1 Disaster/Mass Casualty Nursing

WMD - Weapons of Mass Destruction
NBC- Nuclear, Biologic and Chemical Agents

Natural Disasters
Transportation Disasters

NR 40
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2 DISASTER NURSING

- Mass casualty/disaster incident exists when the number of casualties exceeds available resources
- Disasters classified by levels
  - Level I-local emergency responders are able to handle the disaster
  - Level II-regional efforts and help from surrounding communities sufficient
  - Level III- above two overwhelmed, need Statewide or Federal assistance

3 Disaster plans

- Federal Government mandates that every institution have an updated disaster plan with an Incident Command System.
- The incident commander assumes overall leadership for implementing the institution’s plan
- Plan must be tested through drills or participation in an actual event at least twice yearly

4 Disaster Plan

Plans are designed to:
- Establish communication networks and lines of authority to coordinate onsite care
- Plan for cancellation of non-emergency services
- Identify sources able to provide vaccines, immune globulins, antibiotics and anti-toxins

5 Disaster plans

- Plan for efficient evaluation and discharge of patients
- Develop discharge instructions for non-infectious patients
- Determine sources for additional medical equipment and supplies
- Determine ability to handle a sudden increase in numbers of cadavers
Disaster plan

- Surveillance and detection
- Dedicated decontamination facilities
- Training and drills
- Mental health resources

Emergency Preparedness Teams and their Functions

- Hospital Incident Commander
  - Medical command physician
  - Triage officer
  - Community relations officer
- Physician or administrator who assumes overall leadership.
- Decides number, acuity and resource needs of clients
- Physician or nurse who triages
  - Liaison between medical center and media

Agencies involved in Disasters

- Any number of local, state or Federal agencies.
- DMAT
- DHHS
- FEMA
- DOJ
- USRT’s
- CDC
- OEM
- National Guard
- Various military branches
- Am. Red Cross

DETECTION OF ATTACK

Humans are often the most sensitive, or the only, detector of a biologic attack

Red flags:
- increased number of patients presenting simultaneously with s/s caused by the disseminated disease
- incidence out of character in a geographic area
- More than one epidemic occurring at the same time

DETECTION

- Suspicious activity or discovery of a potential delivery system, ie. spray device
- rapidly increasing disease incidence (hours or days) in a normally healthy population
- Large numbers of rapidly fatal cases
11 DECONTMINATION PROCEDURES

Equipment
• PPE
• Soap, 0.5% sodium hypochlorite
• Towels
• waste containers
• Tape
• Body bags
• Film badge of chemical agent detector

12 DECONTMINATION PROCEDURES

• Decontaminate at scene “hot zone”
• Inform emergency personnel of stages of decontamination
  – Gross
  – Secondary
  – Definitive
• Decontaminate salvageable clients first

13 Triage of Disaster Victims

• GREATEST GOOD FOR GREATEST NUMBER

• Sorting of casualties to determine priority of health care and proper site for treatment

14 Triage Under Usual versus Mass Casualty Operations

Usual Triage
• Emergent (immediate threat to life)
• Urgent (major injuries requiring immediate treatment)
• Nonurgent (minor injuries)

Mass Casualty Triage
• Emergent or class 1 (red tag), immediate threat to life
• Urgent or class II (yellow tag) major injuries requiring immediate treatment
• Nonurgent (green tag) minor injuries “walking wounded”
• Expectant or class IV (black flag), expected and allowed to die

15 Deactivation of Emergency Response Plan

• Event resolution
  – Call off the plan, but not before assuring that sufficient staff and supplies are available and needs of all departments are met
• Debriefing
  – Critical Incident Stress Management
    • Precrisis through postcrisis intervention
    – Post-traumatic Stress Disorder
• Administrative review
  – Plan critique, outcomes assessment

16 Bioterrorism
Potential Bioterrorism Agents

- Bacterial Agents
  - *Anthrax
  - Brucellosis
  - Cholera
  - *Plague, Pneumonic
  - *Tularemia
  - Q Fever

Source: U.S. A.M.R.I.I.D.

Biological Agents of Highest Concern

- Variola major (Smallpox)
- Bacillus anthracis (Anthrax)
- Yersinia pestis (Plague)
- Francisella tularensis (Tularemia)
- Botulinum toxin (Botulism)
- Filoviruses and Arenaviruses (Viral hemorrhagic fevers)

ALL suspected or confirmed cases should be reported to health authorities immediately.

