Objectives

1. Define key terms introduced in this chapter (slide 11).
2. Explain the mnemonics CBRNE and B-NICE and describe the characteristics of the various types of weapons of mass destruction (slides 11-13).
3. Explain the importance of preplanning a response to terrorism involving weapons of mass destruction (slide 14).
4. Discuss the components that should be included in a plan for responding to terrorism involving weapons of mass destruction (slides 15-19).
5. Recognize indications that a response may involve terrorism with weapons of mass destruction (slides 20-21).

Objectives

6. Describe the EMT’s role when responding to terrorism involving weapons of mass destruction (slides 22-27).
7. Describe types of injuries that may occur from conventional explosives and incendiary devices (slides 28-38).
8. Discuss the effects of exposure to and explain the appropriate medical care for each of the following types of chemical agents (slides 39-58):
   a. Nerve agents
   b. Vesicants
   c. Cyanide
   d. Pulmonary agents
   e. Riot-control agents
   f. Toxic industrial chemicals
Objectives

9. Give examples of biological agents in each of the following categories and the appropriate medical care for exposure to biological agents (slides 59-70):
   a. Pneumonia-like agents
   b. Encephalitis-like agents
   c. Biological toxins
   d. Other agents

10. Differentiate between the characteristics of the following types of radiation (slides 71-73):
    a. X-ray and gamma radiation
    b. Neutron radiation
    c. Beta radiation
    d. Alpha radiation

Objectives

11. Differentiate between primary exposure and fallout associated with a nuclear explosion (slides 74-76).
12. Explain blast injuries and thermal burns as mechanisms of injury from nuclear explosions (slides 76-79).
13. Differentiate between a nuclear weapon and a radiological dispersal device (RDD, or “dirty bomb”) (slides 80-81).
14. Discuss assessment and care of patients affected by nuclear detonation and radiation injuries (slides 82-85).
15. Explain issues of personal protection and patient decontamination in connection with chemical, biological, and radiological/nuclear weapons exposure (slides 86-87).

Topics

- Weapons of Mass Destruction
- Prehospital Response to Terrorism Involving WMD
- Conventional Weapons and Incendiary Devices
- Chemical Agents
- Biological Agents
- Nuclear Weapons and Radiation
- Personal Protection and Patient Decontamination
CASE STUDY

Dispatch

Respond code 3 to the Stambaugh Stadium Complex for a possible explosion and multiple injuries. The fire department and law enforcement have been notified.

EMS Unit 101

Time out 1504

Upon Arrival

- There's a football playoff game today
- You notice that fire has one pumper on the scene
- Masses of people are running from the stadium into the adjacent streets
- You notice many appear to be injured and bleeding
How would you proceed?

Weapons of Mass Destruction

- Cause widespread and indiscriminate death and destruction
- B-NICE
  - Biological
  - Nuclear/radiological
  - Incendiary
  - Chemical
  - Explosive

(© Stephanie Ruet/Corbis Sygma)
Effects largely dependent on delivery method
- Nuclear/explosive weapons may cause massive physical damage
- Biological weapons may kill thousands with little physical damage

May be very difficult to detect
- General approach is same as any other multiple-casualty incident

Prehospital Response to Terrorism Involving WMD
Supplies and Equipment

- Establish community response
- Assess needs based on weapon used and magnitude of incident
- Establish communications early

Medical Direction
Medical Direction

• Avoid on-line medical direction
• Use standing orders
• Reserve closest hospitals for the seriously injured

Provider Preparation

• Make personal safety first priority
• Consider scene hazards, such as possible secondary explosions
• Follow specific guidelines for patient management
Responding to the Scene

- Recognize incident and weapon
- Establish incident command system
- Be aware of secondary explosions or booby traps

Issues of Scene Safety
Issues of Scene Safety

- Identify type of weapon used
- If biological, exposure may have happened days ago
- Approach scene from upwind
- Do not enter scene without appropriate personal protective equipment
- Establish security zone and use only one access point

Role of the EMT at the Terrorist Incident Involving WMD

- Perform a thorough scene size-up
- Early units may assume command roles
- Later units will triage/treat/transport patients
Explosives

