Disaster Issues on Public Health

ABCs of Bioterrorism

Fact Sheet 2
Managing Casualties of Viral Weapons of Mass Destruction

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Introduction

- This session will focus on the identification and management of some viral types of weapons of mass destruction:
  - Smallpox
  - Viral Encephalitides
  - Viral Hemorrhagic Fever

Smallpox Pathogenesis

- Virus >> Respiratory tract >> Local lymph nodes >> Brief viremia >> *Latent phase* (virus multiplies in reticuloendothelial system) >> Secondary viremia >> *Prodromal phase* (Mucous membranes of mouth and pharynx infected) >> *Overt phase* (Viral invasion of capillary endothelium of dermal layer of skin (classic lesions)

Smallpox
Variola virus

- **Early Symptoms/Signs**
  - Headache
  - Malaise, fever, rigors, vomiting, backaches
- **Delayed Symptoms/Signs**
  - Cough
  - Bronchitis, pulmonary edema
  - Encephalitis, corneal ulcers, delirium (15%)
  - Abdominal pain
  - Rash (2-3 days later)
  - Osteomyelitis, arthritis
- **Classic Symptoms/Signs**
  - Erythema from face to arms & legs
  - Macule → Papules → (in 1 week) pustular vesicles →(synchronous)
  - Scabs (1-2 weeks)
  - Lesions concentrate on face then spread peripherally to arms and legs. Then develop on torso.
  - Lesions contain live virus

Smallpox
Variola virus

- **Bioterrorism mode of dissemination: aerosol**
- **Incubation period: 7-17 days (10-12 days)**
- **Onset: abrupt**
- **Duration of illness: 4 weeks**
- **Lethality: moderate (20-40% in unvaccinated; 3% in recently vaccinated)**

Smallpox
Variola virus

- **Transmissibility: high**
  - **Direct: Person-to-person especially first week of illness**
  - **Indirect: Fine aerosol distribution or fomites**
- **Diagnostic samples: pharyngeal swab, scab matter, nasal swab, serum**
- **DDx: varicella, erythema multiforme, contact dermatitis, H. zoster, Impetigo, drug eruption**

Smallpox
Variola virus

- Therapy
  - ***Cidofovir*** (pediatric dosage is not established) (possibly effective)
  - ***Ribavirin*** (possibly effective)

Smallpox
Variola virus

- Prophylaxis
  - ***Smallpox vaccine:*** 0.6 ml/kg intradermally. Give immediately if previous vaccination was >3 years earlier. Otherwise, effective if given within 3 days of exposure.

Smallpox
Variola virus

- Isolation/decontamination precautions
  - Victim (overt attack): undress, soap/shower; use 0.5% diluted household bleach for gross or visible contamination.
  - Responder: standard/airborne/contact precaution (maintain minimum 17 days until all scabs separate)
  - Environment: 0.5% bleach

Smallpox Management Overview

- Don appropriate PPE
- Isolate patient
- Quarantine contacts
- Vaccinate exposed population
- Supportive therapy
- Antibiotics for secondary infections

Smallpox Vaccine Complications

- Inadvertent inoculation
- Generalized vaccinia
- Eczema vaccinatum
- Progressive vaccinia
- Post-vaccinial encephalitis

Vaccine immune globulin: Beneficial for severe Cases of eczema vaccinatum, progressive vaccinia Generalized vaccinia. Of no benefit in post-vaccinial encephalitis

At Risk for Vaccine Complications

- Eczema active or past of other forms of chronic dermatitis
- Altered immune states (HIV, AIDS, cancers, immunosuppressive therapy)
- Pregnancy (risk of fetal vaccinia)
- Infants under 1 year
- Adolescents receiving primary vaccination

Viral Encephalitides: Alphavirus

- Eastern Equine Encephalitis (EEE)
- Western Equine Encephalitis (WEE)
- Venezuelan Equine Encephalitis (VEE)

Viral Encephalitides (Alphavirus: EEE, WEE, VEE)

- Early Symptoms/Signs
  - Fever, malaise, chills
  - Headache, photophobia
  - Myalgia
- Delayed Symptoms/Signs
  - Excess salivation, sore throat
  - Nausea, vomiting
  - Diarrhea
  - Muscle weakness
  - Nuchal rigidity
- Delayed Symptoms/Signs (Cont)
  - Meningitis, confusion, lethargy, ataxia, cranial nerve palsies, seizures, coma
  - Impaired respiratory regulation
  - Leukopenia (EEE, VEE)

Viral Encephalitides (Alphavirus: EEE, WEE, VEE)

- Bioterrorism mode of dissemination: aerosol
- Incubation period: 1-6 days (EEE); 5-12 days (WEE); 5-15 days (VEE)
- Onset: acute
- Duration of illness: 1-6 days

Viral Encephalitides (Alphavirus: EEE, WEE, VEE)

- Lethality:
  - VEE: <1% (children with encephalitis: 20% die)
  - EEE: 50-70% (survivors with permanent neurologic deficit)
  - WEE: 10%

Viral Encephalitides (Alphavirus: EEE, WEE, VEE)

- Diagnostic samples: serum, nasal and throat swabs
- Severity: EEE> WEE>VEE (children/elderly most affected)
- Therapy
  - Supportive
  - ***Ribaviron***
  - ***Alpha-Interferon***

} Contact agencies of assistance for current dosing recommendation.

