HAZMAT TRAINING FOR THE FIRST RECEIVER (OSHA)

Finger Lakes Regional Training Center
University of Rochester Medical Center
Rochester, NY

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Lecture Agenda

- General Principles
- Chemical
- BREAK
- Biological
- Radiological
- Decon Operations
# General Principles of Decon

- Training Requirements
- Recognition and Response
- Chemical Identification

## Awareness Level Training

- WHO: Everyone
- WHAT:
  - How to know if someone...
  - How to keep safe
  - How to alert

## Operations Level Training

- WHO: Decon Team Members
- WHAT:
  - Didactic and Practical
    - Recognition of chemicals
    - PPE
    - Recognition of symptoms
    - Clean up
  - When:
    - Must be completed annually along with a respiratory questionnaire
Decontamination

- Who: Anyone that is contaminated
  - Victims
  - Responders

- What: Anything that is necessary for your hospital to function
  - Equipment
  - Structures

Decontamination

- Where
  - Uphill, Upwind when possible
  - Designated external sites

- When: Anytime you suspect contamination
  - Victim complains of pain, odor, ect.
  - Victims near release site
  - Visible material

Decontamination

- Why: Prevent worsening of problem
  - Remove toxic agent
  - Prevent staff/facility contamination

Problem Solution
RECOGNITION & RESPONSE

Hazardous Substance

- Is any substance to which exposure may result in adverse effects on the health or safety of employees. (OSHA)
- Includes:
  - Substances defined by CERCLA
  - Biological agents with disease causing potential
  - US DOT substance listed as hazardous
  - Substances classified as hazardous waste

Chemical Hazards

- 69% occur at fixed sites (ATSDR, 2007-2008)
- 91% involve one substance (ATSDR, 2007-2008)
- Most are liquid (40%) or vapors (41%)
  - Corrosives
  - Pesticides
  - Gases
  - Paints and dyes
  - Volatile organic hydrocarbons
  - Other inorganic chemicals

http://www.atsdr.cdc.gov/HS/HSEES/annual2008.html#substances
Contamination Event
- VERY common
- Patients go to CLOSEST* hospital
- Risk to hospital
  - Contamination of staff and facilities
  - Need emergency plan
  - Need decontamination facility and team

Emergency Response Plan
- Train everyone to AWARENESS level—patients presenting to ED with contamination
- Decon Team Policies and Procedures
- Notification Procedure
- ASSUME all are contaminated

Notification System
- Notifies all in ED/Hospital
  - Specific responsibilities for all
  - Activates Decon team
  - Access Control/Lockdown
Activation/Response

- Decon Team Leader
  - Interviews patient from safe distance and OUTSIDE
  - Determines response based on scope of incident

- Decon Team members and support staff
  - Gets decon room ready
  - Gets partially dressed, except respirator
  - Finalizes PPE and decontaminates victim(s) upon final say of Decon Team Leader

Incident Command System

- ICS should be followed at ALL levels
- Hospital
  - Departmental
    - Specific team (e.g., Decontamination)
  - At each level, designated person to communicate with:
### ICS – Decon Team

- **COMMAND** (Decon Team Leader)
- **SAFETY OFFICER**
- **OPERATIONS** (Decon team members)
- **LOGISTICS** (Decon team suit/equipment support)
- **LIAISON** (Decon Team Leader or designee)

### AGENT IDENTIFICATION

- Labels/warnings...
  - CAS numbers (Chemical Abstract Service #)
  - Shipping manifesto/label
  - Container label
  - DOT placards
  - Name of product on container
Initial ID/precautions

- Emergency Response Guidebook
- Quick guide
- General ID
- Occasional specific ID
- General guidance for class of chemical

Placards and Labels

Other patient's warning...

