Management of Casualties of Biological Warfare & Terrorism

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I. Thou shalt
Maintain an Index of Suspicion

Chemical Warfare Diseases

- Suspicion usually easy
- Casualties clustered in time and space
- Absence of explosive device
The M256 Kit

Index of Suspicion: The Problem of Chem vs Bio

- Chemical
  - Device goes off....
  - Everyone falls down.
  - Tight casualty cluster
  - First Responders
    - Fire
    - Police
    - Paramedic

- Biological
  - Device goes off....
  - No one realizes it.
  - Casualties disperse
  - Present days later
  - First Responders
    - Medical
## Biological Warfare Diseases
### Diagnostic Associations

<table>
<thead>
<tr>
<th>Agent</th>
<th>Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Wide Mediastinum</td>
</tr>
<tr>
<td>Plague</td>
<td>Hemoptysis*</td>
</tr>
<tr>
<td>Smallpox</td>
<td>Exanthem</td>
</tr>
<tr>
<td>Botulism</td>
<td>Flaccid Paralysis*</td>
</tr>
</tbody>
</table>

*when seen in multiple patients on the battlefield
Biological Warfare Diseases
Non-Specific Febrile Presentations

- Tularemia
- Brucellosis
- Q Fever
- VEE
- Prodromal Plague
- Prodromal Anthrax
- Prodromal Smallpox
Chemical or Biological Warfare?
Epidemiologic Clues

- Tight Cluster of Casualties
- High Infection Rate
- Unusual Geography
- Localized Geography
- Unusual Clinical Presentation
- Point Source or Multiple Point Sources
- Unusual Munitions
- Dead Animals
- Lower Attack Rates in Protected

The M8 Alarm System

The M8A1 Automatic Chemical Agent Alarm System consists of the M8A1 Detector (left) and M42 Alarm (right).
Portal Shield
BIDS

Medical & Bio-Surveillance

- Syndromic
  - BioSense
  - ESSENCE

- Airborne
  - BioWatch
  - Portal Shield
  - JBAIDS
  - BIDS
II. Thou shalt Protect Thyself

Protection Against BW & CW

- Physical
  - MOPP gear
  - SERPACWA
- Chemical
  - pre- & post-exposure antibiotics
  - pyridostigmine bromide
- Immunologic
  - passive (e.g. Botulinum antitoxin)
  - active (e.g. Anthrax & Vaccinia vaccines)
Improvised Airways Protection for Toxin Aerosols

<table>
<thead>
<tr>
<th>Airways Protection</th>
<th>Time to Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ricin (large protein)</td>
<td></td>
</tr>
<tr>
<td>- Control Animals</td>
<td>48-72 hr (n=6)</td>
</tr>
<tr>
<td>- 1 Layer T-shirt</td>
<td>55, 70 hr and 6 days</td>
</tr>
<tr>
<td>- 1 Layer Cravat</td>
<td>72 &amp; 72 hr; One Survived</td>
</tr>
<tr>
<td>- 2 Layer T-shirt</td>
<td>All Survived (n=3)</td>
</tr>
<tr>
<td>- 2 Layer Cravat</td>
<td>All Survived (n=3)</td>
</tr>
<tr>
<td>Saxitoxin (low molecular weight)</td>
<td></td>
</tr>
<tr>
<td>- Control Animals</td>
<td>6-10 min (n=4)</td>
</tr>
<tr>
<td>- 2 Layer T-shirt</td>
<td>All Survived (n=4)</td>
</tr>
<tr>
<td>- 2 Layer Cravat</td>
<td>All Survived (n=4)</td>
</tr>
</tbody>
</table>
BSL-3 Pathogens

- Anthrax
- Plague
- Tularemia
- Brucelae
- Q-Fever
- Glanders
- Melioidosis
- Alphaviruses (VEE, WEE, EEE)
BSL-4 Pathogens

- Filoviridae
  - Ebola
  - Marburg
- Arenaviridae
  - Lassa
  - Guanarito
  - Junin
  - Machupo
  - Sabia
- Flaviviridae
  - RSSE & CEE
  - TBE Complex
  - Kyasanur Forest
  - Omsk
- Bunyaviridae
  - CCHF
- Orthopoxviruses
  - Variola

Pediatric MOPP Gear
III. Thou shalt Assess the Patient
(The Primary Survey)

Initial Patient Assessment

- Airway
  - MUSTARD, LEWISITE, PHOSGENE OXIME
- Breathing
  - ANT, PLA, TUL, BOT, SEB, QF, RICIN
  - CYANIDE, NERVE, PHOSGENE
- Circulation
  - PLA, VHF
  - CYANIDE
- Disability - Neuromuscular?
- Exposure - Need for Decon?
IV. Thou shalt
Decontaminate as Appropriate
Decontamination after a Chemical Attack

- **Materiel:**
  - ? 5.0% Hypochlorite

- **Personnel:**
  - ? 0.5% Hypochlorite
  - Soap & Water

Microbial Elimination Terminology

- **Sterilization**
  - elimination of all microbial life

- **Disinfection**
  - high-level disinfectants
    - kill all except high levels of endospores
  - intermediate-level disinfectants
    - kill tubercle bacilli, vegetative bacteria, viruses
  - low-level disinfectants
Decontamination (Disinfection) after a Biological Attack

- **Personnel**
  - decon rarely needed
  - less relevant than for Chem attack
  - soap & water
  - use common sense

