91W10
Advanced Individual Training Course

Nuclear, Biological, and Chemical Handbook

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Academy of Health Sciences
Fort Sam Houston, Texas 78234

TERMINAL LEARNING OBJECTIVE

Given a potential or simulated chemical or biologically contaminated environment.

Individual protection equipment

All soldiers are issued standard "A" chemical defense equipment. This includes a protective mask, battle dress overgarment, chemical protective glove, and chemical protective overboots

CAUTION: Wearing the BDO adds 10-15 degrees F to the body's ambient temperature; therefore, soldiers must maintain an adequate fluid intake both before and during the time of wear. Additional caution must be taken in warmer climates due to the increased risk of heat related injuries.

Battle dress overgarment (BDO)

(1) Characteristics
- (a) Consists of a pair of trousers and a jacket with a charcoal liner
- (b) The outer cloth is specially treated with "scotch-guard" type treatment, to resist liquid chemical agents
- (c) The BDO adds approximately 11 pounds to the weight already carried by the soldier

(2) Wear time
- (a) Uncontaminated environment - minimum of 30 days. The unit commander may extend the wear past the 30 days
- (b) Contaminated environment - 24 hours

Chemical boots

(1) Characteristics - green vinyl over boot (GVO)/Black vinyl overboot (BVO). Worn over combat boots to protect feet from contamination by all known agents, vectors and radiological particles

(2) Wear time
- (a) Uncontaminated environment - 14 days, inspected for serviceability and worn 14 days more if found serviceable
- (b) Contaminated environment - 24 hours, inspected and decontaminated and worn 24 hours more if found serviceable

Protective mask - M40A1

(1) Characteristics
- (a) The M40A1 is designed to protect the wearer from all known chemical and biological agents and riot control agents. When worn correctly, the mask will provide protection for the face, eyes, and respiratory tract
- (b) The mask uses a NATO standard external filter canister that may be positioned on the soldier's right or left cheek to allow him to fire the M16A2 rifle. The filter cannot be exchanged in a contaminated environment
- (c) The only optical insert approved for use in the M40 mask is a wire-frame type

(d) A drinking tube positioned around the outlet valve assembly, allows soldiers to drink from their canteen with an M-1 cap, while in a chemical environment

CAUTION: Both the canteen and coupling half must be checked with M8 paper to ensure they are not contaminated prior to drinking.

(2) Wear time - while in the theater of operations, filters must be replaced at least every 30 days
(3) The filters must be replaced whenever any of the following occurs
  (a) The elements are immersed in water
  (b) The elements are crushed, cut, or damaged
  (c) Excessive breathing resistance is encountered
  (d) After exposure to hydrogen cyanide
  (e) After 30 days in a theater of operations
  (f) When ordered by the unit commander
(4) Protective masks designed for use in tanks, combat vehicles and aircraft are issued as required
(5) The small M17A1 protective mask will only be assigned to soldiers who cannot be correctly fitted with a small M40 mask

Chemical protective gloves

(1) Characteristics
  (a) Butyl rubber with an inner glove made of thin white cotton
  (b) No protection against cold weather injuries
  (c) There are 3 types of gloves
    (i) .025 inch thick - used by soldiers who perform combat tasks
    (ii) .014 inch thick - used by aviators and vehicle mechanics
    (iii) .007 inch thick - used by medical personnel. Allow excellent tactile ability
(2) Wear time
  (a) Uncontaminated environment - can be worn as long as they remain serviceable
  (b) Contaminated environment - wear 24 hours, inspect; if serviceable, decontaminate; reuse. May repeat process every 24 hours
  (c) The .007 inch gloves must be inspected and decontaminated within 6 hours. After inspection, if found serviceable they may be reused

Individual decontamination equipment

M291 skin decontamination kit - is the standard ARMY decon kit
(1) Purpose - to decontaminate the skin
(2) Characteristics
  (a) Each kit contains six applicator packets that utilize a mixture of activated charcoal to absorb and neutralize liquid chemicals on the skin

(b) While decontaminating oneself, a black resin powder is left on the skin to provide visual confirmation of the thoroughness of the application
(c) The resin does not irritate the skin, but use precautions to keep the powder away from wounds, the eyes and the mouth

M295 individual equipment decontamination kit
(1) Purpose - to decontaminate personal equipment
(2) Characteristics
(a) Each kit contains four packets, with one mitt each, that are utilized to remove chemical agents from personal equipment (e.g., M16A2, Kevlar helmet, LBE and M40 mask)
(b) Each mitt contains the same substance found in the M291
(c) Two packets are normally required to completely decontaminate all of a soldier's personal equipment

Patient protective equipment

Patient protective wrap (PPW)
(1) Purpose - to protective the patient during evacuation after the BDO has been removed and the patient has received medical treatment
(2) Characteristics
(a) Designed as onetime use for only one patient
(b) The protective mask is not needed while the patient is in the PPW, but should be evacuated with the patient
(c) A patient can remain in the PPW for up to six hours
(d) Has one continuous zipper around the outer edge for ease of patient insertion
(e) An impermeable, transparent window is located at the head of the wrap for patient observation. Two protected sleeves next to the window permit the passage of IV tubing
(f) A transparent pocket below the window holds the field medical card
(g) Can be carried either by the handles on the side or by inserting poles into the side sleeves

Decontaminable litter - utilized as a replacement for the canvas litter during patient decontamination procedures. The fabric cover is not degraded by decontamination fluids

Detection equipment and alarms

M8 chemical agent detector paper
(1) Purpose - to detect both the presence and specific type of liquid chemical agent
(2) Characteristics
(a) Each soldier carries one booklet of M8 paper in the interior pocket of the protective mask carrier
(b) To use the M8 paper, one-half sheet is blotted onto an unknown liquid. After waiting for 30 seconds, the color change is compared to the colors inside the front cover of the booklet. The colors are as follows

(i) Yellow - G (nerve)
(ii) Red - H (blister)
(iii) Olive green or black - V (nerve)

CAUTION: False positive may be seen if the M8 paper is exposed to liquid insecticide, antifreeze or petroleum products.

M9 chemical agent detector paper

(1) Purpose - to detect the presence of a liquid chemical agent
(2) Characteristics
  (a) Each soldier carries one thirty-foot long by two-inch wide roll of M9 paper
  (b) Procedure for use
    (i) While wearing gloves, one strip is wrapped around the upper arm, the opposite wrists and ankle of the same side as the upper arm, creating a V-shape

WARNING: M9 paper is carcinogenic; therefore, it should not be allowed to come into direct contact with the skin.

(ii) Once the M9 paper comes in contact with a liquid agent, it turns a reddish or pinkish color
(iii) After seeing the color change, the soldier must immediately mask, alert others and, if warranted, proceed with skin decontamination

CAUTION: False positive may be seen if the M9 paper is exposed to liquid insecticide, antifreeze or petroleum products.

M256AI chemical agent detector kit

(1) Purpose
  (a) To detect and identify chemical agents (blood, blister, and nerve) present in either liquid or vapor form
  (b) Also used after a chemical attack to determine if it is safe to unmask
(2) Characteristics
  (a) The M256AI kit consists of the following items
    (i) One booklet of M8 paper, which detects chemical agents in liquid form
    (ii) Twelve detector tickets, which detect chemical agents in vapor form
    (iii) One set of instruction cards
  (b) A complete test using both the M8 paper and the detector ticket takes approximately 20 minutes to perform
  (c) The actual detector tickets for the M256A1 are carcinogenic; therefore, trainer tickets are provided for practical exercises

Chemical agent monitor (CAM)

(1) Purpose - to detect nerve and blister agents in vapor form only

(2) Characteristics
- (a) Operates in two modes, one for nerve, the other for blister
- (b) The intensity of the vapor is displayed as a bar code on the front of the cam

The M8A1 chemical agent alarm

(1) Purpose - to sample the air for the presence of NERVE AGENTS VAPORS ONLY.

(2) Characteristics
- (a) The M8A1 is the only remote continuous air sampling alarm that the U.S. Army currently possesses
- (b) The M8A1 can be located within a hospital complex, with alarm units placed to cover all critical care, treatment and support areas
- (c) The M8A1 has two components
  - (i) M43A1 detector
    - * The M43A1 is the portion that actually detects the vapor agent
    - * One M43A1 can have as many as five M42 alarms attached
  - (ii) M42 alarm
    - * Connected by WD-1 telephone wire to the M43A1 detector unit
    - * The alarm can be set to give an audible, visual, or the combination as a signal

TERMINAL LEARNING OBJECTIVES

Given a standard fully stocked Combat Medic Vest System (CMVS) or fully stocked M5 Bag, oxygen administration equipment (if available). You encounter a casualty with symptoms consistent with chemical agent exposure. All other life threatening injuries have been treated.