- It smelled like...
- It is used for...
- You HAVE TO USE A RESPIRATOR to...
- It tasted like...
- There's a <color> warning/placard on it...
Poison Center will...
- ID chemical
- Based on placard information you find
- Based on signs and symptoms displayed
- Healthcare information
- Signs and symptoms to watch out for
- Treatments that may be needed
- 1-800-222-1222

WHY???
- Types of PPE
- Types of hazards to providers
- Type of Decon
  - Dry- removal of clothing
  - Wet- removal of clothing and shower

CBRNE
- Define
- WMD
- NBC
- CBRNE
- Nuclear Devices
- Biological Weapons
- Chemical Weapons
NBC/CBRNE Agent Sources
- Home production
- Laboratory / commercial production
- Industrial facilities
- Military sources
- Medical / university research facilities

The Fallacies
- It can’t happen to us
- NBC agents are so deadly the victims will all die anyway
- There is nothing we can do

Chemical Agents
Chemical Agents

• General Information
• Pulmonary Agents
• “Blood” Agents
• Blister Agents
• Nerve Agents

Tokyo Sarin Attack

• Numbers seeking medical care:
  • 5,510 total at 278 health-care facilities
  • Mild: 984
  • Moderate: 37
  • Severe: 17
  • Deaths: 12
  • Status unknown: >300

• No secondary contamination of health-care workers, but 2 vapor-exposed physicians

Real Life

• Most will not wait for EMS to arrive
• Most will go to hospitals without decontamination

About 80 % of victims arrive without decontamination
Characteristics and Behavior

- Generally liquid (when containerized)
- Normally disseminated as aerosol or gas
- Present both a respiratory and skin contact hazard
- May be detectable by the senses (especially smell)
- Influenced by weather conditions

Characteristics and Behavior

- Irritant/Corrosive vs. Drug-Like Effects
- Physical States
  - Vapor/Gases act quickly
  - Liquids act slower
  - Solids
- Normally disseminated as aerosol or gas

Characteristics and Behavior

- Present both a respiratory and skin contact hazard
- May be detected by the senses (especially smell)
- All forms of chemicals may cause contamination
- Personnel must wear protective equipment during decontamination and immediate patient care
Chemical Agent Clues
- Rapid onset of symptoms
- Similar signs and symptoms
- Absence of traumatic injury
- Emergency responders may be affected
- Animal or insect die-off
- Report of cloud or vapor release

Routes of Entry
- INHALATION - vapor or aerosol
- SKIN (percutaneous) - liquid or vapor
  (vapor if prolonged contact with skin)
- INGESTION - liquid or solid
- INJECTION - intravenous or intramuscular

Volatility
- Tendency of a liquid agent to form vapor
- Volatility proportional to vapor pressure
- Affected especially by
  - Temperature
  - Wind
  - Method of delivery
Persistence

- Tendency of a liquid agent to remain on terrain, other surfaces, material, clothing, skin
- Affected especially by
  - Temperature
  - Surface material
- Persistence is inversely proportional to volatility

Examples

- Non-persistent agents (less than 24 hours)
  - tabun, sarin, soman, cyanide, phosgene
- Persistent agents (greater than 24 hours)
  - mustard, VX

CHOKING (PULMONARY) AGENTS

- Disrupts pulmonary function
  - Non cardiogenic pulmonary edema
  - ARDS (Adult Respiratory Distress Syndrome)
- Treatment: Supportive
CHLORINE CYLINDERS

Ypres, Belgium, April 1915

CHLORINE - Civilian Uses

- Chlorinated lime (bleaching powder)
- Water purification
- Disinfection
- Synthesis of other compounds
  - synthetic rubber
  - plastics
  - chlorinated hydrocarbons

CHOKING (PULMONARY) AGENTS

<table>
<thead>
<tr>
<th>Phosgene</th>
<th>Chlorine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor: Newly cut hay</td>
<td>Odor: Swimming pool</td>
</tr>
<tr>
<td>Symptoms: Coughing, choking, vomiting</td>
<td>Symptoms: Coughing, choking, vomiting</td>
</tr>
</tbody>
</table>
PHOSGENE

- 42 y/o female
- 2 hrs post exposure
- rapidly inc. dyspnea
- PaO2 40 torr (room air)
- CXR: infiltrates -
  - perihilar
  - fluffy
  - diffuse interstitial

