gloves are available in the marketplace. However, the user must know the criteria for selecting the proper glove for protection against chemical, physical or biological hazards. The glove material must also not cause side effects to the workers, such as latex allergy.

(N. El-Ayouby, NIOSH, Pittsburgh, PA SELECTION OF PROTECTIVE GLOVES.)

MCP 3.0
Safety and Protection

• Skin contact is a potential source of exposure to toxic materials; it is important that the proper steps be taken to prevent such contact. Most accidents involving hands and arms can be classified under four main hazard categories: chemicals, abrasions, cutting, and heat. There are gloves available that can protect workers from any of these individual hazards or any combination thereof.

• Gloves should be replaced periodically, depending on frequency of use and permeability to the substance(s) handled. Gloves overtly contaminated should be rinsed and then carefully removed after use.

(Personal Protective Equipment Program http://www.cdc.gov/od/ohs/manual/pprotect.htm)

MCP 3.0
Safety and Protection

• Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects, and very hot or very cold materials. The type of glove materials to be used in these situations include leather, welder’s gloves, aluminum-backed gloves, and other types of insulated glove materials.

(Personal Protective Equipment Program http://www.cdc.gov/od/ohs/manual/pprotect.htm)

MCP 3.0
Safety and Protection

• Careful attention must be given to protecting your hands when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevent the hands from contacting the point of operation, power train, or other moving parts. To protect hands from injury due to contact with moving parts, it is important to:
  – Ensure that guards are always in place and used.
  – Always lock-out machines or tools and disconnect the power before making repairs.
  – Treat a machine without a guard as inoperative; and
  – Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

(Personal Protective Equipment Program http://www.cdc.gov/od/ohs/manual/pprotect.htm)
Safety and Protection

- The following is a guide to the most common types of protective work gloves and the types of hazards they can guard against:
  
a. **Disposable Gloves.** Disposable gloves, usually made of light-weight plastic, can help guard against mild irritants.

b. **Fabric Gloves.** Made of cotton or fabric blends are generally used to improve grip when handling slippery objects. They also help insulate hands from mild heat or cold.

c. **Leather Gloves.** These gloves are used to guard against injuries from sparks or scraping against rough surfaces. They are also used in combination with an insulated liner when working with electricity.

(Personal Protective Equipment Program [http://www.cdc.gov/od/ohs/manual/pprotect.htm])

MCP 3.0
Safety and Protection

d. **Metal Mesh Gloves.** These gloves are used to protect hands from accidental cuts and scratches. They are used most commonly by persons working with cutting tools or other sharp instruments.

e. **Aluminized Gloves.** Gloves made of aluminized fabric are designed to insulate hands from intense heat. These gloves are most commonly used by persons working with molten materials.

f. **Chemical Resistance Gloves.** These gloves may be made of rubber, neoprene, polyvinyl alcohol or vinyl, etc. The gloves protect hands from corrosives, oils, and solvents. The following table is provided as a guide to the different types of glove materials and the chemicals they can be used against. When selecting chemical resistance gloves, be sure to consult the manufacturers’ recommendations, especially if the gloved hand will be immersed in the chemical.

(Personal Protective Equipment Program http://www.cdc.gov/od/ohs/manual/pprotect.htm)
Safety and Protection

- Foot Protection
  - There are many types and styles of protective footwear and it’s important to realize that a particular job may require additional protection other than listed here. Footwear that meets established safety standards will have an American National Standards Institute (ANSI) label inside each shoe.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

a. **Steel-Reinforced Safety Shoes.** These shoes are designed to protect feet from common machinery hazards such as falling or rolling objects, cuts, and punctures. The entire toe box and insole are reinforced with steel, and the instep is protected by steel, aluminum, or plastic materials. Safety shoes are also designed to insulate against temperature extremes and may be equipped with special soles to guard against slip, chemicals, and/or electrical hazards.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

b. **Safety Boots**. Safety boots offer more protection when splash or spark hazards (chemicals, molten materials) are present:

- When working with corrosives, caustics, cutting oils, and petroleum products, neoprene or nitrile boots are often required to prevent penetration.

- Foundry or "Gaiter" style boots feature quick-release fasteners or elasticized insets to allow speedy removal should any hazardous substances get into the boot itself.

- When working with electricity, special electrical hazard boots are available and are designed with no conductive materials other than the steel toe (which is properly insulated).

Safety and Protection

1. Description and Use of Eye/Face Protectors
   a. **Safety Glasses.** Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, etc. Safety glasses are also available in prescription form for those persons who need corrective lenses.

   b. **Single Lens Goggles.** Vinyl framed goggles of soft pliable body design provide adequate eye protection from many hazards. These goggles are available with clear or tinted lenses, perforated, port vented, or non-vented frames. Single lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to insure protection along with proper vision.

   (Personal Protective Equipment Program
   http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)
Safety and Protection

c. **Welders/Chippers Goggles.** These goggles are available in rigid and soft frames to accommodate single or two eyepiece lenses.

1. Welders goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.

2. Chippers/Grinders goggles provide eye protection from flying particles. The dual protective eye cups house impact resistant clear lenses with individual cover plates.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

d. **Face Shields.** These normally consist of an adjustable headgear and face shield of tinted/transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various sizes, tensile strength, impact/heat resistance and light ray filtering capacity. Face shields will be used in operations when the entire face needs protection and should be worn to protect eyes and face against flying particles, metal sparks, and chemical/biological splash.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

- **Welding Shields.** These shield assemblies consist of vulcanized fiber or glass fiber body, a ratchet/button type adjustable headgear or cap attachment and a filter and cover plate holder. These shields will be provided to protect workers’ eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electric arc welding and oxyacetylene welding and cutting operations.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

• **Head Protection** Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object. Head protectors, in the form of protective hats, must resist penetration and absorb the shock of a blow. The shell of the protective hat is hard enough to resist the blow and the headband and crown straps keep the shell away from the wearer’s skull. Protective hats can also protect against electrical shock.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

- Terrorist use of a biological agent presents very different needs for and uses of personal protective equipment than use of a chemical agent. Unless pre-incident intelligence leads responders to an incident prior to release of a biological agent, the majority of terrorist scenarios would likely involve a covert release of agent. Since most of the biologic agents have incubation times ranging from hours to weeks between exposure and manifestation of clinical symptoms, the majority of the biological agent aerosol is likely to have dissipated from the area of release prior to recognition by first responders that a biological incident has occurred.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

- With the exception of smallpox virus and to a lesser extent plague bacteria, person-to-person transmission of these diseases rarely occurs if "universal precautions" are maintained (e.g., gloves, gown, mask, and eye protection). The majority of infected patients can be cared for without specialized isolation rooms or specialized ventilation systems. Cohort nursing with the usual practice of universal precautions will provide adequate protection. The hemorrhagic virus infections may be transmissible via a respirable aerosol of blood--respiratory protection of workers caring for these patients is required.

(Personal Protective Equipment Program
http://www.cdc.gov/od/ohs/manual/pprotect.htm#head%20protection)

MCP 3.0
Safety and Protection

- In the event that pre-incident intelligence puts fire and rescue personnel at the scene of a release, the same PPE they would employ for a chemical incident should serve to protect them from biological agents as well. Most of the infectious agents and toxins are most efficiently delivered as a respirable aerosol, so respiratory protection would be the primary means of protection from these agents. This can be accomplished by either self-contained supplied air breathing devices (SCBA) or high-efficiency particle respirators (HEPA filters). Eye protection and protective clothing sufficient to provide a barrier will protect from cutaneous infection with these agents. An exception to these biological protective equipment strategies is T-2 mycotoxin, which requires an approach similar to chemical agents.

(Wannamacher et al., 1991; Wannamacher and Weiner, 1997).

MCP 3.0
Safety and Protection

- Protection of the first responders will likely involve barrier protection similar to the equipment currently used for potentially infectious patients supplemented by SCBA or HEPA filters. It is important to note the current OSHA regulations for response workers require protection levels similar to those required for chemical agents. These regulations should be reevaluated for applicability in light of the risks posed by biological toxins.