Advantages of Biologics as Weapons

- Easy to obtain
- Inexpensive to produce
- Potential for dissemination over large geographic area
- Creates panic
- Can overwhelm medical services
- Perpetrators escape easily

BIOLOGIC AGENTS

Category A agents

- Easily disseminated and some transmitted from person to person
- Potential for mass casualties
- Require a sophisticated public health structure for management
- Examples: Anthrax, Botulism, Plague, Small Pox, Tularemia and viral hemorrhagic fever

Category B Agents

- Delivered through water and food sources
- Produce moderate morbidity and low mortality
- Require management assistance from the public health sector
- Examples: Q fever, Brucellosis, Glanders, ricin toxin, epsilon toxin, and Staphylococcus enterotoxin B
BIOLOGIC AGENTS
Category C Agents
• Haven’t been weaponized (but could be)
• Have potential for high morbidity and mortality,
• Readily available and fairly easy to produce and disseminate
• Examples: Nipah virus, Hantavirus, tick borne encephalitis, yellow fever, and multidrug resistant TB

Routes of Infection
• Skin
  – Cuts
  – Abrasions
  – Mucosal membranes

Routes of Infection
• Gastrointestinal
  – Food
    • Potentially significant route of delivery
    • Secondary to either purposeful or accidental exposure to aerosol
  – Water
    • Capacity to affect large numbers of people
    • Dilution factor
    • Water treatment may be effective in removal of agents

Routes of Infection
• Respiratory
  – Inhalation of spores, droplets & aerosols
  – Aerosols most effective delivery method
  – droplet most effective

Medical Response
• Pre-exposure
  – active immunization
  – prophylaxis
  – identification of threat

Medical Response
• Incubation period
  – diagnosis
  – active and passive immunization
  – antimicrobial or supportive therapy

Medical Response
• Overt disease
– diagnosis
– treatment
  • may not be available
  • may overwhelm system
  • may be less effective
– direct patient care will predominate

29  Bioterrorism:

What Can Be Done?
  • Awareness
  • Laboratory Preparedness
  • Plan in place
  • Individual & collective protection
  • Detection & characterization

30  SMALL POX-
  • declared dead in 1980-
  • only CDC and Russia has samples
  • is now a major concern as weapon of mass destruction.
  • Has aerosol transmissibility,
  • ease of large-scale weapon production
  • vast number of people with out antibodies from either vaccination or previous exposure.

31  PATHOGENESIS
  • large complex virus that has two predominant strains
  • Variola major- 30% greater mortality
  • Variola minor- fatality rate of 1%
  • Hemorrhagic and malignant small pox are rare and deadly strains

32  TRANSMISSION
  • Infectious after the onset of debilitating flu like symptoms and the onset of the characteristic rash.
  • Once the rash has appeared, airborne dissemination via the respiratory tract is responsible for transmission. Airborne transmission is possible but not as readily as measles or chicken pox.
  • remains infectious until the last scabs fall off.

33  CLINICAL PRESENTATION
  • Incubation 12-14 days
  • Flu like symptoms,
  • Malaise
  • high fever
• rigors - sudden chills
• vomiting
• headache
• backache
• some develop delirium

### CLINICAL PRESENTATION
- After two to three days the fever breaks and the patient begins to feel somewhat better
- Maculopapular rash appears – mouth and pharynx
- Face and forearms
- Progressing quickly to the trunk and lower extremities
- 8-14 days after the onset of the rash pustules form scabs that leave permanent depressed depigmented scars as they separate.

### DIAGNOSIS
- Character and spread of lesions -
  - all lesions are identical and
  - advance concurrently through stages of development

### MANAGEMENT
- Supportive
- Isolation at home preferred or isolation facilities, 
- Quarantine of regions in event of bioterror attack -
- Negative pressure rooms - 6-12 exchanges per hr
- Airborne precautions (N95 respirator - TB mask -)
- Pt to wear a mask if transported
- Contact Isolation - gowns gloves and single use items

### NURSING CARE
- Adequate hydration -
- mouth sores a challenge -
- antibiotics for infected lesions
- psychosocial support -

### DECONTAMINATION
- Most variola virus dies within 24 hours on surfaces
- Hot water wash and dilute bleach or formaldehyde
- Persons who die from small pox should be cremated

### PROPHYLAXIS
- Small Pox vaccine scarification
- Pts are to return on 7th day for evaluation
- Primary response
  - papule forms by day 2-3
– into a vesicle by day 3-5
– starts to drain by day 5-7
– scab forms by day 10-12.