Classification and Properties of Vesicants

Classifications

(1) Sulfur mustard (HD)
(2) Lewisite (L)
(3) Phosgene oxime (CX)
(4) Hydrogen Cyanide

Properties

(1) Vesicants as a group are often referred to as "blister agents" due to the fact that blisters often form at the site of exposure
(2) Severity of vesicant damage is affected by the environmental conditions at the time of exposure
  (a) Warm, humid conditions will increase the severity of vesicant damage and shorten the time for symptom onset
  (b) Cold weather can retard the time of symptom onset, and if the exposed skin remains cold, it can lessen the severity of vesicant damage

Effects and Treatments for Sulfur Mustard Agent Exposure

Effects

(1) Mild exposure
  (a) Skin
    (i) Erythema - resembles a sunburn
    (ii) Blisters (later)
    (iii) The fluid contained within a blister will not cause further blister formation
  (b) Eyes
    (i) Itching
    (ii) Tearing
    (iii) Gritty feeling
    (iv) Burning
    (v) Photo phobia
  (c) Respiratory
    (i) Runny nose
    (ii) Sneezing
    (iii) Epistaxis
    (iv) Hoarseness
    (v) Hacking cough
(2) Moderate exposure - eyes
  (a) Reddening of the eye
  (b) Swelling of eyelids
  (c) Moderate pain
(3) Severe exposure
  (a) Eyes
    (i) Severe pain

(ii) Severe edema of the eyelids and conjunctiva
(iii) Corneal damage (e.g., ulcers, opacification)

(b) Respiratory
(i) Productive cough with clear, foamy sputum
(ii) Pulmonary edema
(iii) Cyanosis
(iv) Shock
(v) Cardiac failure

(c) Systemic effects
(i) Destruction of bone marrow's ability to produce RBCS, WBCS, and platelets
(ii) Nausea and vomiting

Treatment

(1) Don protective mask and go to MOPP level 4
(2) Decontaminate exposed skin with the M291 kit
(3) Apply calamine lotion or topical steroid for erythema (done after life-threatening conditions are corrected)
(4) Cover blisters less than the size of a quarter with petrolatum impregnated gauze dressings. If blisters are larger or numerous, evacuate for further treatment
(5) If eyes are affected
(a) Irrigate with saline or water from the casualty's canteen
(b) Place Vaseline on the eyelids to prevent sticking
(c) Do not cover eyes
(d) Evacuate immediately
(6) If respiratory system is affected
(a) Maintain airway
(b) Given humidified oxygen (if available)
(c) Provide mechanical ventilation with supplemental oxygen if needed
(d) Ensure casualty is kept at rest
(e) Evacuate immediately

Record the treatment given on the Field Medical Card

WARNING: Death is mainly a result of sepsis, infection, and pulmonary damage.

Effects and Treatment for Lewisite Agent Exposure

Effects

(1) Eyes
(a) Liquid form will cause rapid and devastating effects to the eye
(b) Pain and blepharospasm (involuntary contraction of eyelid muscles) experienced upon contact
(c) Swelling of the eyelids, conjunctiva and cornea
(d) Eyelids will normally be completely closed within one hour
(2) Skin

(a) Immediate pain which diminishes after blisters form
(b) Necrosis of the epithelium occurs within 5 to 10 minutes with area having a grey appearance
(c) Blisters are usually formed at the exposure site within 12 to 18 hours

(3) Respiratory
(a) Burning sensation of the nasal mucosa
(b) Pulmonary edema

Treatment

(1) Immediate decontamination using the M291 kit
(2) Eyes
(a) Irrigate with saline or water from the casualty's canteen
(b) Place Vaseline on the eyelids to prevent sticking
(c) Do not cover or bandage eyes
(3) Respiratory support
(a) Maintain airway
(b) Given humidified oxygen (if available)
(c) Provide mechanical ventilation with supplemental oxygen if needed
(d) Ensure casualty is kept at rest
(4) Cover blisters less than the size of a quarter with petrolatum impregnated gauze dressings. If blisters are larger or numerous, evacuate for further treatment
(5) Evacuate immediately for further supportive care (e.g., maintenance of fluid balance, nutrition)

Record the treatment given on the Field Medical Card

Effects and Treatment for Phosgene Oxime Agent Exposure

Effects

(1) Skin
(a) Pain on contact from either the liquid or solid
(b) Blanching along with a surrounding ring of erythema occurs 20 seconds after contact
(c) Wheal (similar to a bee sting) occurs within 30 minutes
(d) Necrosis of skin at the site of contact
(2) Eye
(a) Immediate pain
(b) Severe edema of the eyelids and conjunctiva
(c) Corneal Damage

Treatment

(1) Immediate decontamination using the M291 kit
(2) Eyes
(a) Irrigate with saline or water from the casualty's canteen
(b) Place Vaseline on the eyelids to prevent sticking
(c) Do not cover to bandage eyes
(3) Respiratory support

(a) Maintain airway
(b) Given humidified oxygen (if available)
(c) Provide mechanical ventilation with supplemental oxygen if needed
(d) Ensure casualty is kept at rest

(4) Evacuate immediately for further treatment of the necrotic skin

Record the treatment given on the Field Medical Card

(1) Recall the effects and treatment for Phosgene Oxime agent exposure.

Signs, Symptoms and Treatment for Cyanide Exposure (Hydrogen Cyanide), (Blood Agent)

Signs and symptoms of cyanide exposure

(1) Moderate, from low concentrations - within minutes
(a) Transient increase in rate and depth of breathing
(b) Dizziness
(c) Nausea and vomiting
(d) Headache

(2) Severe
(a) Convulsions - within 30 seconds
(b) Respiratory arrest - within 2-4 minutes
(c) Cardiac arrest - within 4-8 minutes

(3) The onset of symptoms may occur so rapidly that the casualty will have expired before the medic has a chance to render care

Treatment

(1) Contaminated environment
(a) Mask self then casualty
(b) Evacuate immediately to treatment facility for cyanide treatment (IV with sodium nitrite and sodium thiosulfate)
(c) Administer positive pressure ventilation, if available

(2) Non-contaminated environment
(a) Maintain casualty's airway
(b) Supplemental oxygen with assisted ventilation (if needed)
(c) Evacuate immediately to treatment facility for cyanide treatment (IV with sodium nitrite and sodium thiosulfate)

Record the treatment given on the Field Medical Card

TERMINAL LEARNING OBJECTIVE

Given a standard fully stocked M5 Bag or Combat Medic Vest System, oxygen administration equipment (if available), and blankets. You encounter a casualty with symptoms consistent with nuclear agent exposure. All other life threatening injuries have been treated.

Describe Nuclear Effects

Describe nuclear blast effects

(1) Initial blast wave
(2) Secondary–Projectiles debris
(3) Tertiary–Impact of being thrown. Wind drag can displace large objects and collapse buildings.

Medical effects from a nuclear detonation

Blast Injuries

(1) Two types of blast forces that occur in a nuclear detonation blast wave
  (a) Direct blast wave overpressure forces
  (b) Indirect blast wind drag forces
(2) Types of injuries
  (a) Primary injuries due to overpressures such as ruptured eardrums and lungs
  (b) Secondary injuries such as lacerations and puncture wounds can occur from primary and secondary missiles and falls and crush from debris
  (c) Concussion Injuries

Blunt injuries

(1) Foreign body impact - heavy, blunt missiles may not penetrate, but can result in significant injury, particularly fractures
(2) Acceleration and deceleration injuries

Thermal Injuries

Flash burns

(1) Thermal radiation travels outward from the fireball in a straight line
(2) Thermal intensity decrease with distance
(3) Close to the fireball, all objects will be incinerated

Indirect (flame) burns

(1) Result from exposure to fires caused by the thermal effects in the environment, particularly from ignition of clothing
(2) Could be the predominant cause of burns depending on the number of and characteristics of flammable objects in the environment
(3) Eye injury: the intense light of a nuclear fireball can cause flash blindness

Radiation Injury

(1) Casualties produced by ionizing radiation alone or with other injuries will be common
(2) Acute Radiation Injury on the Battlefield:

(a) Dose delivered quickly, usually over several minutes
(b) High doses are required for clinically observable effects
(c) Results from external whole body irradiation
(d) Exposure MUST be from gamma or neutrons
(e) Effects appear quickly usually within hours

(3) Acute Radiation Injury experience in man:
(a) Survivors of Hiroshima and Nagasaki
(b) Operation Castle (1954)
(c) Industrial and laboratory accidents
(d) Clinical radiotherapy
(e) Chernobyl

Assessment findings of exposure

Radiation Exposure

(1) Whole-body irradiation
(a) Absorbed doses are high and acquired over short periods of time
(b) Results in acute radiation sickness

(2) Three characteristic syndromes that occur with increasing doses
(a) Hematopoietic syndrome
(i) Low to mid range -lethal dose of radiation
(ii) Depression of bone-marrow function causing anemia
(b) Gastrointestinal syndrome
(i) Very serious prognosis - almost always accompanied by non-recoverable loss of bone marrow
(ii) Short latent period of a few days to a week – characterized by severe fluid loss, hemorrhage, and diarrhea
(c) Central Nervous System (CNS) / Cardiovascular syndrome
(i) Associated with absorbed doses in the lethal range
(ii) Rarely seen since heat and blast effect could cause immediate death
(iii) Latent period is very short - varying from several hours to 1 to 3 days

Mechanism of damage

(1) Cellular sensitivity determines organ and whole body response to a dose of radiation
(2) Cells are listed from MOST radiosensitive to least radiosensitive
(a) Lymphocytes
(b) Epidermal epithelium
(c) Erythrocytes
(d) Nerve cells
(3) Radiation effects at each level of biological organization depend on the killing of cells. As a result, the most sensitive organ system is the blood forming system followed by the gastrointestinal system.