Viral Encephalitides (Alphavirus: EEE, WEE, VEE)

- Prophylaxis
  - Vaccine (IND)
    - VEE (TC-83 & C-84 [non-responders to TC-83])
    - EEE (IND)
    - WEE (IND)

Viral Encephalitides (Alphavirus: EEE, WEE, VEE)

- Isolation/decontamination precautions
  - Victim (overt attack): undress; soap/shower; use 0.5% diluted household bleach for gross or visible contamination.
  - Responders: standard precautions
  - Mosquito control x 72 hours
  - Environment: 0.5% bleach

Viral Hemorrhagic Fever (VHF)

- Early Symptoms
  - Conjunctival hemorrhage
  - Fever, malaise, prostration
- Delayed Symptoms
  - Intracranial hemorrhage, confusion, facial flushing
  - Capillary fragility, disseminated intravascular coagulation, shock, pneumonia (Hanta)
  - Jaundice ↑LFT (RVF, MHF, EHF, YF)
  - Hematemesis, melena
- Delayed Symptoms (Continued)
  - Renal failure (HFRS)
  - Thrombocytopenia, leukopenia
  - Headache, deaf, visual deficits (RVF), epistaxis, sore throat
  - Black vomit (YF), nausea, vomiting
  - Abdominal pain, diarrhea, myalgia
  - Petechiae, purpura, ecchymosis
  - Macular rash (MHF, EHF), non-dependent swelling

Viral Hemorrhagic Fever (VHF)

- Bunyaviridae
  - Hantavirus (HRFS)
  - Rift Valley Fever (RVF)
  - Congo-Crimean (CCHF)
- Arenaviridae
  - Lassa Fever (LF)
  - Argentina Hemorrhagic Fever (AHF)

Viral Hemorrhagic Fever (VHF)

- Filoviridae
  - Marburg (MHF)
  - Ebola (EHF)
- Flaviviridae
  - Yellow Fever (YF)
  - Dengue Hemorrhagic Fever (DHF)

Viral Hemorrhagic Fever (VHF)

- Bioterrorism mode of dissemination: aerosol
- Incubation period: 4-21 days (YF: 3-6 days; RVF: 2-5 days; EHF: 2-21 days; DHF: 13-15 days; MHF: 5-7 days)
- Onset: acute
- Duration of illness: weeks (EHF: 7-16 days; YF: 14 days; CCHF: 9-12 days)

Viral Hemorrhagic Fever (VHF)

- Lethality: moderate-high (LF: ↑↑; MHF: ↑↑; CCHF: ↑↑; EHF: ↑↑↑↑; RVF: ↑; RVF with hepatitis: ↑↑↑)
- Transmissibility: moderate
- Diagnostic samples: blood, nasal swab

Viral Hemorrhagic Fever (VHF)

- DDx: malaria, typhoid fever, rickettsia, leptospirosis, TTP, SLE, relapsing fever, meningococcemia, fulminant hepatitis, leukemia, hemolytic uremic syndrome

Viral Hemorrhagic Fever (VHF)

- Therapy
  - Supportive
  - ***Ribavirin*** (CCHF, arenavirus): 30 mg/kg IV x 1 dose → 15 mg/kg IV q6h x 4 days → 7.5 mg/kg q8h x 6 days (caution: children/pregnancy)
  - Passive antibody (arenavirus, CCHF, BHF, and Lassa fever)
  - ***Ribavirin*** (RVF): 30mg/kg q6h x 4 days → 7.5 mg/kg q8h x 6 days

Viral Hemorrhagic Fever (VHF)

- Prophylaxis
  - ***YF vaccine***
  - ***Ribavirin*** (LF, HFRS, RVF, CCHF)
  - Other vaccines (IND)

Viral Hemorrhagic Fever (VHF)

- Isolation/decontamination precautions
  - Victim (overt attack): undress; soap/shower; use 0.5% diluted household bleach for gross or visible contamination.
  - Responder: standard/airborne/contact precautions
    - Quarantine contacts up to 21 days
  - Environment: 0.5% bleach/phenol

Summary

- This session focused on the identification and management of some viral types of biologic weapons:
  - Smallpox
  - Viral Encephalitides
  - Viral Hemorrhagic Fever