PHOSGENE - Uses/Sources

- Chemical industry
  - foam plastics (isocyanates)
  - herbicides, pesticides
  - dyes
- Burning of:
  - plastics
  - carbon tetrachloride
  - methylene chloride (paint stripper)
  - degreasers

“BLOOD” AGENTS (CYANIDE)

- Hydrogen Cyanide (AC)
- Cyanogen Chloride (CK)
Blood Agents

- Cyanide Gas
- Odor: Bitter almonds/musty
- Symptom Onset: Rapid
- Symptoms: Normal skin color, gasping for air, shock, seizure

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CYANIDE (BLOOD AGENTS)

- Hydrogen Cyanide (AC), Cyanogen Chloride (CK)
- Gas at STP, lighter than air
- Mechanism: blocks cell utilization of oxygen
- Old treatment: amyl/sodium nitrite and sodium thiosulfate
- New treatment: hydroxocobalamin

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Cyanide Treatment

Nitrites + Hemoglobin $\rightarrow$ Methemoglobin

$\text{methHgb} + \text{CN} \rightarrow \text{cyanomethemoglobin}$

$\text{CNmethHgb} + \text{thiosulfate} \rightarrow \text{Hgb} + \text{thiocyanate}$

Thiocyanate eliminated renally!
Cyanide Treatment

CN + hydroxocobalamin $\rightarrow$ cyanocobalamin (vit. B12)

Expensive
Easy to use
Less toxic
Eliminated renally
But interferes with some blood tests x 24 hours!

BLISTER AGENTS (VESICANTS)
- Sulfur Mustard (H, HD)
- Nitrogen Mustard (HN1, HN2, HN3)
- Lewisite = chlorovinyl dichloroarsine (L)
- Mustard / Lewisite mixtures (HL, HT, TL)
- Phosgene oxime (CX)

VESICANTS: SULFUR MUSTARD
- Sulfur Mustard, Nitrogen Mustard
- Oily liquid, heavier than air and water, persistent
- Garlic Odor
- Mechanism: alkylating agent, DNA and proteins most sensitive targets
- Symptom onset delayed
- Symptom: Tearing, eye irritation, cough, blisters, and runny nose
- Treatment: Treat similarly to burn patients
BLIND LEADING THE BLIND

MUSTARD: EYE

VESICANT EFFECTS

Convalescence 2wks-6months

Iran/Iraq War: 90-95% burns, pulmonary injury, bone marrow suppression, sepsis, and eventually died.
NERVE AGENTS
(ANTICHOLINESTERASES)
- Tabun (GA)
- Sarin (GB)
- Soman (GD)
- GF
- VX

NERVE AGENTS
- Sarin (GB), VX (persistent)
- All liquids initially at STP
- Mechanism: inhibits acetylcholinesterase, causes massive cholinergic crisis
- Treatment: atropine, oxime, diazepam

Nerve Agents
Odor
- Tabun, Sarin: Non or fruity
- Soman: None
- VX: None/Sulfur

Properties
- Volatile
Normal (cholinergic) synapse

But why does the acetylcholine disappear?

...because of acetylcholinesterase!

Signs and Symptoms of NA Exposure

- Diarrhea
- Urination
- Miosis
- Bradycardia
- Bronchospasm
- Rhinorrhea
- Emesis
- Lacrimation
- Salivation

and:

- Seizures
- Coma
- Death
Rx with atropine…

MARK I Kit (pralidoxime use)

How 2-Pam works
Aging

- Permanent damage to Ache
- Onset varies with agent

MARK I Kit

- Finish decontamination
- Observe for further symptoms
- If needed repeat with another kit
- Children
  - Will need size appropriate dosing
  - No auto-injectors at this time

Follow-up Care

- Notify Decon team leader
- Receiving team and rest of ED should be ready with:
  - IV
  - Atropine
  - Pralidoxime
  - Benzodiazepine
  - Airway
Other Use