**PROPHYLAXIS**

- Keep site clean and dry
- do not scratch or touch drainage - may transfer to another site (secondary inoculation- eyes can lead to blindness, open areas –lesions anywhere on the body)
- Rx vaccinia immune globulin (VIG) therapy

**VACCINATION REACTION**

- Post vaccination symptoms
- Moderate pruritis at the site
- Localized pain from lymphadenopathy
- Low grade fever
- Localized muscle aches and joint pains

**Small Pox Vaccine**

- Updates:
  - March 28, 2003
  - careful monitoring of smallpox vaccinations that have been given recently has suggested that there may be an association between the vaccine and cardiac disease. Incidents of myocarditis, pericarditis, and/or a myopericarditis, angina and myocardial infarction have been reported following smallpox vaccination.

**Small Pox Vaccine**

- Currently, the CDC is recommending, as a precautionary step, people who have been diagnosed as having heart disease with or without symptoms should not get the smallpox vaccine at this time. These include heart conditions such as:
  - previous myocardial infarction
  - angina
  - congestive heart failure
  - cardiomyopathy

**ANTHRAX**

**PATHOPHYSIOLOGY**

- Gram positive spore-forming nonmotile rod
- Anthrax spores are encapsulated
ANTHRAX-CUTANEOUS

- Spores come into contact with broken skin
- Commonly on the head, neck or extremities
- Incubation 2-5 days
- Initial lesion is papular and becomes vesicular in 24-36 hours
- Lesion forms a black, depressed eschar within 2-6 days
- Edema and smaller secondary vesicles may surround some lesions
- Pain uncommon
- Left untreated death from septicemia and meningitis in 5-20%

Anthrax: Cutaneous

INHALATION

- Anthrax not normally airborne
- Inhalation by aerosolization
- Not contagious from one person to another
- Standard precautions
- Incubation up to 60 days but could be longer

Prodromal

- Flu like symptoms and mild and non specific- malaise, dry cough and mild fever
- Symptoms improve for 1-2 days followed by acute, severe dyspnea, stridor and cyanosis
- Chest XRay- widening mediastinum from lymphadenopathy – poor prognosis
- Septic shock and ½ develop meningitis
- Die with in 24-36 hours from hemorrhagic thoracic lymphadenitis and hemorrhagic mediastinitis
58  DIAGNOSIS

- Aerobic culture but takes too long should be treated if known or suspected contact

59  GASTROINTESTINAL ANTHRAX

- Naturally occurring disease is rare and fatal
- Not a good bioterrorism weapon
- diarrhea, fever and bacteremia

60  GENERAL DIAGNOSIS OF ANTHRAX

- Mayo clinic 1 hr DNA test
- Standard Precautions
- Blood work and chest XRay
- Skin lesions scraping sent for Gram stain and culture
- Stools for GI anthrax

61  TREATMENT

Antibiotics-
- Cipro 400 mg IV q 12hrs, continue therapy for 60 days for inhalation anthrax
- Prophylactic- cipro 500 mg PO q 12hrs x 60 days- doxycycline 100mg PO q 12 hrs for cipro intolerance
- Anthrax vaccine not approved for public use (yet) Offered to patients exposed and workers exposed- 3 vaccine injections at 2 week intervals (NSG 2002 Feb p39)
- Adverse reactions to vaccine- fatigue, headache, joint and muscle pains and local reactions that could be mild or severe

62  PLAGUE

- Pneumonitic plague-
- Transmission – as in aerosol cloud – inhalation- person to person through respiratory droplet infection.
- Incubation- 1-6 days
- Dx no tests available

63  PLAGUE

- Sudden attack of illness presenting with severe pneumonia and sepsis.
- Protective Measures
- Aerosol spray remains for only a couple of hours
- Respiratory isolation during the first 48 hrs
- Gown, gloves, eye protection, and mask
- Patients to wear a mask if transported
- Persons with face to face contact-prophylactic antibiotic therapy

64  PLAGUE

- Management
• Streptomycin (drug of choice), or gentamycin IM or IV.
• For mass administration:
  – doxycycline 200mg PO, then 100mg PO q 12 hrs
  – ciprofloxacin 400mg IV q 12 hrs

65 BOTULISM

• Muscle paralyzing disease- toxin- Clostridium Botulinum
• Three kinds occur naturally
  – foodborne,
  – susceptible infants harbor C.botulinum in their intestines
  – wound infections
• Fourth: man made- inhalation- aerosol- not transmitted from person to person
• Recovery weeks to months

66 BOTULISM

• Client presents with s/s similar to ‘Guillian Barre syndrome or Myasthenia Gravis
• Toxins prevent release of acetylcholine presynaptically, thus blocking neurotransmission
• Botulism toxins are the most toxic known

67 Botulism s/s

• Afebrile
• Vision changes – blurring, ptosis etc
• Skeletal muscle paralysis
• Respiratory failure may occur rapidly (24 hours from onset)

68 BOTULISM

• No isolation, not transmitted person to person
• Wash contaminated clothing and items warm water and detergent
• Interventions
  – Early recognition- antitoxin-
  – Supportive- ventilator if needed- monitor for respiratory failure
• Antibiotics not indicated
• Long term Nursing Care

69 Tularemia

• Infectious disease caused by bacterium, Francisella tularensis
• found in animals (especially rodents, rabbits, and hares).