(http://www.nap.edu/html/terrorism/ch3.html)

MCP 3.0
Safety and Protection

• Implementing these PPE strategies may prove difficult, as it is human nature to proceed to maximum protection when the perceived danger is unknown or unusual. It is important to emphasize basic principles of infectious disease control and emphasize the lack of person-to-person transmission for the majority of the biological agents when responding to such incidents, so as to maximize the available medical resources to provide care for the largest number of victims.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)

MCP 3.0
Safety and Protection

- According to the Centers for Disease Control and Prevention (CDC), direct person-to-person spread of anthrax is extremely unlikely. Communicability is not a concern when treating patients with anthrax. That being said, all patients in healthcare facilities, including patients with symptoms of anthrax infection, should be managed in accordance with universal precautions. These precautions are designed to reduce transmission from recognized and unrecognized sources of infection and to prevent direct contact with all body fluids, secretions, excretions, nonintact skin and mucous membranes. In addition, in its Bloodborne Pathogen Standard, the Occupational Health and Safety Administration (OSHA) states that gloves must be worn when there is reasonable likelihood of hand contact with blood or other potentially infectious material and when handling contaminated items or surfaces.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)
Safety and Protection

• Botulism

The gram-positive anaerobic bacillus *Clostridium botulinum* causes botulism. Foodborne botulism is the most common form, but an inhalation form could be used during an act of bioterrorism. This organism produces a potent neurotoxin, which inhibits the release of acetylcholine, resulting in characteristic flaccid paralysis that can create respiratory failure and upper airway obstruction. Person-to-person transmission does not occur.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)

MCP 3.0
Safety and Protection

- Plague
People usually contract plague from being bitten by a rodent flea that is carrying the gram-negative bacillus *Yersinia pestis*, resulting in lymphatic and blood infections (bubonic and septicemia plague). The pulmonary variant, pneumonic plague, can be transmitted person-to-person through respiratory droplets (i.e., coughing, sneezing), infecting those who have direct and close (within 6 feet) exposure to an ill patient.

For pneumonic plague, droplet precautions should be used in addition to standard precautions. Droplet precautions require healthcare providers and others to wear a surgical-type mask when within three feet of the infected patient. Based on local policy, some healthcare facilities require a mask to be worn when simply entering the room of a patient on droplet precautions.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)
Safety and Protection

• Smallpox

The last cases of naturally occurring smallpox disease were seen in Somalia in 1977, and in 1980, the World Health Organization (WHO) declared smallpox eradicated from the earth. The United States stopped vaccinating children in 1972. Immunity to the disease has waned, however, adults who were vaccinated for smallpox before 1972 would require a booster to accelerate their immune response to the disease if it were reintroduced through a bioterrorist action.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)
Safety and Protection

• The disease is created by the orthopox virus variola, which is unique to humans and highly contagious after an incubation period. The virus is transmitted through an infected person's saliva droplets that are aerosolized by coughing or speaking or through direct contact with the infected individual's skin when skin pustules or scabs are present. With modern air handling systems in healthcare buildings, it is possible for airborne transmission of the virus to occur indirectly through the circulating air and heating systems. Airborne and contact precautions should be used in addition to standard precautions when treating patients with suspected or confirmed smallpox.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)
Safety and Protection

- Airborne precautions require healthcare providers and others to wear respiratory protection when entering the patient's room. Appropriate respiratory protection is based on facility selection policy and must meet the minimal National Institute for Occupational Safety and Health (NIOSH) standard for particulate respirators, N95. Contact precautions require healthcare providers and others to wear clean gloves for entry into the patient's room and a gown for contact with the patient and the patient's environment. Based on local policy, some healthcare facilities require a gown to be worn when merely entering the room of a patient on contact precautions. The gown must be removed before leaving the patient's room and hands must be washed with an antimicrobial agent.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)

MCP 3.0
Safety and Protection

Key Considerations for PPE Selection

Informed use of PPE is a critical component of a facility's infection control and bioterrorism response program. Appropriate PPE includes gloves, gowns, laboratory coats, face shields, masks, eye protection and ventilation devices when there is reasonable likelihood of contact with potentially infectious material.

When choosing a glove, the first consideration should be the barrier requirement related to the procedure or task. In other words, what is the level of exposure risk? Patient-care activities that involve exposure to blood, body fluids and other potentially infectious material and activities that may stress the glove material, such as the handling of instruments and sharps and the management of vascular lines, are examples of high-risk situations. Patient-care activities that require glove use for short periods of time and minimal exposure to blood or body fluids are considered low risk for exposure.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)

MCP 3.0
Safety and Protection

• Examples of low-risk situations are administering an intramuscular injection, routine suctioning, caring for a newborn, emptying a urinal and handling food. Individual usage patterns and the length of time a glove is worn may also affect glove barrier effectiveness. Double-gloving may be indicated for more rigorous procedures.
While price is certainly an important factor, and comfortable fit, ease of donning and grip need to be considered, barrier protection is the reason gloves are worn in the first place.

(Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science Vol 1, Number 3, 2003 “The Challenge of Hospital Infection Control During a Response to Bioterrorist Attacks.” Robert W. Grow and Lewis Rubinson)
Safety and Protection

• **Known biological warfare agent hazards**
  – Personnel handling patients contaminated with BWAs require respiratory protection. Dermal protection is largely unnecessary, since BWAs are not dermally active (with the single exception of the mycotoxins).
  – Personnel handling victims who have been exposed to a known BWA aerosol are not required to wear PPE since secondary aerosolization of residual agent from clothing, skin, or hair is insignificant.
  – When victims are contaminated with a known BWA liquid or powder, Level D PPE (universal precautions) and PAPR with HEPA filter are required until decontamination is complete. Level C PPE and PAPR with HEPA filter may be considered if residual on victims is suspected of containing mycotoxins.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)
Safety and Protection

- **Known chemical warfare agent hazards**
  - Personnel handling patients contaminated with CWAs require respiratory and dermal protection.
  - When victims are exposed to a known CWA gas at standard temperature and pressure (STP; e.g., chlorine, phosgene, oxides of nitrogen, cyanide), no PPE is required, since off gassing is insignificant.
  - When victims are exposed to a known CWA vapor from volatile liquid (e.g., nerve agent, vesicant vapor), PPE is required, since off gassing may result in low-level exposure of responders.

Safety and Protection

- **Known chemical warfare agent hazards** (cont)
  When victims are contaminated with a known CWA volatile liquid (e.g., nerve agent liquid, vesicant liquid), Level C PPE with PAPR and chemical cartridge is required until decontamination is complete. In general, Level C PPE is used when the inhalation risk is known to be below the concentration-time product expected to harm personnel and when eye, mucous membrane, and skin exposures are unlikely.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

- **Known radiation hazards**
  
  When victims are exposed to external radiation but not contaminated with a radiation-emitting source, no PPE is required. If any doubt exists whether victims or their clothing are contaminated, they should be surveyed with a Geiger-Müller counter.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

- **Known radiation hazards (cont)**
  When victims are contaminated externally with radioactive material (skin, hair, wounds, clothes), use Level D PPE (i.e., waterproof barrier materials, such as surgical gown, mask, gloves, leg, and/or shoe coverings; universal precautions) until decontamination is complete. Double layers of gloves and frequent changes of the outer layer help reduce the spread of radioactive material. Handle radioactive materials with tongs whenever possible. Lead aprons are cumbersome and do not protect against gamma or neutron radiation. For this reason, experts currently recommend against their use when caring for a radiation-contaminated patient. Health care workers also should wear radiological dosimeters while working in a contaminated environment. The health care facility radiation safety officer usually supplies these devices.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

• **Known radiation hazards** (cont)
  When victims are contaminated internally with radioactive material, wear latex gloves when handling body fluids (urine, feces, wound drainage). The health care facility radiation safety officer or health physicist can determine when the amount of radioactivity in the patient's body secretions has fallen to a nondangerous level.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

- **Unknown hazards (BWA, CWA, or both)**
  According to current US OSHA regulations, Level B PPE is required for emergency medical personnel responding to an unknown hazard. For hospital personnel using Level B PPE, SAR is recommended, since SCBA is more cumbersome to use. Some experts maintain that Level C PPE with PAPR (with organic vapor cartridge and HEPA filter) provides adequate protection until decontamination is complete. Unfortunately, no single ensemble of PPE can protect emergency care personnel against all hazards.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

- The use of PPE should be dictated by the particular type of exposure anticipated. In order to use PPE properly training is required.

- When preparing the community response plan, the different personnel anticipate use of PPE and receive training in the use of the PPE appropriate for each situation.
Safety and Protection

- PPE is associated with a number of potential limitations, as listed below. In general, higher levels of PPE are more difficult to use.
- Takes time to put on: Level A PPE takes the longest time to put on.
- Impaired dexterity: Some first responders or emergency care personnel may experience difficulty in performing some life-saving interventions.
- Impaired mobility: Mobility decreases with weight. Mobility also is limited by using a SAR, since the wearer must retrace his or her steps along the supplied airline to exit hot zone.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)
Safety and Protection

- Impaired communication: Wearing a facepiece or mask commonly results in poor speech intelligibility.
- Impaired vision: Facepieces also may limit the wearer's visual field.
- Heat stress: Encapsulation and moisture-impermeable CPC material lead to heat stress.
- Increased weight: Level A with SCBA is the heaviest PPE.
- Psychological stress: Encapsulation increases the psychological stress to wearers and patients.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas. 
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

- Limited duration of use: Wearing Level A PPE for longer than 30 minutes is difficult.
- Limited oxygen availability: SCBAs only can be used for the period of time allowed by the air in the tank. APRs only can be used in environments in which the ambient air provides sufficient oxygen.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

• Another Herculean task is addressing the needs of patients requiring treatment or requesting evaluation for possible treatment. Anticipate a large number of individuals requesting evaluation and treatment who have little or no risk of exposure and who are completely asymptomatic. These latter patients, referred to frequently as the "worried well," result in a significant additional burden, possibly 5-10 times as great as the number of actual ill or injured.