- IF YOU OR YOUR DECON TEAM LEADER SYMPTOMATIC:
  - Notify Decon team leader
  - Use MARK I kit
  - Assist member to decon
  - Assist member out of decon for further care

COMPARATIVE TOXICITY OF AGENTS

BREAK
Biological Agents

- General Information
- Bacterial Agents
- Viral Agents
- Toxin Agents

Biological Agent Characteristics

- Produce delayed effects
- Do not penetrate unbroken skin
- Non-specific symptoms
- Undetectable by senses
- Difficult to detect in the field
- Do not evaporate
- Long incubation period
Biological Agent Characteristics (continued)

- Most effectively disseminated as aerosols
- Range of effects
- Obtained from nature
- Multiple routes of entry
- Destroyed by environment
- Some are contagious

Classes of Biological Agents

- Biological Warfare Agents
  - Bacteria
  - Viruses
  - Toxins

Agents Considered for BW

- Bacteria and Rickettsiae
  Anthrax spores, Tularemia, Plague, Brucella, Q Fever
- Viruses:
  Smallpox, VEE, Hemorrhagic fevers
- Toxins:
  Botulinum toxin, SEB, Ricin, Saxitoxin
Acquisition of Etiological Agents

- Multiple culture collections
- Universities
- Commercial biological supply houses, e.g. Iraq
- Foreign laboratories
- Field samples or clinical specimens, e.g. Ricin

Biological Agents

- Most toxic per weight
- Production technology is easily accessible
- Inhalation threat – 1 to 5 micron aerosol
- Undetected until numerous casualties
- Incapacitating to lethal effects

BW General Properties

- Not volatile, must be dispersed as an aerosol
- Silent, odorless, tasteless
- Relatively inexpensive to produce
- Simple delivery technology
  - Point source - aerosol generator
  - Line source - moving aerosol generator: auto, airplane, etc
 BW - General Properties 2

- Inhalation is the most significant route of transmission for BW
- Aerosol - 1 to 5 microns ideal size
- Other routes of entry: oral, dermal abrasion, or intentional percutaneous

Biological Detection

- Mainly of clinical diagnosis
- Lab confirmation may be delayed
- Unusually bad cases

Beware of multiple healthy people with similar complaints

Impact of a BW Release

- Extensive and prolonged need for medical services
- Increased need for PPE
- Possibility of a quarantine
- Handling remains/mortuary facilities
- Multiple jurisdictional challenges
- Responding to a “hoax” can be expensive
Physical Protection (PPE)
- Only foolproof means of protection
- Present equipment is effective
- Problem is knowing when to put protective mask on
- No universal protection for civilian populations
- Limited education programs for civilian populations

Possible Epidemic Syndromes in BW
- Influenza syndrome
- Pulmonary syndrome
- Jaundice syndrome
- Encephalitis syndrome
- Rash syndrome or cutaneous lesions
- Unexplained death or paralysis
- Septicemia/toxic shock

Cutaneous Anthrax
Anthrax - Prevention

- No documented cases of person-to-person transmission of inhalational anthrax has ever occurred
- Cutaneous transmissions are possible
- Universal precautions required

Plague - Pathogenesis

- Humans develop disease from either the bite of an infected flea or by inhaling the organism
  - Bubonic - infection of a lymph node (usually lower legs)
  - Pneumonic - infection of the lungs
  - Septicemia - generalized infection from bacteria escaping from the lymph node: toxic shock
- Orophageal infections are rare, but reported

Pneumonic Plague Prevention

- Secondary transmission is possible
- Standard, contact, and aerosol precautions for at least 48 hrs until sputum cultures are negative or pneumonic plague is excluded
Tularemia - Pathogenesis
- Infectious via inhalation, ingestion, or absorption
- Inhaling only 10 to 50 organisms produces most lethal form of disease, typhoidal form
- Ingestion or absorption causes ulceroglandular form of disease
- Is not spread from person to person

Q Fever - Pathogenesis
- Causes disease in animals (sheep, cattle, goats)
- Humans acquire disease by inhaling aerosols contaminated with the organism.