Terminate exposure

Physically remove casualty from contaminated environment

(1) Evacuation removes casualties from the dangers associated with radioactive fallout
(2) Move the casualties perpendicular to the wind direction
  (a) This moves the casualties most quickly to a safe zone
  (b) Be aware that wind directions change frequently
(3) If evacuation is not possible, shelter personnel from fallout and radioactive contamination

Time, distance, and shielding

(1) Time or duration of exposure
  (a) Short duration can still be intense
  (b) The longer the period of exposure the more damage will be done
(2) Distance
  (a) The further away from the epicenter, the less intense the exposure
  (b) Move yourself and the casualty as far away from the epicenter as possible
(3) Shielding is best accomplished by placing as much distance and substance between you and the accumulating radioactive material
  (a) Two inches of steel, 6 inches of concrete, 8 inches of earth and 22 inches of wood will each reduce gamma radiation exposure by 50%
  (b) If fallout is, or you expect it to become, a significant exposure threat, locate or construct a shelter

Provide assessment/treatment for specific exposure

Clinical Course of Radiation Sickness

(1) Initial Stage (before rash and fever)
  (a) Symptoms: Relatively rapid onset of nausea, vomiting, and malaise
  (b) Short duration - generally a few hours
  (c) Incapacitation should not be severe enough to warrant evacuation
(2) Latent Phase
  (a) Relatively symptom-free
  (b) Duration varies with the dose

Symptoms

Frequently occur in the whole-body-irradiated casualties within the first few hours of post exposure

(1) Nausea and vomiting occur with increasing frequency as the radiation exceeds 100-200 cGy
  (a) Onset may be as long as 6-12 hours post exposure

(b) Vomiting within the first hours is associated with fatal doses

(2) Hyperthermia
(a) Significant rise in body temperature within the first few hours of potentially lethal radiation injury
(b) Fever and chills are associated with severe and life-threatening radiation dose

(3) Erythema - redness or inflammation of the skin or mucous membranes that is the result of dilation and congestion of superficial capillaries
(a) Developed within the first day of post exposure if casualty received a whole-body dose of more than 1000-2000 cGy
(b) Erythema is restricted to the affected area
(c) Less frequently seen as a symptom if the dose is lower but still in the potentially fatal range

(4) Hypotension
(a) A noticeable decline in systemic blood pressure if received lethal dose of whole-body radiation
(b) Severe hypotension after irradiation is associated with a poor prognosis

(5) Neurologic Dysfunction
(a) Almost all person who demonstrate obvious signs of damage to the central nervous system within the first hours post exposure have received a lethal dose
(b) Symptoms include mental convulsion, convulsions, and coma

Triage

A mass casualty situation is developed by a nuclear attack

(1) Immediate treatment group (T1). Those requiring immediate lifesaving surgery. Procedures should not be time-consuming and should concern only those with a high chance of survival, such as respiratory obstruction and accessible hemorrhage.

(2) Delayed treatment group (T2). Those needing surgery, but whose conditions permit delay without unduly endangering safety. Life-sustaining treatment such as intravenous fluids, antibiotics, splinting, catheterization, and relief of pain may be required in this group. Examples are fractured limbs, spinal injuries, and uncomplicated burns.

(3) Minimal treatment group (T3). Those with relatively minor injuries who can be helped by untrained personnel, or who can look after themselves, such as minor fractures or lacerations. Buddy care is particularly important in this situation.

(4) Expectant treatment group (T4). Those with serious or multiple injuries requiring intensive treatment, or with a poor chance of survival. These patients receive appropriate supportive treatment compatible with resources, which will include large doses of analgesics as applicable. Examples are severe head and spinal

injuries, widespread burns, or high doses of radiation; this is a temporary category.

The physician should make a preliminary diagnosis of radiation injury only for those casualties for whom radiation is the sole source of the problem

This is based on:

(1) Appearance of nausea
(2) Vomiting
(3) Diarrhea
(4) Hyperthermia
(5) Hypotension
(6) Neurologic dysfunction

Provide emergency medical care

Decontamination

(1) Soldiers from fallout areas may have fallout on their skin and clothing
(2) Soldier will not be radioactive, but may suffer radiation injury from the contamination
(3) Removal of the contamination
  (a) Should be accomplished as soon as possible, definitely before admission into a clean treatment area
  (b) Decontaminate the casualty's hood
  (c) Cut off the casualty's hood
  (d) Decontaminate the casualty's mask and exposed skin
  (e) Remove the casualty's Field Medical Card (FMC)
  (f) Remove gross contamination on the overgarment by wiping all visible contamination spots with a sponge soaked in 5% solution
  (g) Remove the casualty's protective overgarment jacket
  (h) Remove the casualty's protective overgarment trousers
  (i) Remove the casualty's butyl rubber gloves
  (j) Remove the casualty's protective overboots
  (k) Remove and secure the casualty's personal effects
  (l) Remove the combat boots following the same procedures as for removing the protective overboots
  (m) Cut off the casualty's battle dress uniform (BDU)
  (n) Cut off the casualty's undergarments
  (o) Remove the casualty's glove inner liners
  (p) Remove the casualty's socks
  (q) Decontaminate the casualty's ID tags
    (i) Decontaminate your butyl rubber gloves in the 5% solution
    (ii) Wipe the ID tags with the 0.5% solution
  (r) Move the casualty to the skin decontamination area
  (s) Perform spot skin decontamination

(i) Spot decontaminate potential areas of contamination with the M258A1 or M291 Skin Decontaminating Kit or the 0.5% solution
(ii) Pay particular attention to areas where gaps exist in the MOPP gear, such as the neck, lower part of the face, waistline, wrists, and ankles
(iii) Briefly wash or brush exposed skin (this will reduce 99 percent of contamination)

(t) Remove field dressings and bandages
(u) Decontaminate any splints
(v) Transfer the casualty to the shuffle pit

Treatment for Radiation Injury

(1) Start IV
(2) Administer antibiotics where appropriate
(3) Management of infection

Management of soldiers injured from the immediate effects of nuclear weapons

Flash, blast, thermal are the same as for conventional battlefield injuries - severity may be increased

(1) A burn is a burn regardless of whether it is caused by a nuclear explosion or by napalm and its management remains the same
(2) True of fractures, lacerations, mechanical injuries, and shock
(3) For most of the conventional injuries, standard first-aid procedures should be followed.
(4) Thermal Burns: (See Treat a Casualty with a Burn Injury
(a) Dressings for wounds and burns should follow a closed-dressed principle, with application of an adequate sterile dressing using aseptic techniques
(b) DO NOT close the wound, regardless of its size, unless authorized by a physician
(c) If signs of infection and fever develop, give antibiotics
(d) Overwhelming infection can develop rapidly from a burn caused by radiation
(e) Good nursing care and aseptic control of all procedures is a must; casualties should get plenty of rest, light sedation if they are restless or anxious, and a bland, nonresidue diet
(5) Penetrating injuries
(a) Fractured limbs Refer to Treat a Casualty with a Musculoskeletal Injury
(b) (b) Possible spinal injury Refer to Treat a Casualty with a Spine Injury
(c) (c) Head and torso. Refer to Treat a Casualty with a Head Injury and Treat a Casualty with a Chest Injury
(6) Pressure Trauma
(a) Breathing difficulty
(i) Edema
(ii) Fluid accumulation

(iii) If pulmonary embolus suspected place casualty head down on left side
(iv) Watch for developing dyspnea and possible tension pneumothorax: Consider plural decompression

NOTE: If any lung pressure injury signs are present consider the administration of 100% oxygen. (If available)

(b) Ear and bowel Injury
(i) Require supportive care only
(ii) Ear pain/hearing loss keep ear canals clean and suspect lung damage

NOTE: Hollow organs and open air spaces are more susceptible to barotrauma.

(iii) Bowel injuries present as abdominal pain
(iv) Consider limited duty of casualties with diminished hearing loss

(7) Radiation exposure considerations
(a) Consider antibiotic therapy and rehydration
(b) Keep other wounds clean
(c) Consider irrigation
(d) Apply sterile dressing if required

(8) Flash Injury

NOTE: When administering Morphine Sulfate, be aware of the indications and contraindications of this drug as they relate to burns. Indications: Severe acute or chronic pain, relieved dyspnea of acute left ventricular failure, pulmonary edema, and pain of a Myocardial Infarction (MI). Contraindications: Hypersensitivity to opiates, increased intracranial pressure, convulsive disorders, bronchial asthma, and respiratory depression, diarrhea caused by poisoning until the toxic material has been eliminated.