• Primary components of mass patient care include the following: (1) personnel and material resource protection, (2) decontamination, (3) triage, (4) treatment, and (5) disposition.

Safety and Protection

• **Facility and/or medical personnel protection**
  – Although frequently omitted as first responders in most documents concerning weapons of mass destruction, the true first responders in a covert bioterrorism attack are the health care providers and ancillary staff at hospitals, clinics, and private physician offices. Consider both collective and personal protection.

Safety and Protection

• Collective protection includes positive pressure ventilation systems and high-efficiency particulate air filtration. Both require major modifications in existing facilities and are cost prohibitive. Unless the health care facility is directly downwind from the release site, virtually no risk of major contamination of the facility by airborne spread is present. However, these systems may be considered for new construction. Expedient collective protection may include shutting off ventilation systems and closing and sealing all exterior doors and windows. Since a bioterrorism attack is most likely to occur at some time prior to discovery, these actions may have little effect on facility personnel protection.

Safety and Protection

• Collective protection includes positive pressure ventilation systems and high-efficiency particulate air filtration. Both require major modifications in existing facilities and are cost prohibitive. Unless the health care facility is directly downwind from the release site, virtually no risk of major contamination of the facility by airborne spread is present. However, these systems may be considered for new construction. Expedient collective protection may include shutting off ventilation systems and closing and sealing all exterior doors and windows. Since a bioterrorism attack is most likely to occur at some time prior to discovery, these actions may have little effect on facility personnel protection.

Safety and Protection

- Personal protection includes vaccinations and postexposure chemoprophylaxis, personal protective equipment, and augmented standard infectious disease protocols. Provide chemoprophylaxis to all health care personnel as soon as a diagnosis is known. Although many ultimately do not need this treatment, staff shortages at a time of greatly increased demand translate into a further degradation of health care response and increased community morbidity.

Safety and Protection

- Controversy continues to exist about the level of personal protective equipment required for hospital personnel. With the exception of the T-2 mycotoxins, intact skin provides an adequate barrier to infection. Re-aerosolization has not been well studied but is believed to be negligible. Unless a patient presents immediately after a release, little risk exists to health care providers from exposure to residual weaponized pathogens. However, some agents are highly contagious through respiratory droplets; add these precautions to standard precautions until the exact diagnosis is made. Personnel involved with decontamination of a suspected bioagent should wear respiratory and splash protection, at a minimum (i.e., Occupational Safety and Health Administration Level C).

Safety and Protection

- **Decontamination**
  - Most patients who have been infected with a pathogen by a bioterrorism attack do not develop symptoms until 1 day to several weeks after the attack. The exceptions to this are patients exposed to biological toxins, who may develop symptoms several hours after exposure. At present, most biological agents do not survive for long periods outside a host. Even the relatively hardy spore of anthrax is degraded by direct exposure to UV light; consequently, decontamination is not necessary unless the attack is overt and recent. Several cidal and static decontamination solutions are under investigation, but for mass decontaminations, copious amounts of soap and water are probably sufficient. The issue of capture of effluent from decontamination is more significant with chemical than with biological agents, since these pathogens and toxins are denatured through water treatment facilities.

Safety and Protection

• Triage
  – Traditional triage from a mass casualty event involving trauma primarily is based on physiologic parameters, anatomic sites of injury, and attempts to separate patients requiring minimal effort to stabilize from those who require immediate surgery or further life-saving interventions. Patients with physical injuries or vital signs incompatible with life without extensive use of resources are identified as expectant. Triage in the wake of a bioterrorism attack may require triage based on prognosis alone. In the case of anthrax or pneumonic plague, a patient with any symptoms has a very poor prognosis, despite vigorous treatment, and, in the presence of an overwhelming number of patients, these minimally ill patients may need to be triaged to the expectant category based on their poor prognosis. As with postexposure prophylaxis, give some consideration to these potentially difficult decisions prior to the crisis.

Safety and Protection

- **Permeation**: Permeation refers to the process by which HAZMAT cross through protective barriers. Permeation depends on both the properties of the protective garment (or equipment) and concentration of chemical at surface. Permeation is measured in terms of the breakthrough time.
- **Degradation**: Degradation refers to the process by which structural characteristics of PPE are degraded by contact with chemical substances. Degradation allows permeation or penetration.
- **Recontamination**: Wearers may become contaminated during PPE removal unless decontamination and PPE removal protocols are followed systematically.

Safety and Protection

• Improper use: Protective respiratory devices and CPC must be properly fitted, tested, and periodically checked before use. An improper fit is an avoidable cause of penetration.
• Penetration: Penetration refers to the process by which HAZMAT may penetrate openings in protective respiratory equipment or clothing. The risk of penetration increases with the use of negative-pressure respirators.


MCP 3.0
Safety and Protection

• Depending on the agent, pre exposure and/or post exposure vaccination can be an effective method for control of damage from a mass casualty incident involving chemical, biological or radiological exposures.

• Some slowly developing biological agents can be contained by post exposure vaccination.

• Antidotes to toxins and select antibiotics planned for in response to specific agents should be identified and sources maintained.

(CBRNE - Personal Protective Equipment Last Updated: January 13, 2003, Jeffery Arnold, Eric Lavonas.
http://www.emedicine.com/EMERG/topic894.htm#section~routes_of_exposure_to_hazards)

MCP 3.0
Safety and Protection

• A terrorist may plant more than one device. Additional devices may not be the same type as the initial one and may not be at the same site. Investigate and secure the area where casualties or onlookers congregate during an emergency to exclude the presence of additional devices. For example, a terrorist in Northern Ireland exploded a bomb that caused several casualties. Knowing a crowd would form to unload and assist the casualties, the terrorist exploded a second bomb outside the busy emergency treatment area.

Safety and Protection

- The use of the Geiger Counter for identification of radiological exposures is essential
- Chemical detectors have been developed for defense against nerve agents
- Some biotoxin detectors are being developed
Decontamination

• Decontamination: Nuclear Blast/Reaction
  – The most common contaminants will primarily emit alpha and beta radiation. It is impossible for a patient to be so contaminated that he is a radiation hazard to health care providers; so medical or surgical treatment should not be delayed because of possible contamination. Most of the time, the simple removal of outer clothing and shoes will reduce contamination by 90%. External contamination of the skin and hair is from particulate matter that can be washed off. If practical, the clothing and effluent from washing should be sequestered and disposed of properly.

Decontamination

- Anthrax
  - The risk for re-aerosolization of *B. anthracis* spores appears to be extremely low in settings where spores were released intentionally or were present at low or high levels. In situations where the threat of gross exposure to *B. anthracis* spores exists, cleansing of skin and potentially contaminated fomites (e.g., clothing or environmental surfaces) may be considered to reduce the risk for cutaneous and gastrointestinal forms of disease.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 13)
Decontamination

• Botulism
  – Contamination with botulinum toxin does not place persons at risk for dermal exposure or risk associated with re-aerosolization. Therefore, decontamination of patients is not required.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 17)
Decontamination

- Plague
  - The risk for re-aerosolization of *Y. pestis* from the contaminated clothing of exposed persons is low. In situations where there may have been gross exposure to *Y. pestis*, decontamination of skin and potentially contaminated fomites (e.g. clothing or environmental surfaces) may be considered to reduce the risk for cutaneous or bubonic forms of the disease.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 20)
Decontamination

- Smallpox
  - Patient decontamination after exposure to smallpox is not indicated.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 25)
Decontamination

- Liquid or aerosolized chemicals can pose a dermal threat and must be removed as rapidly as possible. Vapor exposures do not require decontamination. It is essential to remove the exposed person’s clothing and rapidly decontaminate by using copious amounts of soap and water. Decontamination solution may be used, if available and appropriate.

(CDC. THE PUBLIC HEALTH RESPONSE TO BIOLOGICAL AND CHEMICAL TERRORISM: INTERIM PLANNING GUIDANCE FOR STATE PUBLIC HEALTH OFFICIALS. July 2001)
Decontamination

• Recommended procedures for on-scene responders
  – 1. On-scene responders should wear gloves and a gown or other protective clothing. Each responder should be provided with a personal dosimetry device.
  – 2. Medically unstable patients should be transported to a hospital immediately. A radiological survey, decontamination procedures, or steps taken to contain the contamination may be performed in the ambulance provided these actions do not interfere with more immediate medical requirements of the patient.

Decontamination

• Recommended procedures for on-scene responders
  – 3. If the patient is medically stable and conditions at the site permit, limit any further exposure to radiation by moving the patient to an area of low background. The outer clothing of the individual should be removed and the patient should be wrapped in a cloth sheet or blanket to permit handling. The wrapping should be loose to avoid hyperthermia and to allow easy access to the patient by medical personnel.