Q Fever
- Single organism is able to cause infection
- 2 to 3 week incubation period
- Hepatitis, pneumonia, endocarditis
- Can be contagious
- May survive of surfaces up to 60 days
Viruses as Biological Agents
- Smallpox
- Venezuelan Equine Encephalitis (VEE)
- Viral Hemorrhagic Fevers

Smallpox - Clinical Course
- 7-17 day incubation period followed by myalgias, fever, rigors, vomiting, HA, and backache
- May have mental status changes
- Discrete rash with pustules develops over face and extremities and spreads to trunk
- Infectious until all scabs healed over
- All contacts quarantined for at least 17 days

Smallpox
Terrorist Use of Infectious BW Agents

- Provisional diagnosis needs to be made quickly
- High index of suspicion that BW agents have been used
- No time to wait on laboratory results to establish a definitive diagnosis
- The time course of the epidemic may aid in diagnosis

Toxins as Biological Agents

- Think of them as chemicals!
  - Botulinum
  - Ricin
  - Staphylococcal Enterotoxin B

Toxins General Characteristics

- Poisons produced by living organisms that cause effects in humans, animals or plants
- More toxic per weight than chemical agents
- Not volatile and minimal absorption in intact skin
- Not prone to person-to-person transmission
- Sudden onset of symptoms, prostration or death
- Effects: interfere with nerve conduction; interact with immune system; inhibit protein synthesis
- THINK OF IT AS A CHEMICAL!!!!!
Botulism Poisoning - Epidemiology

- Most outbreaks of foodborne botulism result from eating improperly preserved home-canned foods, with vegetables canned in oil being the most common source.
- 145 cases/year in the United States
  - 15% foodborne
  - 65% infantile botulism
  - 20% wound
- Toxin can be harvested and delivered as aerosol
- No person to person transmission

Botulinum Toxin - Pathogenesis

- Neurotoxins produced by Clostridium botulinum - Botulism
  - Most lethal compounds per weight - 15,000 times more toxic than VX
  - Similar effects whether inhaled or ingested
  - Onset of neurologic symptoms
    - After inhalation, 24-72 hours
    - After ingestion, 12-36 hours

Botulism - Pathogenesis 2

- Blocks the release of ACh at the presynaptic terminal of the neuromuscular junction and autonomic nervous system
- Bulbar palsies and skeletal muscle weakness occur
Botulism - Signs & Symptoms

- Descending paralysis
- Bulbar palsies first
  - blurred vision
  - mydriasis
  - diplopia
  - ptosis
  - photophobia
  - dysphagia
  - dysarthria

Botulism - Signs & Symptoms 2

- Soon skeletal muscles become weak, starting in the upper body and moving symmetrically downward
- Symptoms progress acutely to respiratory failure in 24 hours to 2 days (try to obtain antitoxin)
- Patients usually awake and alert

“Floppy” baby flaccid paralysis

Ricin - Pathogenesis

- Potent cytotoxin - a by-product of castor oil production: 5% of mash after oil removed
- Over a million tons of castor beans are processed yearly into castor oil
- 200 times more toxic by weight than VX
- Blocks protein synthesis within the cell and thus tissue death
- Causes airway necrosis and edema when inhaled
**Ricin - Pathogenesis**
- Toxic by multiple routes of exposure
- Can be dispersed as an aerosol
- Effective by inhalation, ingestion, injection

**Ricin - Signs & Symptoms**
- Fever, chest tightness, cough, SOB, nausea, and joint pain 4 to 8 hours after inhalation
  - Airway necrosis and edema leads to death in 36 to 72 hours
- Ingestion causes N.V, severe diarrhea, GI hemorrhage, and necrosis of the liver, spleen, and kidneys - shock and death within 3 days
- Injection causes necrosis of muscles and lymph nodes with multiple organ failure leading to death

**Ricin - Diagnosis & Treatment**
- **DIAGNOSIS**
  - Difficult
  - Routine labs are nonspecific
- **TREATMENT**
  - Supportive - oxygenation and hydration
  - No antitoxin or vaccine available
  - Not contagious
Staphylococcal Enterotoxin B (SEB) Pathogenesis