NOTE: Changes in fluid volume and tissue blood flow make absorption of any drug given intramuscularly or subcutaneously unpredictable. The intramuscular or subcutaneous routes should not be used and narcotics should only be given intravenously and in doses no larger than those needed to control pain.

Depleted Uranium (DU) Awareness

Characteristics

(1) DU is a heavy metal, that is 60% as radioactive as natural uranium found in the soil.

(2) Nuclear Fuel Cycle and Enrichment. It is termed “depleted„ because it is the waste that is left from the enrichment process of natural uranium. Natural uranium has three major isotopes (U-234, U-235, and U-238). The U-234 and U-235 are extracted from natural uranium ore to be used a nuclear of fission based fuel. The U-238 can not be used for reactor fuel or weapons grade uranium, thus is considered waste. About 99% of uranium ore is U-238, the other 1% is the most radioactive component of the ore.

(3) DU is very dense metal, about 1.6 times greater than lead.

(4) DU can be easily machined or working into different shapes. This allows it to be "molded" and fabricated for many industrial situations that require a very dense material.

Properties

(1) Chemically, DU is the same as natural uranium. It is a heavy metal, just like mercury, lead, or tungsten.

(2) DU is pyrophoric. DU will readily ignite when it strikes a target. This property is what eyewitness accounts of DU hits described as the enemy vehicle being engulfed in flame.

NOTE: DU is NOT fissionable material. It will no go critical regardless of the quantity or its configuration. All fissionable material (U-234/235 has been removed). DU rounds are not explosive, nor will they create a nuclear explosion when they hit a vehicle. They use their mass, properties, and high rate of velocity to penetrate vehicle’s armored skins (punches through).

Identification

(1) Spent Penetrator:

- (a) Rod shaped. If the penetrator is intact and has not impacted with a hard target, it may retain its original shape.
- (b) Color may be silver, green-black, black, or black-gold
- (c) Tungsten or other metals may be used as penetrators. These may look the same as the depleted uranium penetrator. The only way to POSITIVELY identify a DU penetrator is with a RADIAC meter. ASSUME ALL PENETRATORS FOUND TO BE DU.

(2) Burning Vehicles

- (a) M1A1 Abrams MBT may have depleted uranium in their armor plating. When penetrated, there may be DU in the smoke. Of course, DU will be in the air on the inside of the tank when it is hit and penetrated.
- (b) Any vehicle hit and penetrated with DU munitions may have the same conditions as above.

TERMINAL LEARNING OBJECTIVE

Given a standard fully stocked Combat Medic Vest System (CMVS) or fully stocked M5 Bag, IV administration equipment and fluids, oxygen, suction and ventilation equipment (if available), selected medications, documentation forms and personal chemical protective equipment. You encounter a casualty with symptoms consistent with biological agent exposure. All other life threatening injuries have been treated.

Identify Potential biological warfare agents and their characteristics

Potential Agents

Biological agents that may be used as weapons can be classified as follows:

(1) Bacteria-are small free-living organisms
(2) Viruses-are organisms which require living cells in which to replicate
(3) Rickettsiae-are microorganisms which have characteristics common to both bacteria and viruses carried by parasites
(4) Chlamydia-are obligatory intracellular parasites incapable of generating their own energy source
(5) Fungi- are primitive plants, which do not utilize photosynthesis, are capable of anaerobic growth, and draw nutrition from decaying vegetable matter
(6) Toxins- are poisonous substances produced and derived from living plants, animals, or microorganisms; some toxins may also be produced or altered by chemical means

Characteristics of biological agents

Intrinsic features of biological agents that influence their potential for use as weapons include-

(1) Infectivity -Reflects the relative ease with which microorganisms establish themselves in a host species
(2) Virulence -Reflects the relative severity of disease produced by the agent
(3) Toxicity -Reflects the relative severity of illness or incapacitation produced by a toxin
(4) Pathogenicity -Reflects the capability of an infectious agent to cause disease in a susceptible host
(5) Incubation period -Reflects the time between exposure to an agent or toxin and the appearance of symptoms
(6) Transmissibility -Reflects the relative ease in which an agent is passed from person to person
(7) Lethality -Reflects the relative ease in which an agent causes death in a susceptible population
(8) Stability -Reflects an agents ability to remain viable when exposed to environmental factors, including temperature, relative humidity, atmospheric pollution, and sunlight
(9) Additional factors - Suitability of a microorganism or toxin for use as a weapon may be influenced by factors such as ease of production; stability when stored or transported; and ease of dissemination

Potential Methods and Optimum Times for Dissemination of Biological Agents

Potential methods of dissemination

(1) Aerosol - live microorganisms can be introduced into the air in a wet aerosol. The use of an aerosol is considered more likely than any other method

(2) Large liquid drops - using large liquid drops of agent, usually toxins, will cause ground contamination which is similar to a persistent chemical agent

(3) Arthropod vector - least likely to be used because
- (a) Cost of producing the vectors
- (b) Controlling the vectors after their release
- (c) Natural predators that might destroy the vectors

(4) Covert - use of a biological agent by a terrorist group is a potential threat against
- (a) Large population centers
- (b) Military targets
- (c) Political targets

The same routes of entry pertinent to natural spread of diseases are also relevant when their etiologic agents are delivered intentionally by weapons.

Aerosol delivery of an agent or toxin could result in exposure through one or more of the following routes

(1) Respiratory exposure
- (a) Aerosol delivery systems aim to generate invisible clouds with particles or droplets between .5 and 10 microns in diameter
- (b) Inhalation of agent aerosols provides a direct pathway to the systemic circulation
- (c) Natural process of breathing causes a continuing influx of biological agent to exposed individuals

(2) Ingestion. Food and water supplies may be contaminated by an aerosol delivered attack. Consumption could result in exposure and disease.

(3) Dermal exposure. Intact skin provides an excellent barrier against infection. Mucous membranes and damaged skin constitute breaches in this normal barrier through which agents may pass.

Contamination of food and water

Direct contamination of consumables, such as drinking water, food stuffs of medications could be used as a means to disseminate infectious agents or toxins

(1) Most likely be the result of sabotage efforts used against military units or bases

(2) Filtration and chlorination significantly reduces this hazard in regards to water supplies

(3) Arthropod vector releases; can be used to release infected natural and unnatural arthropod hosts such as mosquitoes, fleas, or ticks

Optimum time for dissemination

The hours between dusk to dawn present the optimum time for dissemination for the following reasons:

(1) Inactivation of biological aerosols by ultraviolet radiation is minimal
(2) Prevailing atmospheric conditions allow an agent cloud to travel great distances

Categories and Definitions of Biological Agents

Pathogens

Are disease producing microorganisms, such as bacteria, mycoplasma, rickettsia, fungi, or viruses. Carried by arthropods, rodents, monkeys, or man

Toxins

Are poisons naturally produced through the activities of living organisms. Produced by plants, microorganisms and animals

Other agents of biological origin

(1) The human body has a very small quantity of biological agents
(2) For example: bioregulators/modulators (BRM) can be small molecules or peptides that act as neurotransmitters and/or modifiers of neural responses
(3) If introduced in large quantities, will cause severe adverse effects or death

Indicators of a Biological Warfare Attack

The U.S. Army does not have equipment that will detect and identify biological agents

All soldiers need to be aware of certain indicators that indicate an attack is occurring or has occurred

(1) Mysterious illness in both the soldier and civilian population which approaches epidemic numbers
(2) An unusual, unknown, or uncommonly seen disease or syndrome for the particular geographical area
(3) Large number of insects that are unusual, unnatural for the area, or have significantly increased in number
(4) Deaths of animals in the region from unknown causes or from the same diseases as human victims
(5) Mist or fog sprayed by slow moving aircraft or helicopter
(6) Artillery shells which detonate with less powerful explosions than HE rounds
(7) Aerial bombs that pop as opposed to exploding

Methods of Defense Against a Biological Agent Attack

Pre-attack

(1) Ensure all soldiers have updated routine immunizations and immunize them against the specific anticipated biological threat, if an immunization exists for the particular agent(s). Medical intelligence agencies will provide warnings as needed
(2) Maintain personal hygiene and physical fitness

(3) Maintain field sanitation guidelines

During attack

(1) Reduce respiratory exposure by donning the M40 series protective mask
(2) Wear the battle dress overgarment, chemical protective boots, and gloves
(3) Utilize a protective shelter that has a filtered air supply

Post-attack - decontamination

(1) Personnel - decontaminate exposed skin with the M291 decontamination kit or use warm soapy water to remove the agent
(2) Equipment - use M295 individual equipment decontamination kit or the M11, M13 portable decon apparatus
(3) Food and water - seal or box foodstuffs and boil water for 15 minutes

Actions after a Biological Agent Attack

Continue mission only if it will not spread the contamination to non-exposed personnel

Identify the agent

(1) To institute a specific treatment
(2) To institute measures to control the exposure
(3) To confirm that an attack occurred
(4) To estimate time of exposure
(5) To estimate number of possible casualties
(6) To get intelligence as to the enemy's biological capability

Administer medical treatment

(1) Monitor and support both cardiac and respiratory functions
(2) Treat for shock
(3) Administer appropriate therapy and/or medication if the specific agent is known and the medication is available
(4) Protect patient from further biological agent exposure
(5) Complete the field medical card
(6) Evacuate the patient
    (a) Notify the evacuation personnel at the battalion aid station (BAS) of the biological casualty
    (b) Ensure that both the patient and evacuation personnel are in protective clothing
    (c) The patient will be treated and held at the BAS to prevent further spreading of the contamination

TERMINAL LEARNING OBJECTIVE
Given a scenario involving a Casualty Decontamination Station (CDS).