- Shock wave in all directions
- Blast rapidly diminishes over distance
- Barriers provide some protection
- Effects amplified in small spaces

(© Ciniglio Lorenzo/Corbis Sygma)
Primary, Secondary, and Tertiary Effects

- **Primary**: blast of the explosion
- **Secondary**: flying debris, shrapnel, and other projectiles
- **Tertiary**: injuries from being thrown by explosion

**Body Position**
Body Position

- Most damage done by standing and facing explosion
- Lying prone facing away from explosion reduces injury

Types of Injuries

- Lungs
- Abdomen
- Ears
- Crush injuries
- Shrapnel injuries
Incendiary Devices

- Primary injury is a burn
- Incendiary chemicals are commonly available in large quantities
- Treat as a thermal burn

Chemical Agents
Properties of Chemical Weapons

• Volatility: tendency of a chemical to evaporate
• Persistence: tendency to remain a puddle and resist evaporation

Types of Chemical Agents

Nerve Agents
Signs and Symptoms

SLUDGE:
- Salivation
- Lacrimation
- Urination
- Defecation
- Gastric distress
- Emesis

Emergency Medical Care

- Focus on airway and ventilation
- Administer antidote of atropine and pralodoxime
- Be prepared for seizures
- Cover patient to prevent further exposure

Types of Chemical Agents

Vesicants
Signs and Symptoms

- Thick, oily, volatile liquid
- May take two to 24 hours for symptoms
- Burning, redness, blistering, and necrosis of the skin
- Stinging, tearing, and development of ulcers in the eyes
- Shortness of breath, coughing, wheezing, and pulmonary edema
- Nausea and vomiting
- Fatigue

Emergency Medical Care

- Immediately and continually irrigate affected areas
- Treat burns as chemical burns
- Apply dry sterile dressing
- Treat eye injuries

Types of Chemical Agents

Cyanide
Signs and Symptoms

- Anxiety
- Weakness
- Dizziness
- Nausea
- Muscular trembling
- Tachycardia
- Tachypnea
- Pale, cyanotic, or normal skin
- Apnea
- Unresponsiveness

Emergency Medical Care

- Appropriately manage airway and breathing
- Provide high-flow, high-concentration oxygen
- If available, administer a cyanide antidote kit
- Treatment is time sensitive

Types of Chemical Agents

Pulmonary Agents
**Signs and Symptoms**

- Tearing
- Runny nose
- Throat irritation
- Dyspnea
- Wheezing
- Cough
- Crackles
- Stridor
- Secretions

**Emergency Medical Care**

- Manage the airway and assure adequate breathing
- Tracheal intubation may be necessary
- Suction secretions
- Prevent exertion
- Administer a beta-2 agonist for wheezing

**Types of Chemical Agents**

**Riot-Control Agents**
**Signs and Symptoms**

- Tear gas and capsicum-based “pepper-spray” cause extreme irritation of the eyes, nose, mouth, skin, and respiratory tract.
- Cause involuntary eye closing from the severe irritation or temporary blindness.
- Irritation usually lasts approximately 30 minutes after exposure.

**Emergency Medical Care**

- Remove patient from contaminated environment.
- Irrigate eyes with saline.
- Remove contacts.
- Provide oxygen therapy via nonrebreather mask at 15 lpm.
- Consider an MDI if wheezing is present.

**Types of Chemical Agents**

**Toxic Industrial Chemicals**
Toxic Industrial Chemicals

- Industrial chemicals are very diverse
- May act like any of the previous chemicals
- Consult a hazmat specialist to identify chemical and decide on best treatment route

Biological Agents

- The same as any other illness except that the harm is intentional
- May be spread by spraying, contact with infected and contagious person, and other simple means such as through the mail
- Often enters through respiratory system
- Aim is to cause an epidemic
Specific Biological Agents

Pneumonia-Like Agents

- Common symptoms are cough, shortness of breath, fever, and malaise
- Anthrax
- Plague
- Tularemia

Specific Biological Agents

Encephalitis-Like Agents
Encephalitis-Like Agents

- Smallpox
- Venezuelan Equine Encephalitis
- Common symptoms are headache, fever, and malaise