MCP 4.0
Decontamination

• Recommended procedures for on-scene responders
  – 4. Treat the patient’s injuries (i.e., burns, cuts, etc.) sustained in the incident and then, if needed, provide symptomatic treatment for the radiation illness (e.g., the use of anti-emetics). If an open wound is involved, cover the wound with a clean dressing.
  – 5. Do not release a medically stable patient to ambulance personnel before a radiological survey has been performed. If contamination is confirmed, a preliminary decontamination should be performed. Record the results of the radiological survey and proceed to decontaminate.


MCP 4.0
Decontamination

• Recommended procedures for on-scene responders
  – 6. Decontaminate the medically stable patient by washing the individual with tepid water to remove any radioactive contamination, beginning with the areas of highest levels of contamination. Proceed gently, mindful that this is a preliminary decontamination and that a more thorough decontamination process will be performed at a medical facility. When finished, repeat the radiation survey of the patient and record the final results. Save all clothing and bedding and all metal objects (e.g., jewelry, coins, belt buckles, etc.). A nasal swab is also recommended to detect inhalation of radioactive contaminants. Tag each item with the patient’s name, location, time, and ate. Save each in appropriate containers; mark containers clearly with: “RADIOACTIVE-DO NOT DISCARD.”

Decontamination

• Recommended procedures for on-scene responders
  – 7. Transport patient to medical facility for further treatment. The medical facility should be given advanced warning if they are going to receive patients exposed to radiation so that the facility can institute the appropriate medical protocols. Remember, individuals suffering from radiation injury my not be radioactive, but their skin and the clothing they are wearing could be contaminated with radioactive material. Protection of first responders should be focused on the source of the radiation.

Decontamination

• The plan for decontaminating patients exposed to anthrax may include the following:
  – Instructing patients to remove contaminated clothing and store in labeled, plastic bags.
  – Handling clothing minimally to avoid agitation.
  – Instructing patients to shower thoroughly with soap and water (and providing assistance if necessary).

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 13)
Decontamination

- Decontamination
  - Pulmonary agents (Phosgene, etc.)
    - None usually needed
  - Ricin (Castor bean toxin)
    - Clothing removal
    - Water rinse
  - T-2 mycotoxin
    - Clothing removal
    - Water rinse

Decontamination

• The plan for decontaminating patients exposed to anthrax may include the following:
  – Instructing personnel regarding Standard Precautions and wearing appropriate barriers (e.g. gloves, gown, and respiratory protection) when handling contaminated clothing or other contaminated fomites.
  – Decontaminating environmental surfaces using an EPA-registered, facility-approved sporicidal/germicidal agent or 0.5% hypochlorite solution (one part household bleach added to nine parts water).

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 13)
Decontamination

• Contamination with botulinum toxin does not place persons at risk for dermal exposure or risk associated with re-aerosolization. Therefore, decontamination of patients is not required.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 17)
Decontamination

• The plan for decontaminating patients with plague may include:
  – Instructing patients to remove contaminated clothing and storing in labeled, plastic bags.
  – Handling clothing minimally to avoid agitation.
  – Instructing to patients to shower thoroughly with soap and water (and providing assistance if necessary).

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 20-21)
Decontamination

• The plan for decontaminating patients with plague may include:
  – Instructing personnel regarding Standard Precautions and wearing appropriate barriers (e.g. gloves, gown, face shield) when handling contaminated clothing or other contaminated fomites.
  – Performing environmental surface decontamination using an EPA-registered, facility approved sporicidal/germicidal agent or 0.5% hypochlorite solution (one part household bleach added to nine parts water).

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 20-21)
Decontamination

• Decontamination of smallpox patients / environment
  – Patient decontamination after exposure to smallpox is not indicated.
  – Items potentially contaminated by infectious lesions should be handled using Contact Precautions.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 25)
Decontamination

- Decontamination
  - Nerve Agents
    - Rapid disrobing
    - Water wash with soap and shampoo
  - Cyanide
    - Clothing removal
  - Blister agents (Sulfur mustard)
    - Clothing removal
    - Large amounts of water

Decontamination

• External contamination
  – Completed after patient is medically stabilized
  – Immediately remove, bag and tag patient clothing/possessions
  – Some radioactive materials are also corrosive or toxic due to their chemical properties (for example uranium hexafluoride [UF6])
  – If available, scan each patient with a radiation detector(s) to identify contaminated areas.

Decontamination

• Skin decontamination decreases the risk of acute dermal injury, internal contamination and contaminating response personnel (and the environment); remove as much contamination as possible without harming the skin:
  – Wash gently with soap and water for 3-4 minutes to avoid damaging the skin followed by rinsing for 2-3 minutes.
  – Water temperature should be tepid to avoid trapping radioactive material (cold water) or promoting absorption because of vasodilation (hot water)


MCP 4.0
Decontamination

• Decontaminate open wounds first:
  – Cover with waterproof dressing when finished
  – Hexachlorophene 3 per cent detergent cleanser and water is an alternative to regular soap and water
  – Wash gently with soap and water for 3-4 minutes to avoid damaging the skin followed by rinsing for 2-3
  – Sterile water or saline for irrigation


MCP 4.0
Decontamination

• Internal contamination
  – Internal decontamination usually undertaken at the hospital
  – Nasal swabbing and wound, urine and stool sampling are required to determine the extent of exposure
  – Gastric lavage, administration of antacids (especially those contaminating aluminum) cathartics and pulmonary lavage may be done at the hospital


MCP 4.0
Decontamination

- Secondary contamination from chemicals may be possible but is unlikely when gross contamination is absent. Effective screening of those arriving at the mass care facility to ensure that contaminated people are identified and effectively decontaminated before entering should be sufficient to prevent contamination of the facility or those temporarily residing in it. Care must be taken to isolate bodily fluids (including vomitus) to prevent secondary illness from off gassing after the ingestion of some chemicals.

(CDC. THE PUBLIC HEALTH RESPONSE TO BIOLOGICAL AND CHEMICAL TERRORISM: INTERIM PLANNING GUIDANCE FOR STATE PUBLIC HEALTH OFFICIALS. July 2001)

MCP 4.0
Decontamination

• The need for decontamination depends on the suspected exposure and in most cases will not be necessary. The goal of decontamination after a potential exposure to a bioterrorism agent is to reduce the extent of external contamination of the patient and contain the contamination to prevent further spread. Decontamination should only be considered in instances of gross contamination.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 8)
Decontamination

• Decisions regarding the need for decontamination should be made in consultation with state and local health departments. Decontamination of exposed individuals prior to receiving them in the healthcare facility may be necessary to ensure the safety of patients and staff while providing care. When developing Bioterrorism Readiness Plans, facilities should consider available locations and procedures for patient decontamination prior to facility entry.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 8)
Decontamination

• Depending on the agent, the likelihood for re-aerosolization, or a risk associated with cutaneous exposure, clothing of exposed persons may need to be removed. After removal of contaminated clothing, patients should be instructed (or assisted if necessary) to immediately shower with soap and water. Potentially harmful practices, such as bathing patients with bleach solutions, are unnecessary and should be avoided.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 8)
Decontamination

- Clean water, saline solution, or commercial ophthalmic solutions are recommended for rinsing eyes. If indicated, after removal at the decontamination site, patient clothing should be handled only by personnel wearing appropriate personal protective equipment, and placed in an impervious bag to prevent further environmental contamination.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 8)

MCP 4.0
Decontamination

• If possible, staff should screen and survey for levels of contamination before moving a patient into the facility; this will minimize staff and equipment exposure. As a control, staff should attempt a background reading of the facility before surveying the patient.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 60.)

MCP 4.0
Decontamination

• If possible, staff should screen and survey for levels of contamination before moving a patient into the facility; this will minimize staff and equipment exposure. As a control, staff should attempt a background reading of the facility before surveying the patient.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 61.)

MCP 4.0
Decontamination

• Most things needed for decontamination are already available in a hospital – the only additional recommended equipment is radiation survey equipment to measure beta and gamma rays. Radiation survey equipment to detect contamination includes a Geiger counter to detect beta and gamma radiation.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 61.)

MCP 4.0
Decontamination

- Staff should address privacy concerns of patients who are undressing. Disposable dressing gowns should be provided for patients concerned about modesty and to ensure that the environment is appropriate to remove clothing (e.g. not too cold).

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 61.)

MCP 4.0
Decontamination

- Patients presenting with animals (for example, seeing-eye dogs): depending on the volume of patients and/or medical condition of the owner, staff should consider separating the animal from the patient until all are decontaminated.