Components, Function(s), Location, Description, and Equipment of a Casualty Decontamination Station (CDS)

Triage station
- (1) Function - to receive patients from the ambulance and conduct triage
- (2) Location - area located near the contaminated ambulance drop off point
- (3) Description
  - (a) Senior medic oversees the unloading of the ambulances, performs triage, stabilizes patients, and provides treatment
  - (b) Personnel in MOPP level 4
  - (c) Ambulatory patients routed through a parallel decontamination line. Non-medical personnel is assigned to assist ambulatory patients with decon process
- (4) Equipment
  - (a) M8 chemical detection paper
  - (b) M9 chemical detection paper
  - (c) Chemical agent monitor

Contaminated emergency treatment area (CETA)
- (1) Function - to stabilize patients with life threatening injuries prior to decontamination
- (2) Location - optional area, adjacent to the triage station
- (3) Description
  - (a) Senior medic oversees the unloading of the ambulances, performs triage, stabilizes patients, and provides treatment
  - (b) Personnel in MOPP level 4
  - (c) Ambulatory patients routed through a parallel decontamination line. Non-medical personnel is assigned to assist ambulatory patients with decon process
    - (i) If CETA is used, a second medic (not senior) will perform patient treatment
    - (ii) Patient must be stabilized prior to being decon
- (4) Equipment
  - (a) M8 chemical detection paper
  - (b) M9 chemical detection paper
  - (c) Chemical agent monitor
  - (d) Suction apparatus (battery operated and manual)
  - (e) Oxygen tank with a delivery system
  - (f) Airway adjuncts
  - (g) Resuscitator, hand operated
  - (h) Field dressing, cravats, and tourniquets
  - (i) Nerve agent antidote kits
  - (j) Atropine auto injectors
  - (k) Convulsant antidote nerve agent injectors
  - (l) IV supplies (Fluids, tubing, catheters, iodine pads, tape, constricting bands)

Decontamination area

(1) Function - consists of a clothing removal station and a skin decontamination station
  (a) Clothing removal station - removal of all clothing and equipment, except for protective mask, dressings, bandages, splints, and tourniquets
    (i) Clothing and equipment are cut one layer at a time
    (ii) After clothing has been removed, the litter patient is transferred to a decontamination litter via a three-person log roll
  (b) Skin decontamination station - completely decontaminate the patient's skin and protective mask
    (i) Decontaminate or replace medical items such as the protective mask, dressing, bandages, splints, and tourniquets
    (ii) Calcium hypochlorite - 0.5% is used to decontaminate the skin and 5% is used for clothing and equipment
(2) Location - on "dirty" side of the "hot line"
(3) After skin decontamination, the patient is checked with M8 paper or the CAM, then moved to the shuffle pit
(4) Description
  (a) All activities in this area are overseen by one medic
  (b) Non-medical personnel are utilized to perform the functions in this area
  (c) Areas must be set aside for the storage of decontamination litters and waste receptacles
  (d) Personnel are dressed in MOPP level 4 and wear butyl rubber aprons over their battle dress overgarments to protect themselves from the patient's contamination
(5) Equipment
  (a) Each station has two litter support stands
  (b) Two personnel are assigned for each litter stand that is set up
  (c) Two buckets - one with 0.5% chlorine (Cl) solution for all skin decontamination and the other with 5% chlorine solution personal equipment
  (d) One sponge per bucket
  (e) A minimum of two pairs of 7.25" angled bandage scissors per station
  (f) Chemical protective gloves for each soldier
  (g) Butyl rubber apron for each soldier
  (h) M8 chemical detection paper booklets

Shuffle pit

(1) Function - litter exchange from contaminated to uncontaminated side
  (a) Patient is then retriaged by the senior medic of the clean side

(b) The field medical card is copied on the "clean" side, and the "dirty" one is destroyed

(2) Location - actual line between the clean treatment and the decontamination areas

(3) Description
- (a) The medic located on the uncontaminated side supervises personnel at the shuffle pit
- (b) Area is large enough so that both the litter bearers can completely stand within its boundaries. It is dissected in half by an imaginary line referred to as the "hot line"
- (c) The hot line separates the dirty side from the clean side. Contaminated personnel and equipment are not allowed to cross the hot line
- (d) The top 3-6 inches of the surface soil in the shuffle pit is mixed with super tropical bleach (STB), at the ratio of two parts STB to three parts soil

(4) Equipment
- (a) Litter stands
- (b) Super tropical bleach

Treatment area

(1) Function - consists of a clean treatment area and a collective protective shelter
- (a) Clean treatment area - to re-triage casualties by the clean side medic
- (b) Collective protective shelter (CPS) - MD/PA treats patients with serious injuries

(2) Location - between shuffle pit and evacuation area on the clean side

(3) Description
- (a) Clean treatment area - treat the ambulatory patients with minor injuries and send them to disposition point for evacuation rearward or returned to duty
- (b) Collective protective shelter (CPS)
  - (i) Patients are routed directly to the CPS from the shuffle pit if they have serious injuries
  - (ii) MD/PA located in CPS provide care
  - (iii) Patients enter and exit through an air lock so as to keep contamination out of the CPS. Personnel inside the CPS are in MOPP level 0. The CPS can be an open-air facility with overhead cover that is at least 45-50 meters upwind from the shuffle pit. Patients leaving the CPS will be in patient protective wrap

(4) Equipment - no special equipment required

Evacuation/holding area

(1) Function - patient waiting area for evacuation to rearward medical facility

(2) Location

(a) Area is placed under a cover which overlaps both the clean treatment area and the CPS
(b) The clean ambulance pickup point is located upwind of the evacuation/holding area

(3) Description - patient waiting area for evacuation
(4) Equipment - no special equipment required

Triage Considerations and Categories

Triage considerations

(1) The senior medic performs triage on all the patients immediately upon arrival at the CDS
(2) All patients are screened with the chemical agent monitor to determine the following
(a) If an exposure to a chemical agent has occurred
(b) The type of chemical agent exposure
(3) Patients that are not contaminated are routed directly to the clean treatment area

Triage categories

(1) Immediate
(a) Patient has signs and symptoms of severe, life-threatening wounds or injuries without any chemical injuries
(b) Signs and symptoms may include - shock; burns on the face, neck, hands/feet, perineum, genitalia; obstructed airway; respiratory failure
(2) Chemical immediate
(a) Patient has signs and symptoms of life-threatening chemical injuries without any conventional injuries
(b) Signs and symptoms may include - labored breathing, coughing, vomiting, profuse sweating, weak pulse, and marked salivation
(3) Delayed
(a) Patients with conventional injuries that are not life-threatening. Also, they exhibit mild signs and symptoms of chemical agent poisoning
(b) Signs and symptoms may include - severe eye injuries, open wounds to the chest without respiratory distress, open/penetrating abdominal injuries without shock, open wounds/fractures, and second/third degree burns over 20% of the body
(4) Minimal
(a) Patient has no signs and symptoms of chemical agent poisoning, but they do have minor conventional injuries
(b) Following are examples of patients in this category - sprains, strains, closed fractures, minor lacerations and contusions, minor combat stress, individuals that only require treatment by the medic, individuals that can be returned to duty within 48-72 hours, and individuals that can receive full treatment at CDS

Expectant

(a) Patients whose injuries are so extensive that even if they were the only casualty and had the benefit of intensive and thorough medical treatment, their survival would still be unlikely

(b) Examples of these types of injuries would be - Massive head injuries with signs of impending death, second/third degree burns over more than 85% of the body, cardiac arrest patients (unless personnel resources are available to assist them), and patients with both severe chemical agent poisoning and conventional life-threatening injuries

TERMINAL LEARNING OBJECTIVE

You are supervising the contaminated side of an established chemical decontamination station. Medical personnel and nonmedical augmentees are in MOPP level 4. Chemically contaminated casualties have been triaged by the senior medic and have been routed to your area for decontamination. Necessary materials and equipment: M291 decontamination kit, 5% chlorine solution, 0.5% chlorine solution, butyl rubber aprons, butyl rubber gloves, stainless steel buckets, cellulose sponges, water source, plastic bags, litters, litter stands, bandage scissors, M8 chemical detection paper, chemical agent monitor (CAM), contaminated disposal containers, bandages, gauze, and tourniquets.