Specific Biological Agents

Biological Toxins

- Cannot be passed person-to-person
- Among the most dangerous compounds known to man
- Botulinum
- Ricin
- Staphylococcus
- Enterotoxin 13
- Epsilon toxin
- Trichothecene
- Mycotoxins
Specific Biological Agents

Other Agents

• Five to 50 percent death rate
• Cholera
• Viral hemorrhagic fevers
• Brucellosis

Emergency Medical Care for Biological Agents
Emergency Medical Care

- Recognition is extremely important
- Most are not contagious, but some are
- Always wear a HEPA mask
- Care should focus on maintaining the airway and breathing function
- Administer oxygen
- Best protection is prevention

Nuclear Weapons and Radiation

Radiation
Radiation

- X-ray and gamma radiation
- Neutron radiation
- Beta radiation
- Alpha radiation
- All forms of radiation can be harmful if ingested

Radiation Exposure

- **Primary**
  - Shortly after detonation
  - Limited to blast zone
  - Usually blast is primary concern
- **Fallout**
  - Dust and particles
  - May be far from epicenter
  - Most dangerous within 48 hours of blast

Back to Objectives
Blast Injuries

- Nuclear detonation causes blast
- Much greater close to ground zero
- Windblast may reach 160 mph
- May destroy structures

Thermal Burns
Thermal Burns

- Mechanism causing most deaths and injury
- Very short but very intense heat
- Anything close to detonation is incinerated
- Clothing may ignite and cause flame burns
- Brilliant light flash may cause eye injuries

Radiological Dispersal Devices

- "Dirty Bomb"
- Conventional explosive containing radioactive material
- Used to contaminate an area with radioactive material
- May induce radiation sickness in many people
The farther from the epicenter, the better the chances of survival
Affects multiple body systems
- Bone marrow and blood cells
- Bowel
- Skin
- Nervous and cardiovascular systems
Emergency Medical Care

- Primary concern is for safety
- Move patients perpendicular to wind
- Seek shelter if fallout is a concern
- Manage airway and breathing
- Be aware of emboli and pneumothorax
- Manage burns as thermal burns
- Keep wounds clean
- Consider taking iodine tablets

Personal Protection and Patient Decontamination

- Use same principles as with hazardous materials
- Always wear appropriate protective gear
- Only operate within your level of training
**CASE STUDY**

**Scene Size-Up**
- Football stadium explosion
- Large number of people running from stadium
- Establish command uphill and upwind
- Establish unified command
- Conventional-type bomb

**Follow-Up**

**Scene Size-Up**
- Don protective gear
- Midsection of stadium has collapsed
**CASE STUDY**

Primary Assessment and Triage
- Direct walking patients to triage area
- Use START triage
- Begin evacuating red triage patients from stadium
- Injuries are typical of conventional-type explosive
- Many have penetrating injuries

**CASE STUDY**

Establishing Sectors
- Secondary triage and treatment sector
- Supply sector
- Extrication sector
- Staging sector
- Transportation sector

**CASE STUDY**

Establishing Sectors
- Arriving units sent to either staging or treatment sectors
- Transport of red-tagged patients underway
- 150 people injured
CASE STUDY
Additional Threats
• Specially trained experts now on scene
• No confirmation of chemical weapons
• Concern over secondary explosions

CASE STUDY
Additional Threats
• No evidence of chemical, biological, or nuclear material
• No further explosions go off
• Scene is cleared of all patients

Critical Thinking Scenario
• Dispatched to a local mall for reports of dozens of ill people
• You’re the second EMS unit to arrive
• You find a crowd of approximately 60 people huddled in the parking lot
• People say they heard a loud bang and then many started to cough and choke shortly afterward
Most patients present with the following:

- Shortness of breath and irritation of the throat
- Runny nose, tears, cough, and secretions
- Wheezing and crackles on auscultation of the lungs

Critical Thinking Scenario

1. What is the first action you would take?
2. How would you initially manage the patients?
3. What do you suspect they are suffering from?

Critical Thinking Questions

Reinforce and Review

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