- Fever producing exotoxin secreted by Staphylococcus aureus - has endotoxin effects
- Common cause of food poisoning in improperly handled foods
- Symptoms vary by route of exposure
- Causes proliferation of T-cells and massive production of various interleukins and cytokines, which mediate the toxic effects

SEB - Pathogenesis 2

- Incapacitating - even at sublethal doses
- 80% of exposed develop symptoms
- May be aerosolized and inhaled
- May be introduced into the food supply and ingested

SEB - Signs & Symptoms

- 3 to 12 hours after inhalation
  - Sudden onset of high fever, HA, chills, myalgias, and nonproductive cough
  - Severe SOB and chest pain with larger doses
  - Chest x-ray usually nonspecific - ARDS in severe cases
  - Ingestion - Nausea, vomiting and diarrhea develops, which may be severe
Defense Against BA – Self-Protection
- Treat every patient with respiratory complaints, a rash or open wounds as an “Infectious Source”
- Normal standard universal precautions for most biological agents
- HEPA filter mask upgrade for Pneumonic Plague/Smallpox/VHF
- Special protective garments are not necessary
- Precaution upgrades in areas of the hospital where aerosols could be generated: Lab centrifuges, autopsy facilities

Defense Against BA - Triage
- Initial triage of all biological casualties is immediate
- Highest priority will be allocating existing resources
  - Isolation rooms away from other patients
  - Mechanical ventilators
  - Personal protective equipment for staff
  - Medications

Key Points
Medical Approach to BA Attack
- Mandatory universal precautions with all infectious patients prevents spread of infection by containing all bodily fluids and utilizing barrier-protection nursing procedures
- Decontamination as appropriate (toxins)
- Initiate therapy for what is treatable, but do not delay for infectious identification
- Report concerns to HOSPITAL ICS (they will report to Public Health Officials, Law Enforcement, and FBI)
Radiological Materials

Terms and Definitions
- Ionizing Radiation
- Protection
- Contamination vs. Exposed

Ionizing Radiation
- Alpha particles
- Beta particles
- Gamma rays
- Neutrons
Ionizing Radiation - Alpha

- Alpha particles only travel 1 to 2 inches in air and microns in tissues
- Cannot penetrate the dead layer of the skin
- Can be shielded by a sheet of paper
- Greatest danger is from inhalation or ingestion

Ionizing Radiation - Beta

- Free electrons
- Penetrate skin but not vital organs
- Shielded by thick clothing or aluminum
- Greatest danger is through inhalation or absorption of beta emitters

Ionizing Radiation - Gamma Rays

- High energy rays
- Penetrate deep into tissue; require dense shielding
- Primary cause of radiation sickness
- Produced from radioactive decay and are a by-product of a nuclear weapon explosion or reactor accident
**Ionizing Radiation - Neutrons**

- Uncharged particles
- **Can damage cells on contact**
- Can make material they strike radioactive
- Result of a nuclear weapon explosion
- Penetrates extensively; require special shielding

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**Radiation Exposures**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Exposure (mrem)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Annual Exposure</td>
<td>360 mrem per year</td>
</tr>
<tr>
<td>Chest x-ray</td>
<td>10 to 30 mrem</td>
</tr>
<tr>
<td>Flight</td>
<td>0.5 mrem every hour</td>
</tr>
<tr>
<td>Smoking 1.5 packs per day</td>
<td>16,000 mrem per year</td>
</tr>
<tr>
<td>Mild radiation sickness*</td>
<td>200,000 mrem</td>
</tr>
<tr>
<td>Lethal Dose*</td>
<td>450,000 mrem</td>
</tr>
<tr>
<td>* single acute exposure</td>
<td></td>
</tr>
</tbody>
</table>

Chronic

Acute

DOE maximum annual occupational limit = 5,000 mrem
DOE maximum emergency dose (for saving property) = 10,000 mrem
Maximum emergency dose (for saving life) = 25,000 mrem