Definition and Principles of Decontamination

Definition

(1) Contamination - the deposition and/or absorption of biological or chemical agents, or radiological material on or by structures, areas, personnel, or equipment

(2) Decontamination - removal or neutralization of hazardous levels of nuclear, biological, or chemical contamination from personnel and material

Reasons for Decontamination

(1) Lethality - Some kinds of contamination are so lethal that they can kill or incapacitate if they contact exposed skin for only a few minutes

(2) Performance degradation - Mission oriented protective posture (MOPP) gear provides protection but also reduces efficiency
- (a) Creates awkwardness
- (b) Tires and discourages soldiers
- (c) Reduces efficiency
- (d) Reduces field of view
- (e) Resting and sleeping are difficult
- (f) Soldiers cannot eat
- (g) Urinating and defecating are potentially dangerous
- (h) Reduces command, control, and communications (C3)

(3) Equipment limitations - Although MOPP gear will provide protection from most chemical and biological agents, it cannot protect the soldier forever.
- (a) Contamination will eventually penetrate
- (b) Water, fuel, grease, and oil could defeat the protection qualities.
- (c) Provides little direct protection from radiological contamination
- (d) Equipment must be decontaminated in order to be used.

(4) Spread - Unless decontamination is done early, contamination will spread and cause a more extensive hazard
- (a) Soldiers climbing in and out of vehicles
- (b) Contaminated equipment evacuated for repair
- (c) Contaminated supplies and ammunition flowing forward

Principles of Decontamination

(1) Decontaminate as soon as possible
  (a) The most important principle
  (b) The sooner the contamination is removed, the sooner MOPP levels can be reduced and combat potential restored
(2) Decontaminate only what is necessary - Consider the following factors:
  (a) Mission
  (b) Time available
  (c) Degree of contamination
  (d) Length of time the unit has been in MOPP 4
  (e) Decontamination assets available
(3) Decontaminate as far forward as possible
  (a) Keep equipment on or near the operational area
  (b) Allows decontamination to begin earlier
  (c) Limits the spread of contamination to other areas
(4) Decontaminate by priority
  (a) Mission essential first
  (b) Nonmission essential last

Decontaminants

Natural decontaminants

Natural decontaminants are readily available and frequently occurring in nature and are generally employed in field expedient methods of decontamination

(1) Water - Flush contamination from surfaces with large quantities of water
  (a) Used for - nuclear, biological, and chemical
  (b) Cautions - effective in physically removing contamination but does not neutralize the contamination
(2) Steam - accompanied by scrubbing is more effective than the use of steam alone.
  (a) Used for - nuclear, biological, and chemical
  (b) Cautions - effective in physically removing the contamination. However, contamination may not be neutralized.
(3) Absorbents - used to physically remove gross contamination from surfaces
  (a) Used for - chemical removal
  (b) Cautions - The absorbent becomes contaminated and must be disposed of accordingly
  (c) Examples - earth, sawdust, ashes, rags, and similar material
(4) Sealants - used to physically seal in or shield contamination
  (a) Used for - nuclear, biological, and chemical
  (b) Cautions - break in the surface of the sealant will expose the contamination. Contaminated areas covered with sealants must be marked with appropriate NBC warning signs.

(c) Examples - concrete, asphalt, earth, paint, and similar materials

Standard decontaminants

Standard decontaminants are most often used and are available through the supply system and are stocked for contingency operations

(1) STB (supertropical bleach) - a mixture of chlorinated lime and calcium oxide (white powder) with 30 percent available chlorine
  (a) Effective against
    (i) Nerve agents, both V and G series
    (ii) Blister agent, lewisite only
    (iii) Biological agents
  (b) Gives off toxic vapors on contact with G agents.
  (c) A 30-minute contact time is required.
  (d) Corrosive to most metals and injurious to most fabrics (thorough rinse required; metal surfaces must be oiled afterwards)

(2) DS2 (decontaminating solution #2) - a mixture of 70% diethylenetriamine (DETA), 28% 2-methoxyethanol (methyl cellosolve), and 2% sodium hydroxide
  (a) Effective against
    (i) All known chemical agents
    (ii) Biological agents (except spores) with sufficient contact time
  (b) Available in 1 1/3 quart cans, 14 liter containers, or in 5-gallon drums
  (c) A protective mask and rubber gloves must be worn when using DS2 (extremely irritating to skin) (MOPP 4).
  (d) Ignites spontaneously on contact with STB and HTH (calcium hypochlorite)
  (e) Corrodes aluminum, cadmium, tin, and zinc; softens leather; may soften, remove, and discolor paints
  (f) Can be used in temperatures down to 25° Fahrenheit
  (g) Thirty minutes contact time for VX or 8-10 minutes for mustard and G agents

(3) Other standard decontaminants include:
  (a) Mask the sanitation solution calcium hypochlorite (HTH); effective against chem/bio agents
  (b) Soaps and detergents - When they are mixed with (hot) water, they are effective against nuclear and chem/bio agents

Nonstandard decontaminants

Nonstandard decontaminants are not frequently used. Some of these items can be found in the open market and available in the supply system but for other primary purposes. They may be utilized for decontamination.

(1) Caustic soda (sodium hydroxide)
(2) HTH (calcium hypochlorite) or HTB (high-test bleach)
(3) Bleach (sodium hypochloritehousehold bleach)
(4) Washing soda (sodium carbonate)
(5) Organic solvents (gasoline, kerosene, diesel, and alcohol)
(6) Acids (sulfuric, hydrochloric, and acetic acids)

Decontaminate the casualty

Decontaminate the casualty's hood
Cut off the casualty's hood
Decontaminate the casualty's mask and exposed skin
Remove the casualty's Field Medical Card (FMC)
Remove gross contamination on the overgarment by wiping all visible contamination spots with a sponge soaked in 5% solution
Remove the casualty's protective overgarment jacket
Remove the casualty's protective overgarment trousers
Remove the casualty's butyl rubber gloves
Remove the casualty's protective overboots
Remove and secure the casualty's personal effects
Remove the combat boots following the same procedures as for removing the protective overboots
Cut off the casualty's battle dress uniform (BDU)
Cut off the casualty's undergarments
Remove the casualty's glove inner liners
Remove the casualty's socks
Decontaminate the casualty's ID tags

Nuclear, Biological and Chemical
Appendix A
NBC Equipment Overview Skill Sheets

NBC Equipment Overview

Enemy has capability to employ nuclear, biological, and chemical weapons. Unit is at MOPP 0 unless intelligence indicates MOPP 1 is necessary. Effective downwind messages and chemical downwind messages are being received. This task is always performed in MOPP 4.

Medical platoon prepares for NBC environment without interruption of the mission. Medical platoon takes actions necessary to minimize effects of friendly nuclear blast within 30 minutes prior to detonation.

NBC Equipment Overview
Soldiers Name: _____ SSN: _____ CO: _____ TM: _____
Start: _____ Stop: _____ Initial Evaluator: _____
Start: _____ Stop: _____ Retest Evaluator: _____
Start: _____ Stop: _____ Final Evaluator: _____

		1st	2nd	3rd
a.	Leaders issue NBC defense equipment. (1) Issue to each soldier individual NBC defense equipment authorization by TOE and application common table of allowances (CTA). (2) Check to ensure that unit NBC defense equipment authorized by TOE and applicable CTA is operational and is issued to designated, trained, and knowledgeable operators. (3) Identify shortages, and take replacement action. (4) Fill decontamination apparatus.	P / F	P / F	P / F
b.	Medical platoon member check M258A1 kit. (1) Check components to ensure expiration dates have not been reached. (2) Check to ensure kit contains a minimum of five samplers -- detectors, instruction card, and NBC M8 paper.	P / F	P / F	P / F
c.	Leaders adjust operations based on the situation. (1) Check to ensure subordinates are equipped to comply with MOPP level. (a) Each soldier carries protective mask with hood, skin decontamination kit, and detector paper. (b) In MOPP 0, the soldier carries or stores nearby mask, overgarment, overboots, and gloves. (c) In MOPP 1, the soldier wears overgarment with M9	P / F	P / F	P / F