- **Materiel**
  - often unnecessary
  - less relevant than for Chem attack
  - 5.0% bleach more than adequate
  - 0.1% bleach kills anthrax spores

V. Thou shalt
Establish a Diagnosis
(The Secondary Survey)
“AMPLE” History

- Allergies, Arthropods
- Medications, MOS, MOPP Status
- Past Illnesses/Immunizations
- Last Meal, Food Procurement
- Environment
  - events on battlefield
  - travel history
  - other unit members
  - munitions

Physical Exam

- Respiratory
- Neuromuscular
  - central & peripheral
- Hematologic/Vascular
- Dermatologic
Obtaining Specimens

- CBC, ABG
- Nasal Swabs (culture, PCR)
- Blood for Bacterial Culture, PCR
- Serology
- Sputum Bacterial Culture
- Toxin Assays (blood, urine)
- Throat Swab (viral culture, PCR, ELISA)
- Environmental Samples?

VI. Thou shalt
Render Prompt Treatment
Field Expedient Therapy
Chemical & Biological Casualties

- Immediate Pulm
  - SEB
  - Mustard
  - Lewisite
  - Phosgene
  - Cyanide

- Immediate Neuro
  - Nerve Agents

- Delayed Pulm
  - Anthrax
  - Plague
  - Tularemia
  - Q Fever
  - SEB, Ricin
  - Mustard, Lewisite
  - Phosgene

- Delayed Neuro
  - Botulism
  - VEE (CNS)

Field Expedient Therapy
Chemical & Biological Casualties
Specific Therapy Available & Advisable

- Immediate Pulm
  - Cyanide

- Immediate Neuro
  - Nerve Agent

- Delayed Pulm
  - Anthrax
  - Plague
  - Tularemia
  - Q Fever

- Delayed Neuro
  - Botulism
Field Expedient Therapy
Chemical & Biological Casualties
Therapy Based on Syndrome Type

- Immediate Pulm
  - Cyanide Kit

- Immediate Neuro
  - NAAK

- Delayed Pulm
  - Doxycycline

- Delayed Neuro
  - Bot Antitoxin
  - (Rx at Echelon II)

VII. Thou shalt
Practice Good Infection Control
Isolation Precautions in Hospitals

- Standard Precautions (UP + BSI)
- Transmission-Based Precautions
  - Airborne Precautions
  - Droplet Precautions
  - Contact Precautions

Airborne Precautions

- Measles
- Varicella
- Pulmonary Tuberculosis
**Droplet Precautions**

- Invasive H flu B Disease
- Invasive Meningococcal Disease
- Drug-Resistant Pneumococcal Disease
- Diphtheria, Pertussis, Mycoplasma, GABHS
- Adenovirus, Mumps, Rubella, Influenza, Parvovirus B19

**Contact Precautions**

- Certain Drug Resistant Pathogens (MRSA, VRE)
- C. difficile
- Enterics in incontinent host:
  - O157:H7, Shigella, Hepatitis A, Rotavirus
- RSV, Parainfluenza, Enterovirus
- Skin Infections:
  - HSV, Impetigo, Lice, Scabies, SSSS, Draining Abscesses, etc
- Hemorrhagic Conjunctivitis
- VHF
Isolation Precautions
Biowarfare Diseases

- Pneumonic Plague
  - Droplet Precautions
- Smallpox
  - ? Airborne Precautions
  - “Strict Quarantine”
- Viral Hemorrhagic Fevers
  - Contact Precautions

VIII. Thou shalt Alert the Proper Authorities
# Notifiable Diseases

**CDC Data, 2001-2005**

<table>
<thead>
<tr>
<th>Disease</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
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<tbody>
<tr>
<td>Anthrax</td>
<td>23</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Botulism</td>
<td>155</td>
<td>118</td>
<td>129</td>
<td>133</td>
<td>135</td>
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<tr>
<td>Brucella</td>
<td>136</td>
<td>125</td>
<td>104</td>
<td>114</td>
<td>120</td>
</tr>
<tr>
<td>Plague</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>8</td>
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<tr>
<td>Tularemia</td>
<td>129</td>
<td>90</td>
<td>129</td>
<td>134</td>
<td>154</td>
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<tr>
<td>Q Fever</td>
<td>26</td>
<td>61</td>
<td>71</td>
<td>70</td>
<td>136</td>
</tr>
</tbody>
</table>

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**JPBDS**

- Files NBC-1 & NBC-4 Reports Automatically
- Designed to replace IBADS & Portal Shield

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9/16/2011
IX. Thou shalt
Conduct an Epidemiological Investigation

The Epidemiological Sequence

- 1. Observation
- 2. Count Cases
- 3. Relate Cases to Population
- 4. Make Comparisons
- 5. Develop the Hypothesis
- 6. Test the Hypothesis
- 7. Make Scientific Inferences
- 8. Conduct Studies
- 9. Intervene and Evaluate
Public Health Assets in the Field

- Local/County Health Departments
- State Health Departments
- Centers for Disease Control
- Public Health Veterinarians
- Infectious Disease Society of America

X. Thou shalt Know and Spread the Gospel
Videotapes and DVDs

Nat’l Tech Info Service
1-800-41 TRAIN

CD-ROMs

Management of Chemical Warfare Injuries

- Reference
- Interactive Training
24-Hour Emergency Response Numbers

- 1-888-USARIID
  - HOT ZONE
  - “Bio Incident Line”

- 1-800-USARIID
  - HOTTER ZONE
  - “Hot Live Talk”