(Jane’s Mass Casualty Handbook: Hospital. Chapter 6: Chemical and Radiation. P 231.)
Decontamination

• Principles of Standard Precautions should be generally applied for the management of patient-care equipment and environmental control.
  – Each facility should have in place adequate procedures for the routine care, cleaning, and disinfection of environmental surfaces, beds, bedrails, bedside equipment, and other frequently touched surfaces and equipment, and should ensure that these procedures are being followed.
  – Facility-approved germicidal cleaning agents should be available in patient care areas to use for cleaning spills of contaminated material and disinfecting non-critical equipment.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 7)
Decontamination

• Principles of Standard Precautions should be generally applied for the management of patient-care equipment and environmental control.
  – Used patient-care equipment soiled or potentially contaminated with blood, body fluids, secretions, or excretions should be handled in a manner that prevents exposures to skin and mucous membranes, avoids contamination of clothing, and minimizes the likelihood of transfer of microbes to other patients and environments.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 7)
Decontamination

• Principles of Standard Precautions should be generally applied for the management of patient-care equipment and environmental control.
  – Policies should be in place to ensure that reusable equipment is not used for the care of another patient until it has been appropriately cleaned and reprocessed, and to ensure that single-use patient items are appropriately discarded.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 7)
Decontamination

• Principles of Standard Precautions should be generally applied for the management of patient-care equipment and environmental control.
  – Rooms and bedside equipment of patients with bioterrorism-related infections should be cleaned using the same procedures that are used for all patients as a component of Standard Precautions, unless the infecting microorganism and the amount of environmental contamination indicates special cleaning. In addition to adequate cleaning, thorough disinfection of bedside equipment and environmental surfaces may be indicated for certain organisms that can survive in the inanimate environment for extended periods of time. The methods and frequency of cleaning and the products used are determined by facility policy.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 7)

MCP 4.0
Decontamination

- Principles of Standard Precautions should be generally applied for the management of patient-care equipment and environmental control.
  - Sterilization is required for all instruments or equipment that enter normally sterile tissues or through which blood flows.
  - Patient linen should be handled in accordance with Standard Precautions. Although linen may be contaminated, the risk of disease transmission is negligible if it is handled, transported, and laundered in a manner that avoids transfer of microorganisms to other patients, personnel and environments. Facility policy and local/state regulations should determine the methods for handling, transporting, and laundering soiled linen.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 7)

MCP 4.0
Decontamination

• Principles of Standard Precautions should be generally applied for the management of patient-care equipment and environmental control.
  – Contaminated waste should be sorted and discarded in accordance with federal, state and local regulations.
  – Policies for the prevention of occupational injury and exposure to bloodborne pathogens in accordance with Standard Precautions and Universal Precautions should be in place within each healthcare facility.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 7)
Evidence Preservation

• Chain of custody requires that evidence be collected such that all individuals who have custody of the material are recorded without a “break in the chain”.
• This generates significant challenges for the WMD response team as first priority is the care of the victims.
• However, a well organized plan for evidence collection will allow for possible capture and prosecution of perpetrators and may help prevent secondary events.
• Remember that corpses are likely evidence in many WMD scenarios.

MCP 5.0
Evidence Preservation

• Removing the clothing from the patient should remove 70 to 90% of the contamination. Staff or responders should bag and tag clothing, dressings, etc., for future evaluation and potential use as criminal evidence and small personal belongings (jewelry, wallet, etc.) should be surveyed for contamination. If the personal belongings are not contaminated they can be returned to the patient. Otherwise, steps must be taken to decontaminate the items before giving them back to the patient. If the patient is medically able to remove his/her own clothing and wash, then the patient should do so; however, providers should maintain communication during the process.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 62.)

MCP 5.0
Evidence Preservation

- Specimen Collection
  - It is important that the first 30 samples from the most contaminated (exposed) people be sent to CDC as rapidly as possible. Expeditious shipment of the first samples will allow CDC laboratory personnel to help identify the causative agent and also will speed the determination of whether or not a second chemical agent is involved in the exposure. After the first 30 samples are collected and shipped, CDC’s objective is that as many samples as possible be collected (either directly by CDC laboratory personnel who have been deployed to the site or by state or local medical personnel).

(CDC. THE PUBLIC HEALTH RESPONSE TO BIOLOGICAL AND CHEMICAL TERRORISM: INTERIM PLANNING GUIDANCE FOR STATE PUBLIC HEALTH OFFICIALS. July 2001)
Psychological Effects

• For Psychological induced symptoms:
  Critical Incident Stress Symptoms:
  Physical--Chills, fatigue, dizziness, chest pains
  Cognitive--Confusion, nightmares, poor concentration and memory
  Emotional--Fear, panic, denial, intense anger, emotional outbursts
  Behavioral--Withdrawal, antisocial acts, inability to rest

(WMD Awareness for the Healthcare Professional)
Psychological Effects

- Chemical
  - Nerve
    - Pinpoint pupils
    - Runny Nose
    - Difficulty Breathing
    - Loss of Consciousness
    - Convulsions/Seizures
    - Sweating
    - Nausea/Vomiting

(WMD Awareness for the Healthcare Professional)
Psychological Effects

• Chemical
  – Vesicant
    • Reddening of skin
    • Convulsions
    • Respiratory failure
    • Sluggish
    • Apathetic
    • Lethargic
    • Fever

(WMD Awareness for the Healthcare Professional)
Psychological Effects

- Chemical
  - Blood
    - Increased Respirations
    - Dizziness
    - Headaches
    - Cardiac symptoms
    - Odors: burnt almonds or peach kernels

(WMD Awareness for the Healthcare Professional)
Psychological Effects

• Biological
  – Many of the diseases associated with biological agents present as a flu-like illness.
  – Many people will present with the same type illness
  – There is a failure of the “disease symptoms” to respond to medications

(Disease-a-Month: Biological Terrorism: Understand the Threat, Preparation, and Medical Response, February 2000, p. 174; The Public Health Response to Biological and Chemical Terrorism: Interim Planning Guide for State Public Health Officials, DHHS, CDC, July 2001)
Psychological Effects

• Biological Syndromes
  – Encephalitis
  – Hemorrhagic mediastinitis
  – Pneumonia with abnormal liver functions
  – Papulopustular rash
  – Hemorrhagic fever
  – Descending paralysis
  – Nausea, vomiting, and diarrhea

(Franz powerpoint slides, courtesy of CDC)

MCP 6.0
Psychological Effects

• **Radiological**
  – Additional symptoms include skin reddening and, in severe cases, vomiting.
  (http://www.cia.gov/cia/reports/cbr_handbook/cbrbook.htm#6)

  – Consists of three levels of effects: Hematopoletic (blood cells, most sensitive); Gastrointestinal (GI cells, very sensitive); and Central Nervous System (brain/muscle cells, insensitive). The initial signs and symptoms are nausea, vomiting, fatigue, and loss of appetite. Below about 200 rems, these symptoms may be the only indication of radiation exposure

  (http://www.fas.org/irp/threat/cbw/CBR_hdbk.htm#_1_8)

MCP 6.0
Psychological Effects

• Mental health intervention is a prompt and effective medical response to a bioterrorism attack. Early detection, successful management of casualties, and effective treatments bolster the public’s sense of safety and increase confidence in our institutions. Because the overriding goal of terrorism is to change people’s beliefs, sense of safety, and behaviors, mental health experts are an essential part of planning and responding.

(www.usuhs.mil/psy/octexecutivesummary.html)

MCP 6.0
Psychological Effects

The mental health needs of three populations must be addressed:
1. Those who are exposed and develop traditional psychiatric disorders
2. Those with pre-existing mental illness that may be reactivated or exacerbated
3. The general population

(http://www.usuhs.mil/psy/octexecutivesummary.html)

MCP 6.0
Psychological Effects

• Most disaster management programs include psychosocial interventions for the victims. The intervention aims at facilitating victims to gain a sense of empowerment. Without psychosocial intervention, the victims would remain in their passive-dependent state, not able to effectively utilize resources to reconstruct their lives and communities. Thus, psychosocial interventions should be an integral component of disaster management.

(Mental Health in Disaster in the Philippines, Eleanor L. Ronquillo, MD, Department of Psychiatry, Philippine General Hospital and University of the Philippines, Manila, Philippines)
Psychological Effects

1. Provide step-wise information to victims as it becomes available; what steps are being taken for the patient's care, results of testing as available, credible event information as it becomes available and so on.

2. Stress the positive actions being taken.

3. Provide written information as soon as possible after decontamination, triage and initial treatment. Include agent-specific information (summarized for patients) as appropriate.

4. Assure full registration of all victims (for entry into a long-term surveillance program if that is established).

5. Explain to observed patients that they are being monitored for delayed symptoms.

(Jane’s Mass casualty Handbook: Hospital: Emergency Preparedness and Response, Chapter 4, Pg 140-141.)

MCP 6.0
Psychological Effects

6. Explain to discharged patients that a surveillance system may be instituted to assess late symptoms and to provide further information or treatment as it becomes available.

7. Provide individual evaluation by mental health workers and treatment as indicated.

8. Provide small groups and individual counseling (as available) for those who request it.

9. Provide written information on stress and on stress control resources, including telephone numbers.

(Jane’s Mass casualty Handbook: Hospital: Emergency Preparedness and Response, Chapter 4, Pg 140-141)

MCP 6.0
Psychological Effects

- *Clear consistent information* should be provided to patients, visitors and the general public. Failure to provide a public forum for information exchange may increase anxiety and misunderstanding, increasing fear among individuals who attribute non-specific symptoms to exposure to the bioterrorism agent.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 10).