	paper affixed and carries overboots, gloves and mask. (2) Inform ambulance teams of location of protective shelters. (3) Direct platoon members to harden positions (a) Improve fox holes and bunkers. (b) Locate natural and man-made features which provide protection (4) Check to ensure M13 decontamination apparatus if full. (5) Fill decontamination apparatuses. (6) Identify shortages of NBC equipment and request resupply as needed. (7) Enforce field sanitation measures.			
d.	Medical platoon members prepare for nuclear attack. (1) Warn personnel. (2) Medical platoon members place vehicles and equipment in a position that provides the best terrain shielding. (3) Turn off and disconnect nonessential electronic equipment. Tie down essential antennas and take down nonessential antennas and antenna leads. (4) Improve shelters giving consideration to blast, thermal, and radiation effects. (5) Zero dosimeters, if available. (6) Secure loose, flammable, explosive items, food, and water containers. Protect them from nuclear weapon effects. (7) Leaders check to ensure individuals know the appropriate action if an attack occurs. (8) Leaders conduct periodic monitoring. (9) Take additional actions	P / F	P / F	P / F

	consistent with the tactical and medical situation.			
e.	Medical platoon members prepare for a chemical attack. (1) Leaders warn teams. (2) Determine and follow MOPP-level guidance. (a) Ensure all individuals are at or above required MOPP-level (b) Adjust levels based on weather, work rate, and threat (c) Identify activities that become more difficult due to MOPP and take actions to compensate (3) Use expendable or readily decontaminated material to cover all equipment, munitions, POL, food, and water containers that cannot be placed in a shelter. (4) Place detector paper to provide maximum exposure to toxic rain and where it can be easily observed. (5) Check to ensure M258A1 kits are serviceable and are issued down to crew level. (6) Fill decontaminating apparatuses. (7) Leaders check to ensure individuals know the appropriate action if an attack occurs. (8) Take additional actions consistent with the tactical situation.	P / F	P / F	P / F
f.	Medical platoon members prepare for a friendly nuclear strike. (1) Acknowledge warning (STRIKWARN). (2) Leaders warn and advise platoon personnel of: (a) Time, location, and area coverage of the planned decontamination. (b) Element vulnerability to immediate effects and residual contamination. (c) Measures required to	P / F	P / F	P / F

	prevent casualties, damage, and interference with the mission. (3) Leaders monitor to ensure platoon personnel execute directed actions. (a) Minimize skin exposure by rolling down sleeves, buttoning collars, or wearing additional clothing, such as MOPP gear. (b) Take cover in foxholes, bunkers, armored vehicles, basements, culverts, caves, or tunnels. (c) Place vehicles so that terrain provides shielding. (d) Protect electronic equipment from electromagnetic pulse (EMP) by removing or tying down antennas and disconnecting power and antenna leads. (e) Move loose items that could be blown around by the explosion so that they do not represent a hazard. (f) Warn all individuals. (g) Leaders brief personnel on the actions to take and when to take them. (4) Leaders implement protective measures as directed by company HQ. (5) Complete actions before detonation occurs.			

Instructor Comments:

Nuclear, Biological and Chemical
Appendix B
NBC Decontamination Skill Sheets

NBC Decontamination

Persistent agent attack has occurred, or contamination has been picked up from crossing a contaminated area. Unit has assumed MOPP level 4. Replacement overgarments, M291 and M280 decontamination kits, brooms, mops, supertropical bleach, or other expedient chemical defense items are on hand.

This task is always performed in MOPP4.

Decontamination measures are started immediately and personnel are decontaminated within 15 minutes and recontaminated is negligible.

NBC Decontamination
Soldiers Name: _____ SSN: _____ CO: _____ TM: _____
Start: _____ Stop: _____ Initial Evaluator: _____
Start: _____ Stop: _____ Retest Evaluator: _____
Start: _____ Stop: _____ Final Evaluator: _____

		1st	2nd	3rd
a.	Decontaminated casualty's hood. (1) Covered the mask air inlets with hand. Instructed casualty to cover if able. (2) Wiped off front, sides, and top of hood with a cellulose sponge soaked with 5% calcium hypochlorite solution or use M291 skin decontaminating kit. (3) Uncover mask air inlets.	P /	P / F	P / F
b.	Cut off casualty's hood. (1) Dip scrubs and scissors in 5% solution. (2) Cut hood neck cord. (3) Cut away the drawstring below voicemitter. (4) Released or cut hood shoulder straps. (5) Unzipped hood zipper. (6) Began cutting at zipper, below voicemitter. (7) Proceeded cutting upward, close to filter inlet covers and eye lens outserts. (8) Cut upward to tope of eye lens outserts. (9) Cut across forehead to outer edge of next eye outsert. (10) Cut downward toward patient's shoulder, staying close to eye lens outserts and filter inlet covers. (11) Cut across the lower part of voicemitter to the zipper. (12) Dipped the scissors and rinsed gloves in 5% solution. (13) Cut from center of forehead, over top of head. (14) Folded left and right sides of hood to sides of casualty's head, laying the sides of hood on litter.	P /	P / F	P / F
c.	Decontaminated casualty's mask and exposed skin. (1) Used M291 skin decontamination	P /	P / F	P / F

	kit or 5% solution. (2) Covered mask air inlets. (3) Decontaminated exterior of mask. (4) Wiped down all exposed skin areas, to include neck and behind the ears. (5) Uncovered the mask air inlets.			
d.	Removed casualty's Field Medical Card (FMC). (1) Cut FMC tie-wire, allowing FMC to fall into plastic bag. (2) Sealed plastic bag and rinsed bag with 5% solution. (3) Placed plastic bag under protective mask head straps.	P /	P / F	P / F
e.	Removed gross contamination on the overgarment by wiping all visible contamination spots with a sponge soaked in 5% solution.	P /	P / F	P / F
f.	Removed the casualty's protective overgarment jacket. (1) Cut sleeves from cuff up to shoulder of jacket, then through the collar. Kept the cuts close to inside of the arms so that most of the sleeve material can be folded outward. (2) Unzipped the jacket. (3) Rolled chest sections to the respective sides, with inner black liner outward. Carefully tuck cut jacket between arm and chest. (4) Rolled cut sleeves away from the arms, exposing black liner.	P /	P / F	P / F
g.	Removed the casualty's protective overgarment trousers. (1) Cut the trouser legs from the ankle to the waist. Kept cuts near insides of legs, along inseam, to the crotch. (2) Folded cut trouser halves onto the litter with contaminated sides away from the casualty. (3) Rolled inner leg portion under and between the legs.	P /	P / F	P / F
h.	Removed the casualty's butyl rubber gloves. (1) Decontaminated your butyl rubber gloves in 5% solution. (2) Lifted casualty's arm up and out of the cutaway sleeve unless contraindicated by casualty's	P /	P / F	P / F

	condition. (3) Pulled butyl rubber gloves off by rolling cuff over fingers, turning the glove insider out. Did not remove white glove liners. (4) Lowered the casualty's arms and folded them across chest. (5) Placed gloves in contaminated disposal container. (6) Decontaminated butyl rubber gloves in 5% solution.			
i.	Removed the casualty's protective overboots. (1) Stood at foot of litter facing casualty. (2) Cut protective overboot laces. (3) Grasped heel of protective overboot with one hand and the tow of protective overboot with the other hand. (4) Pulled heel downward and then toward you until the overboot is removed. (5) Placed the overboots in contaminated disposal container.	P /	P / F	P / F
j.	Removed and secured the casualty's personal effects. (1) Removed casualty's personal articles from overgarment and BDU pockets. (2) Placed articles in plastic bags. (3) Labeled the bags with casualty's name and SSN. (4) Sealed plastic bags. (5) If articles are not contaminated, returned them to casualty. If articles are contaminated, placed bags in contaminated holding area until can be decontaminated.	P /	P / F	P / F
k.	Removed the combat boots following the same procedures as for removing the protective overboots.	P /	P / F	P / F
l.	Cut off the casualty's battle dress uniform (BDU). (1) Cut off BDU shirt. (2) Unbuckled or cut belt material. (3) Cut off BDU trousers following the same procedure as for protective overgarment trousers.	P /	P / F	P / F
m.	Cut off the casualty's undergarments. (1) Cut off underpants.	P /	P / F	P / F

	(2) Cut off T-shirt. (3) Cut off brassiere, if necessary.			
n.	Removed the casualty's glove inner liners. (1) Removed glove liners using same procedures as for removing butyl rubber gloves. (2) Crossed casualty's arms over chest.	P /	P / F	P / F
o.	Removed the casualty's socks. (1) Decontaminated your butyl rubber gloves in 5% solution Positioned yourself at the foot of the litter (2) Removed each sock by rolling it down over the foot, turning it inside out or by cutting the sock off (3) Placed the socks into a contaminated disposal container	P /	P / F	P / F
p.	Decontaminated the casualty's ID tag's (1) Decontaminated your butyl rubber gloves in the 5% solution (2) Wiped the ID tags with the 0.5% solution	P /	P / F	P / F
q.	Removed field dressings and bandages. (1) Carefully cut off dressings and bandages (2) Cut off any remaining clothing that was covered by the dressings and bandages (3) Decontaminated the exposed areas of skin with the 0.5% solution (4) Irrigated the wound with the 0.5% solution if the wound is suspected to be contaminated (5) Placed removed dressing and clothing in contaminated disposal container.	P /	P / F	P / F
r.	Replaced any tourniquets. (1) Decontaminated an area above the existing tourniquet (2) Placed a new tourniquet 1/2 to 1 inch above the old tourniquet (3) Removed the old tourniquet (4) Removed any remaining clothing or dressings covered by the old tourniquet (5) Decontaminated the newly exposed areas (6) Placed the removed tourniquet, dressings, and clothing in a			

	contaminated disposal container			
s.	Decontaminated any splints. (1) Stabilized the splinted extremity (2) Decontaminated the splint and the extremity by liberally flushing them with the 0.5% solution	P /	P / F	P / F
t.	Checked casualty for contamination. (1) Used M8 chemical agent detector paper or the chemical agent monitor (CAM) (2) Decontaminated any areas of detected contamination, as necessary	P /	P / F	P / F

Instructor Comments:

Nuclear, Biological and Chemical
Appendix C
Establish a Protective Decontamination Shelter &
Chemical Protective Biological Shelter Skill Sheets

Chemical Protective Biological Shelter

Unit receives chemical strike warning or report in the area of operations. CPBS are available. Five augmentee personnel are available from the supported unit to perform patient decontamination. NBC conditions are likely to be a factor in mid-to-high intensity.