70 Spread of Tularemia

• the bite of an infected insect or other arthropod (usually a tick or deerfly),
• handling infected animal carcasses,
• eating or drinking contaminated food or water, or
• breathing in F. tularensis.
Tularemia
- Francisella tularensis is highly infectious:
- As a bioweapon, the bacteria would likely be made airborne for exposure by inhalation.
- Severe respiratory illness, life-threatening pneumonia and systemic infection,
- Readily available in nature
- Manufacturing an effective aerosol weapon would require considerable sophistication.

Symptoms of Tularemia
- Inhalation could include
  - Sudden fever, chills, headaches, muscle aches, joint pain, dry cough, progressive weakness, and pneumonia.
  - Persons with pneumonia can develop chest pain and bloody sputum and can have trouble breathing or can sometimes stop breathing.

Symptoms of Tularemia
- Ulcers on the skin or mouth, swollen and painful lymph glands, swollen and painful eyes, and a sore throat.
- Symptoms usually appear 3 to 5 days after exposure to the bacteria, but can take as long as 14 days.

Management
- No isolation necessary-
- Tularemia is not known to be spread from person to person,
- Treated as soon as possible.
- The disease can be fatal if it is not treated with the appropriate antibiotics.

Management
- Antibiotic from the tetracyclines (such as doxycycline)
  - Or fluoroquinolone (such as ciprofloxacin) given orally
  - Streptomycin or gentamicin, which are given intramuscularly or intravenously

Tularemia
- A vaccine for tularemia is under review by the Food and Drug Administration and is not currently available in the United States.

Chemical Terrorism
- Chemical agents released with intent to cause harm or death to large numbers of people
- Characteristics of chemical agents include:
– Volatility – tendency to become a vapor
– Persistence – chemical is less likely to vaporize and disperse. Weaponized chemicals are more likely to persist and cause secondary exposure

79 Chemical Terrorism
• Toxicity – potential to cause injury – dose, concentration and time add up to toxicity
• Latency – time from absorption to symptoms
• Chemical weapons have ability to cause painful internal and external injury and death

80 Classes of chemical weapon agents

81 Classes of chemical weapon agents

82 Nuclear Radiation Terrorism
• Types of Radiation Induced Injury
  – External irradiation: all or part of body exposed, not radiation hazard to others
  – Internal irradiation: radioactive material uptake into cells, tissues of body. Occurs through inhalation, ingestion or insertion of radioactive sources. Presents source of contamination to others. Effects felt immediately or years later.

83 Priority in Treatment of Radiation Exposure
• Treat life threatening injuries first
• Limit exposure
  – Time, distance and shielding
• Contamination control
  – decontamination

84 Radiation Decontamination
• Limit movement of persons
• Decontaminate outside hospital-shower until all contaminants have been removed
• Double bag waste
• Staff to wear protective clothing
  – Water resistant gowns
  – Double gloves
  – Masks
  – Caps
  – Goggles
  – Booties
  – dosimeters

85 Acute Radiation Syndrome
• Prodromal Phase (presenting symptoms)
• 48-72 hrs after exposure
• Clinical presentation
  – N/V/D, loss of appetite, fatigue
  – High fever, respiratory distress, ↑excitability
86 Acute Radiation Syndrome

- Latent phase (symptom free period)
- May last up to 3 weeks after prodromal period, if exposed to high dose radiation, period shorter
- Clinical manifestations
  - Decreasing lymphocytes, leukocytes, thrombocytes and red blood cells

87 Acute Radiation Syndrome

- Illness phase (after latent period)
- Clinical presentation
  - Infection
  - F&E imbalances
  - Hemorrhage
  - Diarrhea
  - Altered LOC
  - Shock
  - Recovery may take weeks to months

88 Radiation Survival

- Three categories of predicted survival
  - Probable: no initial or minimal symptoms
  - Possible: N/V that persists for 24-48hrs, latent period, supportive treatment
  - Improbable: high dose radiation, nonresponsive to treatment