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**Health Risks**

- Risks depend on:
  - Amount
  - Rate
- Categorized as:
  - Acute
  - Chronic
Exposure Protection

- Time
- Distance
- Shielding

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Result</th>
<th>Dose Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mrem</td>
<td></td>
<td></td>
<td>100 mrem/hr x 15 minutes (0.25 hour) = 25 mrem</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance</th>
<th>Source</th>
<th>Dose Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 meter</td>
<td>1 meter</td>
<td>100 mrem/hr 25 mrem/hr</td>
</tr>
</tbody>
</table>
Shielding

- Alpha
- Beta
- Gamma

Contaminated vs. Exposed

- Contaminated victims pose a risk to others
- If you are contaminated, you are also exposed
- Exposed victims are not necessarily contaminated
- Geiger counter to determine if victims are contaminated

DECONTAMINATION TEAM

Roles
Chemical ID
PPE
Equipment
Patient Flow
## Decon Team Duties

- Decon Team Leader
- Decon Operations Team (2, must have training)
- Suit/equipment Support Team (2-4, all must have training)

### Decon Team Leader

- Direct patient(s)
  - to staging area
  - remove clothes
- Brief Team
- Monitor team
  - Operations Team
- Suit/equipment support
- Chemical ID (use poison center)
- Decon team member ONLY communicate with Team Leader!

### Decon Team Members (2)

- Pre-entry assessment
- Inspect equipment
- Don PPE
- Decontaminate as needed
- Provide BLS
- Clean self/room
- Doff PPE
- Post-entry assessment
- Shower
- Debrief
Suit/equipment Support
- Utilize appropriate PPE (splash protection)
- Prepare PPE
- Assist donning/doffing PPE
- Monitor team
- Assist moving cleaned patients
- Assist in PPE removal and exit of Decon team

Key Questions Prior to Decon
- Water compatibility of substance
  - Most OK
- Dry vs Wet Decon
- Level of PPE required
- Signs and symptoms of acute exposure
- Cleanup and disposal requirements

Personal Protective Equipment
Level A

Required when the highest potential for exposure to hazards exists and the highest level of skin, respiratory, and eye protection is called for

VAPOR PROTECTION

Level B

Required when the highest level of respiratory protection but a lesser level of skin protection is needed

Can be encapsulating or non-encapsulating

LIQUID SPLASH PROTECTION

Level C

Required under circumstances that call for lesser levels of respiratory and skin protection

Can be used with SCBA's or APR's

DUST & SOLIDS PROTECTION
Level D

Appropriate when minimal skin protection and no respiratory protection is required

SUPPORT PROTECTION

Levels of Protection

Greater Hazard
Level A  Level B  Level C  Level D

Higher Burden

Equipment Needs

- Crash cart in hallway or near tent
- Pass to clinical team member when needed
- Medication
- Intubation equipment
- Maintain personnel protection!
Radios
- Must go on UNDER PPE
- Make sure all on ONE channel
- Test before putting on, after dressed
- Have backup procedures for communication should radios fail
  - Hand on top of head = OK
  - Hand(s) to neck = can’t breathe

Cautions
- Risks to person in decon room!
- PPE survey & exam
- Personnel: vital signs before & after!
- Risks:
  - Heat
  - Chemical
  - Equipment malfunction

Patient Flow
- Special door from outside (ONLY!)
- “Hot” zone: by exterior door
  - Undress
  - Collect contaminated clothing
- “Warm” zone: under shower, on stretcher
  - Shower or wash
- “Cool” zone: by door to hallway
  - Pass to clean stretcher, etc
  - Assistants to help
Patient Flow

Enter decon

Shower/hose (decontaminating)

Dry/re-dress

Exit to hospital

Tent (if applicable)

- Additional training in setting up
- Know your facilities policy!

Conclusion

- Keep yourself safe!
- Keep institution safe!
- Only in this manner can we take care of patients.
- What is appropriate PPE?
- What is our appropriate response?
QUESTIONS?

Thank You!

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