MCP 6.0
Psychological Effects

• IC professionals should develop prior working relationships with mental health support personnel (e.g., psychiatrists, psychologists, social workers, clergy and volunteer groups) and assist in their collaboration with emergency response agencies and the media. Local, state, and federal media experts can provide assistance with communication needs.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p.9)

MCP 6.0
Psychological Effects

- Consider the following to address patient and general public fears:
  - Minimize panic by clearly explaining risks, offering careful but rapid medical evaluation/treatment, and avoiding unnecessary isolation or quarantine.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p.9)
Psychological Effects

- Rapid and accurate test to diagnose illnesses are significant ways to diminish the anxiety that ripples through the nation after a terrorist attack. To the degree there are clinical symptoms that distinguish bioterrorism and the usual organism that create illness, the public can be educated so they can assess the need to seek medical assistance. In the absence of such discriminators, reassurance will be much more difficult and may prove to be false.

(www.usuhs.mil/psy/octexecutivesummary.html)
Psychological Effects

- The mental health skill sets for interventions following terrorist attacks need to be specified across the various mental health provider disciplines. Training and education programs must be developed and based on evidence-based practices and should span the continuum from early crisis counseling interventions to longer-term care for those who develop psychiatric disorders.

(www.usuhs.mil/psy/octexecutiveSummary.html)

MCP 6.0
Psychological Effects

• Education and training of primary care providers on psychological and behavioral responses to bioterrorism is a critical priority. The direct effects of traumatic events on mental health and the effects of chronic stress on most medical problems (e.g., diabetes, heart disease) are important for accurate primary care health provision.

(www.usuhs.mil/psy/octexecutive-summary.html)

MCP 6.0
Psychological Effects

• Coordination between health care resources, political offices, and public affairs is needed in an ongoing and sustained program. After a terrorist attack, tensions will be high between the scientific world and the political world, e.g., in the scientific community, good science is a goal whereas for politicians, good will is the goal.

(www.usuhs.mil/psy/octexecutivesummary.html)

MCP 6.0
Psychological Effects

• Leadership at local, state and regional levels as well as in the private sector requires education about the psychological and behavioral implications of crisis management. For example, they need to explicitly recognize the long-term consequences of manning decisions and the negative consequences of over dedication to work in a disaster (e.g., exhaustion leading to errors of decisions and behaviors that put people at risk).

(www.usuhs.mil/psy/octexecutivesummary.html)
Psychological Effects

- Cooperation between responding agencies with items such as quarantine issues, conspiratorial theories created by the public, media education, lack of resources due to surge capacity should be worked out immediately.

(www.usuhs.mil/psy/octexecutivesummary.html)
Psychological Effects

• There should be action to mobilize positive action as in past civil defense programs in order to promote resiliency and recovery.

(www.usuhs.mil/psy/octexectivesummary.html)
Triage

- The triage plan should include a process for establishment of an assessment center, separate from the emergency department. The assessment center can be used to rapidly screen victims for injury and contamination, as well as to serve as a location removed from the emergency department where decontamination of victims can take place. The assessment center should also be used for observation, limited treatment and evaluation and reuniting with family members where possible.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 54.)

MCP 7.0
Triage

- Hospitals must ensure that triage has an efficient record-keeping process insuring that injured persons are not missed. The Armed Forces Radiobiological Research Institute (AFRRI) and the Radiation Emergency Assistance Center/Training Site (REAC/TS) have developed and tested a record-keeping process and a system of tagging for triage, AFFRI’s Biodosimetry Assessment Tool software application.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 54.)
Triage

• Treatment priorities for mass casualties are as follows:
  – *Immediate*: casualties who require lifesaving care within a short time, when that care is available and of short duration. This care may be a procedure that can be done within minutes at an emergency treatment station by a corpsman (eg, relief of airway obstruction) or may be acute lifesaving surgery.
  – *Delayed*: casualties with severe injuries who are in need of major or prolonged surgery or other care and who will require hospitalization, but delay of this care will not adversely affect the outcome of the injury. Fixation of a stable fracture is an example.

(Office of the Surgeon General. Department of the Army, United States of America. Medical Aspects of Chemical and Biological Warfare. Chapter 14: Triage of Chemical Casualties. P4.)
Triage

- Humans who are exposed to biological agents, even to replicating agents, will not have measurable amounts of the agent in their blood or serum for several days at the earliest, and they will not have a measurable immune response. However, after inhalation exposure of replicating agents or toxins, nasal mucosal swab samples may contain sufficient agent to allow identification by PCR or ELISA. In this sense, humans- or domestic animals- may be the only “collectors” at the site of the aerosol attack.

(Disease-a-Month: Biological Terrorism: Understanding the Threat, Preparation, and Medical Response; February 2000, p.178)
Triage

- Although there are currently no commercially available field assays designed for this purpose, the concept has been demonstrated in the laboratory with experimental animals, and nasal swab assays are being studied. This method of triage of those who are potentially exposed to an aerosol is not very practical for agents of high infectivity or toxicity for which the effective dose is very low. Nasal swab analysis may be useful for anthrax, for example, but not for the alphaviruses or for some of the viral hemorrhagic fevers with extremely low infective doses.

(Disease-a-Month: Biological Terrorism: Understanding the Threat, Preparation, and Medical Response; February 2000, p.178)
Triage

• In a contaminated environment, emergency care is given by personnel in the highest level of mission-oriented protective posture (MOPP 4), whose capabilities are limited by their protective gear. After receiving emergency care, a casualty must go through the decontamination station before receiving more definitive care in a clean environment. Decontamination takes 10 to 20 minutes. No medical care is provided during this time or during the time spent waiting to begin the decontamination process.

(Office of the Surgeon General. Department of the Army, United States of America. Medical Aspects of Chemical and Biological Warfare. Chapter 14: Triage of Chemical Casualties. P5.)

MCP 7.0
Triage

• Before leaving the emergency care area, the patient must be stabilized to an extent that his condition will not deteriorate during this time. If stabilization cannot be achieved, the triage officer must consider this factor when making the triage judgment. A different type of decontamination—immediate spot-decontamination—must be performed at the triage or emergency treatment station in the dirty (ie, contaminated) area when there is a break in the clothing or a wound that is suspected to be the source of contamination.

(Office of the Surgeon General. Department of the Army, United States of America. Medical Aspects of Chemical and Biological Warfare. Chapter 14: Triage of Chemical Casualties. P5.)

MCP 7.0
Triage

- Consideration should be given to setting up a temporary *primary* assessment center that would be located on the hospital campus, removed from the Emergency Department, or depending upon logistics and the magnitude of the event, a temporary *secondary* assessment center that would be located within the community but removed from the hospital. If practical, any outside assessment center should be set-up upwind from the patient arrival area.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P54.)
Triage

- In the aftermath of a terrorist attack, many victims may go to the hospital. City hospitals may have overwhelming admissions and emergency room visits after the attack. If the agent used was not life-threatening, crowd control procedures may suffice for large numbers of hospital visits. If the agent causes severe illness or death, hospital administrators must be prepared to increase capacities by adding beds and reducing routine patient load.

(Disease-a-Month: Biological Terrorism: Understanding the Threat, Preparation, and Medical Response; February 2000, p.179)
Triage

- When systems are overwhelmed and the capacity to deliver care to all the injured is not available then the triage process changes to efficient identification of those who can be rapidly saved with limited resources... The greatest good for the greatest number.
Triage

- Consideration should be given to setting up a temporary *primary* assessment center that would be located on the hospital campus, removed from the Emergency Department, or depending upon logistics and the magnitude of the event, a temporary *secondary* assessment center that would be located within the community but removed from the hospital. If practical, any outside assessment center should be set-up upwind from the patient arrival area.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 54.)

MCP 7.0
Treatment

• Specific treatments for radiologic exposure:
  – Americium-241: DTPA or EDTA chelation in the first 24 to 48 hours following pulmonary exposure is effective.
  – Plutonium-239/238: Administer 1 g CaDTPA, by nebulizer or IV, within 24 hours of exposure; followed by 1 g ZnDTPA qd while monitoring urine levels.
  – Radioiodine: See Potassium Iodide.
Treatment

• Specific treatments for radiologic exposure:
  – Strontium-90: Immediately after ingestion, oral administration of aluminum phosphate can decrease absorption by as much as 85%. Administration of stable strontium can competitively inhibit the metabolism and increase the excretion of strontium-90. Large doses of calcium and acidification of the urine with ammonium chloride will also increase excretion.


MCP 8.0
Treatment

• Specific Treatments for radiologic exposure:
  – Uranium-238/235/234: Sodium bicarbonate makes the uranyl ion less nephrotoxic. Tubular diuretics may be beneficial. Laboratory evaluation should include urinalysis, 24-hour urine for uranium bioassay, serum BUN creatinine, beta-2-microglobulin, creatinine clearance, and liver function studies.

Treatment

• Specific Treatments for radiologic exposure:
  – Potassium Iodide: Radioactive iodine (RAI) is a product of nuclear fission and a potent cause of thyroid cancer. Potassium iodide (KI), if taken in time and at the appropriate dosage, blocks the thyroid gland’s uptake of RAI and reduces the risk of cancer and other diseases that might be caused by exposure to RAI.


MCP 8.0
Treatment

- Hospitals should adhere to FDA recommendations (Guidance: *Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies*, U. S. Department of Health and Human Services, Food and Drug Administration, Center for Drug Evaluation and Research, December, 2001) for administration of Potassium Iodide.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 66.)

MCP 8.0
Treatment

• Anthrax
  – Vaccine availability
    • Inactivated, cell-free anthrax vaccine (Bioport Corporation 517/327-1500, formerly Michigan Biologic Products Institute) – limited availability.
  – Immunization recommendations
    • Routinely administered to military personnel. Routine vaccination of civilian populations not recommended.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 12)

MCP 8.0
Treatment

• Anthrax
  – Oral Fluoroquinolones
  • One of the following:
    – Ciprofloxacin
      » Adults: 500 mg twice daily
      » Children: 20-30 mg per kg of body mass daily, divided into two doses
    – Levofloxacin
      » Adults: 500 mg once daily
      » Children: Not recommended
    – Ofloxacin
      » Adults: 400 mg twice daily
      » Children: Not recommended

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 14)

MCP 8.0
Treatment

• Anthrax
  – Pediatric use of fluoroquinolones and tetracyclines is associated with adverse effects that must be weighed against the risk of developing a lethal disease. If *B. anthracis* exposure is confirmed, the organism must be tested for penicillin susceptibility. If susceptible, exposed children may be treated with oral amoxicillin 40mg per kg of body mass per day divided every 8 hours (not to exceed 500mg, three times daily).

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 14)
Treatment

- Anthrax
  - Prophylaxis should continue until *B. anthracis* exposure has been excluded. If exposure is confirmed, prophylaxis should continue for 8 weeks. In addition to prophylaxis, post-exposure immunization with an inactivated, cell-free anthrax vaccine is also indicated following anthrax exposure. If available, post-exposure vaccination consists of three doses of vaccine at 0, 2 and 4 weeks after exposure. With vaccination, post-exposure antimicrobial prophylaxis can be reduced to 4 weeks.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 14)
Treatment

• Botulism
  – Vaccine availability
    • A pentavalent toxoid vaccine has been developed by the Department of Defense. This vaccine is available as an investigational new drug (contact USAMRIID, 301/619-2833). Completion of a recommended schedule (0, 2, 12 weeks) has been shown to induce protective antitoxin levels detectable at 1-year post vaccination.
  – Immunization recommendations
    • Routine immunization of the public, including healthcare workers, is not recommended.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 16)
Treatment

• Plague
  – Prophylaxis
    • Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with local and state health departments and CDC.
    • Post-exposure prophylaxis should be initiated following confirmed or suspected bioterrorism Y. pestis exposure, and for post-exposure management of healthcare workers and others who had unprotected face-to-face contact with symptomatic patients.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 21)
Treatment

• Plague
  – **First choice**
    • Doxycycline
      – Adults: 100 mg twice daily
      – Children: 5 mg per kg of body mass per day divided into two doses

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 21)
Treatment

• Plague
  – **Second choice**
    • Ciprofloxacin
    • Adults: 500 mg twice daily
    • Children: 20-30 mg per kg of body mass daily, divided into two doses
  – Pediatric use of tetracyclines and fluoroquinolones is associated with adverse effects that must be weighed against the risk of developing a lethal disease.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 21)
Treatment

• Plague
  – Prophylaxis should continue for 7 days after last known or suspected Y. pestis exposure, or until exposure has been excluded. Facilities should ensure that policies are in place to identify and manage health care workers exposed to infectious patients. In general, maintenance of accurate occupational health records will facilitate identification, contact, assessment, and delivery of post-exposure care to potentially exposed healthcare workers.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 21)
Treatment

• Smallpox
  – Vaccine availability
    • A live-virus intradermal vaccination is available for the prevention of smallpox.
  – Immunization recommendations
    • Since the last naturally acquired case of smallpox in the world occurred more than 20 years ago, routine public vaccination has not been recommended. Vaccination against smallpox does not reliably confer lifelong immunity. Even previously vaccinated persons should be considered susceptible to smallpox.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 25)
Treatment

- Smallpox
  - Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with local and state health departments and CDC.
  - Post-exposure immunization with smallpox vaccine (vaccinia virus) is available and effective. Vaccination alone is recommended if given within 3 days of exposure. Passive immunization is also available in the form of vaccinia immune-globulin (VIG) (0.6ml/kg IM). If greater than 3 days has elapsed since exposure, both vaccination and VIG are recommended. VIG is maintained at USAMRIID, 301/619-2833.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 25)
Treatment

- Pharmaceuticals
  - Nerve Agents: Atropine, Diazepan or Lorazepam
  - Cyanide: Amyl Nitrite, Sodium Nitrite, Sodium Thiosulfate
  - Blister agents (Sulfur mustard): British Anti-Lewisite (BAL or Dimercaprol)
  - Pulmonary agents (Phosgene, etc.): specific treatment depends on agents
  - Ricin (Castor bean toxin): None
  - T-2 mycotoxin: Possibly high doses of steroids

Treatment

- Potassium iodide supplementation is not as effective for those individuals over 40 years of age and therefore it is generally recommended that these individuals only receive supplementation if it is estimated that their exposure is significant enough to potentially destroy the thyroid leading to hypothyroidism. FDA guidance on the administration of potassium iodide (KI) based on age, predicted thyroid exposure, pregnancy and lactation status is below. Potassium iodide should be taken immediately though it may still have a significant impact if taken even 3-4 hours after exposure. It should be available to those in a radioactive fallout area. The Nuclear Regulatory Commission requires that states with a population within the 10-mile emergency planning zone of commercial nuclear power plants consider including potassium iodide as a protective measure for the general public to supplement sheltering and evacuation in the unlikely event of a severe nuclear power plant accident.

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 67.)

MCP 8.0
Treatment

- Vaccination is generally contraindicated in pregnant women, and persons with immunosuppression, HIV–infection, and eczema, who are at risk for disseminated vaccinia disease. However, the risk of smallpox vaccination should be weighed against the likelihood for developing smallpox following a known exposure. VIG should be given concomitantly with vaccination in these patients.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 25)
Treatment

• Following prophylactic care, exposed individuals should be instructed to monitor themselves for development of flu-like symptoms or rash during the incubation period (i.e., for 7 to 17 days after exposure) and immediately report to designated care sites selected to minimize the risk of exposure to others.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 25)

MCP 8.0
Treatment

- Facilities should ensure that policies are in place to identify and manage health care workers exposed to infectious patients. In general, maintenance of accurate occupational health records will facilitate identification, contact, assessment, and delivery of post-exposure care to potentially exposed healthcare workers.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 25)
Treatment

• Nerve agents
  – Symptom Onset
    • Vapor: seconds
    • Liquid: minutes to hours
  – Symptoms
    • **Moderate exposure**: Diffuse muscle cramping, runny nose, difficulty breathing, eye pain, dimming of vision, sweating
    • **High exposure**: The above plus sudden loss of consciousness, flaccid paralysis, seizures

Treatment

- A variety of radiation detection devices are available, the most common of which is a Geiger-Mueller (GM) counter.
- Each type of detector has measurement limitations, so it is important they are used correctly by experienced responders wearing proper PPE. Some GM instruments cannot detect alpha and low-energy beta radiation, so other specialized meters such as the ‘pancake’ detector (for alpha radiation detection) may be needed to assess radioactivity. If high radiation levels are likely, ionization detectors should be used to measure radiation exposure and dose rates. Detection instruments must be properly maintained, calibrated and used to ensure accurate results.


MCP 8.0
Treatment

• Tools for Identification of Biological agents
  – Culture and isolation (1-30 days)
  – Animal inoculation (2-30 days)
  – Immunoassays (2-6 hours)
  – Nucleic Acid Assays (3-5 hours)
  – Mass Spectroscopy (1-8 Hours)

(D Franz powerpoint slides)
Treatment

- Clinical Diagnostic Tests
  - Blister agents (sulfur mustard)
    - Often smell of garlic, horseradish, or mustard on body
    - Oily droplets on skin from ambient sources
    - No specific diagnostic tests
  - Pulmonary Agents (Phosgene, etc.)
    - No tests available but source assessment may help identify exposure characteristics (majority of trucking incidents generating exposures to humans have labels on vehicle)

Treatment

- Clinical Diagnostic Tests
  - Ricin (Castor bean toxin)
    - ELISA (from commercial laboratories) using respiratory secretions, serum, and direct tissue
  - T-2 (mycotoxin)
    - ELISA from commercial laboratories
    - Gas chromatography/Mass spectroscopy in specialized laboratories

Treatment

- Potassium Iodide
  - After careful review of the data from Chernobyl, relating estimated thyroid radiation dose and cancer risk in exposed children, the FDA is revising its recommendation for administration of KI based on age, predicted thyroid exposure, and pregnancy and lactation status. For adults over 40 (with an exposure greater than 500 rem), adults 18 through 40 (with exposures over 10 rem), and pregnant or lactating women, the dose is 130 mg of KI. For children and adolescents ages 3 to 18, the dose is 65 mg, unless the adolescent is near adult size (>70 kg). Such teens would get the adult dose. Children ages 1 month to 3 years should receive 32 mg and infants (<1 mo, with an exposure over 5 rem) should get 16 mg.

Treatment

- Potassium Iodide
  - Pregnant women should be given KI for their own and their baby’s protection since iodine (stable or radioactive) readily crosses the placenta. With the risk of blocking fetal thyroid function with excess stable iodine, repeat dosing with KI of pregnant women should be avoided. Lactating females should receive KI for their own protection, and potentially to reduce the radioiodine content of the breast milk. The infant should get his/her KI directly. Since stable iodine as a component of breast milk may increase the risk of hypothyroidism in nursing neonates, repeat dosing with KI should be avoided in the lactating mother, except during continuing severe contamination. If repeat dosing of the mother is necessary, the nursing neonate should be monitored.

Treatment

• Many issues surrounding bioterrorism have not been adequately addressed. Pregnant women, children, the elderly, and immunocompromised patients have physiologic and sometimes developmental differences affecting their susceptibility to an attack.

Treatment

• Some features of illness and treatment require special consideration, but similarities among these populations far outweigh differences. Refinement of our approach could lessen the devastation caused by these agents. Research should include a more critical assessment of the optimal types and dosing of pharmaceuticals used for these populations.

Treatment

- Planning efforts should address early identification of the complex needs of the groups discussed here. Medical conditions such as pregnancy, cancer, HIV, and eczema require rapid identification before the institution of a smallpox vaccination program. Unexposed pregnant women and immunocompromised patients will require education about avoiding close contact with recent vaccinees.

Treatment

- Quarantine of those individuals unable to be vaccinated will need to be addressed. Counseling of children and women who have miscarried should be anticipated. Strategies need to be developed to reach individuals such as homeless people and shut-ins.

Treatment

• The general objectives in approximate order of importance for the management of contaminated, injured patients are as follows:
  – 1. First aid and resuscitation
  – 2. Medical stabilization
  – 3. Definitive treatment of serious injuries
  – 4. Prevention/minimization of internal contamination
  – 5. Assessment of external contamination and decontamination
  – 6. Treatment of other minor injuries
  – 7. Containment of the contamination to the treatment area and prevention of contamination of other personnel

Treatment

• The general objectives in approximate order of importance for the management of contaminated, injured patients are as follows:
  – 8. Minimization of external radiation to treatment personnel
  – 9. Assessment of internal contamination
  – 10. Treatment of internal contamination (this could be concurrent with many of the above)
  – 11. Assessment of local radiation injuries/radiation burns
  – 12. Careful long-term follow-up of patients with significant whole-body irradiation or internal contamination
  – 13. Careful counseling of patient and family members about expected long term effects and risks.

Treatment

- When the agent has been identified, decisions can be made about triage and postexposure prophylaxis. Is specific therapy available? How much time do we have to treat primary exposures? Is there a chance of secondary spread? If the causative agent of inhalation anthrax, pneumonic plague, or possibly tularemia with its 35% case fatality rate, is identified from field or nasal swab samples, a very rapid response becomes first priority. With these agents, postexposure prophylaxis within the first 24 to 48 hours can mean the difference between life and death.

(Disease-a-Month: Biological Terrorism: Understanding the Threat, Preparation, and Medical Response; February 2000, p.178)
Treatment

• Short term care needs for victims of mass casualty events include the symptomatic, antidote, vaccine, antibiotic and prophylactic treatments.
• Further evaluation for continued syndromic development is required to identified sub-acute progression.
Treatment

- The triage of patients at alternate sites followed by urgent stabilization should be part of the community plan for a WMD event.
- Treatment-in-place avoids transportation requirements by allowing treatment/stabilization at or near the site.
- These interventions are required when standing facilities are expected to be otherwise overwhelmed by demand.

MCP 8.0
Transportation

• Historically, in a disaster a relatively large percentage of any population leave their homes and flee. Flight after a biological aerosol attack is, of course, the wrong thing to do. Not only does movement from the areas complicate the investigation, it also takes patients away from help and, in the case of contagious agents, may facilitate the spread of the outbreak. Knowledgeable, respected medical leadership in the city will be needed to appeal to members of the population for their trust and cooperation with the response personnel.

(Disease-a-Month: Biological Terrorism: Understanding the Threat, Preparation, and Medical Response; February 2000, p.177)
Transportation

• In WMD events one of the most important methods of transportation is the victim. In previous incidents self referral to hospital emergency facilities was the most common means of transportation.
• Significant problems with this are continued exposure of victims, exposure of medical personnel and massive presentation of the worried well.
Transportation

- Hospitals should have plans in place to transfer patients (if conditions allow) to other hospitals or other medical facilities during disasters according to pre-arranged formal agreements. Hospitals are protected from having to transfer unstable patients under the provisions of the Emergency Medical Treatment and Active Labor Act (EMTALA).

(CDC. Division of Environmental Hazards and Health Effects, National Center of Environmental Health. Interim Guidelines for Hospital Response to Mass Casualties from a Radiological Incident. P 53.)

MCP 9.0
Transportation

- Once the hospital emergency room receives notification of the incident, it should immediately initiate the appropriate response plan. Since the entrance used for contaminated patients may not be the usual emergency room entrance, the ambulance and security personnel must be so informed. It is useful for security personnel to be stationed at appropriate locations to provide directions for ambulance drivers and to limit access only to essential personnel. When the ambulance arrives, the patients are conducted into the treatment area.


MCP 9.0
Transportation

- If there is not an outside door to the treatment room, there are several ways to move the patients without spreading contamination. One way is to lay nonskid plastic sheeting down the hallways over which the ambulance stretcher may be wheeled. It is also possible, if the patient’s injuries are not too serious, to transfer the patient from the potentially contaminated stretcher in the ambulance onto a clean stretcher with the patient wrapped in clean blankets or sheets. The patient can then be transported down the usual hallways with the contamination contained inside the wrapping.

Transportation

• Most infections associated with bioterrorism agents cannot be transmitted from patient to-patient. In general, the transport and movement of patients with bioterrorism-related infections, as for patients with any epidemiologically important infections (e.g., pulmonary tuberculosis, chickenpox, measles), should be limited to movement that is essential to provide patient care, thus reducing the opportunities for transmission of microorganisms within healthcare facilities.

(Bioterrorism Readiness Plan: A Template for Healthcare Facilities; APIC Bioterrorism Task Force and CDC Hospital Infections Program Bioterrorism Working Group, p. 6)

MCP 8.0
Transportation

- The contamination of transportation vehicles, supplies and equipment is dependant on the type of incident. Radiological exposure of equipment can be washed until counts are in a safe range. Chemical exposure is usually treated according to a plan for decontamination of ambulances, but private vehicles may be more difficult. Biologicals are handled as described in the previous slide.
Fatality Management

A bioterrorist event is likely to produce significant numbers of fatalities, especially during the early phases of response. Local medical examiners, morgues, and funeral homes most likely will not be able to absorb the surge. Once activated and mobilized, the National Disaster Medical System includes a number of deployable Disaster Mortuary Operations Response Teams. At least one of these teams has additional training in handling contaminated or infected remains. Issues involved with fatality management include the following:

Fatality Management

• Infection control
  – Enforce the same precautions required for live victims while handling deceased patients, during autopsy, and during disposal or disposition of the remains.
  – Survivability of all potential pathogens in corpses has not been studied.
• Victim identification and tracking
  – Even in a massive catastrophe, legal, moral, ethical, psychological, and religious reasons exist to identify the dead.
  – Release or cremation of remains will be delayed unless positive identification occurs or, at a minimum, enough evidence is collected (e.g., dental radiographs, fingerprints, photographs, potentially DNA samples) for determination later.


MCP 10.0
Fatality Management

- Establishment of temporary morgues
  - In the event of mass fatalities, the ability of hospitals and medical examiners to maintain all remains is doubtful.
  - Without safeguards and training, local funeral homes may be resistant to accepting contaminated bodies. Processes must be in place prospectively to augment the existing system through the use of temporary morgues.
  - These sites require temperature and biohazard control, adequate water, lighting, rest facilities for staff, and viewing areas and should be in communication with patient tracking sites (probably the American Red Cross) and the emergency operations center.
  - Security also may be an issue.

Fatality Management

• Disposal or release of remains
  – Many moral, cultural, and religious issues are involved with disposal of the deceased. Although under a declared disaster, the governor and the President have extraordinary powers, at some point a decision must be made concerning the release of remains to families for interment or cremation or to the state for chemical cremation or incineration.
  – Develop appropriate plans and decision algorithms in advance.