This task is always performed in MOPP4.

Decontamination station is operational within 45 minutes of WARNING.

Chemical Protective Biological Shelter
Soldiers Name: _____ _____ SSN: _____ CO: _____ TM: _____
Start: _____ Stop: _____ Initial Evaluator: _____
Start: _____ Stop: _____ Retest Evaluator: _____
Start: _____ Stop: _____ Final Evaluator: _____

		1st	2nd	3rd
a.	Treatment section provides tailgate medical services. (1) Immediately assumes MOPP level as directed. Increases MOPP level if necessary. Remains in MOPP while operating outside CBPS. (2) Provides emergency medical services within five minutes. Continues in CBPS is operational and decontamination, triage, and holding area outside the shelter are established.	P / F	P / F	P / F
b.	Treatment section and augmentee personnel erect CBPS. (1) Erect one CBPS with all necessary medical equipment placed inside. Become operational and are prepared to receive first patient within 45 minutes. (2) Establish and disestablish shelter as directed. (3) Platoon sergeant supervises personnel performing assigned specific tasks in erecting shelter. (4) Erect only one CPBS. The second shelter remains on trailer and is protected against chemical contamination. Use this shelter upon relocation of treatment element. (5) Pad all litter stands and equipment placed on the floor of the CBPS to prevent puncture of the floor. (6) Place medical equipment and supplies in treatment area. Place litter stands in shelter. Place plastic bags and clean	P / F	P / F	P / F

	FMCs in airlock. Place patient protective wraps (PPW) in the shelter.			
c.	Treatment section and augmentees establish overhead cover. (1) Establish decontamination and holding areas. (2) Erect plastic sheeting downwind of CBPS, overlapping airlock entrance for the decontamination and triage area. (3) Erect plastic sheeting adjacent to the first sheeting and the side of the CBPS opposite the generator for the evacuation holding area. (4) Erect sheeting within ten minutes. (5) Check to ensure sheeting for decontamination and triage area measures at least 6 meters by 15 meters. (6) Check to ensure sheeting for holding area measures at least 6 meters by 7.6 meters. (7) Do not erect overhead cover if wind speed is greater than 10 knots.	P / F	P / F	P / F
d.	Treatment section and augmentees establish shuffle pit. (1) Position shuffle pit 3 to 4.6 meters from center of airlock entrance. Enter shuffle pit not less than 3 meters nor more than 4.6 meters away from the CBPS airlock. (2) Dig shuffle pit, 3 meters wide by 1.2 meters long by 15 cm deep, within ten minutes, (humus soil), while CBPS is being inflated. Harder soils will require longer time. (3) Fill shuffle pit with super tropical bleach and earth. (4) Position litters on litter strands in center of shuffle pit.	P / F	P / F	P / F
e.	Treatment section establishes hot line. (1) Establishes hot line thru	P / F	P / F	P / F

	shuffle pit around the waiting area, CBPS, and holding area, and mark with engineer tape or other marking material. (2) Marks hot line within five minutes after shuffle pit is established.			
f.	Treatment section and augmentees establish decontamination and triage areas. (1) Position litters, litter strands, EMT equipment, and required decontamination materials contained in the Chemical Agent Patient Decontamination Set and Chemical Agent Patient Treatment Set. Decontamination Set should be in the vicinity of patient decontamination area. Patient Treatment Set should be with Trauma Treatment Set. (2) Place physical barriers and sentries, if available, around hot line area to maintain security and prevent transfer at other points. (3) Equip contaminated emergency treatment area with selected emergency lifesaving equipment and supplies, including Chemical Agents Casualty Treatment Set. (4) Set up clothing removal area with one pair of litter strands, large plastic bags, extra plastic bags for personal effects and FMCs, two pails or buckets filled with five percent aqueous sodium hypochlorite solution, four pair heavy-duty scissors, gauze or sponges, and M258A1 kits. (5) Establish patient decontamination area with	P / F	P / F	P / F

	one litter on a pair of litter strands. (6) Equip decontamination area with plastic bags, two pails or buckets with five percent sodium hypochlorite solution, gauze or sponges, M258A1 kits, replacement tourniquets and bandages, and M8 detector paper.			
g.	Treatment section and augmentees clean treatment area. (1) Establish clean treatment area inside hot line in front of M51 shelter to side away from generator. (2) Equip treatment area with PPW, medical supplies, and equipment as directed by unit SOP.	P / F	P / F	P / F
h.	Treatment section and augmentees establish patient waiting area. (1) Establish patient waiting area, inside hot line in front of M51 shelter to the side near the generator trailer. (2) Equip with medical supplies, equipment, and PPW for those patients waiting over 10 minutes for entry into M51 shelter.	P / F	P / F	P / F
i.	Treatment section and augmentees establish contamination sump. (1) Establish 75 meters downwind from end of overhead cover for disposition of all contaminated waste. (2) Keep sump separate from contaminated holding area.	P / F	P / F	P / F
j.	Treatment section and augmentees establish contaminated holding area. (1) Establish contaminated holding storage area for recoverable equipment 75 meters downwind. (2) Keep area separate from contaminated sump. (3) Establish contaminated holding area for expectant	P / F	P / F	P / F

	patients near triage area, downwind.			

Instructor Comments:

Nuclear, Biological and Chemical
Appendix D
Establish a Protective Decontamination Shelter &
Priority of treatment and Triage
Skill Sheets

Priority of treatment and Triage

Unit is receiving patients on an integrated battlefield. All personnel with the exception of personnel working in the CPBS are protected as appropriate. Chemical detection and decontamination materials are available outside of the hot line. Select EMT equipment and supplies are available. Assume chemical contamination on all patients.

Some iterations of this task should be performed in MOPP4.

Patients are triaged and prioritized in order of medical priority.

Priority of treatment and Triage
Soldiers Name: _____ SSN: _____ CO: _____ TM: _____
Start: _____ Stop: _____ Initial Evaluator: _____
Start: _____ Stop: _____ Retest Evaluator: _____
Start: _____ Stop: _____ Final Evaluator: _____

		1st	2nd	3rd
a.	Combat medic or treatment section member handles weapons and ordnance. (1) Removes from personnel. (2) Stores and secures weapons and ordnance in a predesignated downwind location.	P / F	P / F	P /
b.	Platoon leader (physician) or PA triages and classifies patients into treatment and decontamination priorities based on signs, symptoms, wounds, or illnesses. (1) Classifies immediate (nonchemical) (a) Classifies patient as immediate when a life-threatening situation exists or is likely to occur. (b) Begins lifesaving treatment immediately in the contaminated triage or treatment area. (c) Prepares patient for routing into the decontamination line and CBPS. (d) Continues emergency treatment and monitoring of vital signs during decontamination process and in patient waiting area. (2) Classifies immediate (chemical) (a) Classifies patient as chemical immediate when signs and symptoms of severe chemical poisoning are indicated. (b) Identifies agent as established by screening process. (c) Administers appropriate antidotes. (d) Provides assistance with ventilations as required. (e) Provides patient assistance as required	P / F	P / F	P /

		through decontamination line and CBPS.			
	(f)	Provides treatment as required during decontamination.			
(3)	Classifies	minimal (nonchemical)			
	(a)	Classifies patient as minimal when patient has minor wounds or medical symptoms and patient shows no signs or symptoms of chemical agent poisoning.			
	(b)	Directs patient through decontamination lines as patient load situation permits.			
	(c)	Sends patient to holding area outside CBPS after decontamination and treatment are completed.			
(4)	Classifies	minimal (chemical)			
	(a)	Classifies a minimal chemical when patient displays minimal chemical agent positioning symptoms that are controlled with previously given antidotes.			
	(b)	Observes patient for effect or previously administered antidote.			
	(c)	Sends patient to self-decontamination area.			
	(d)	Checks patient's condition during and after decontamination.			
	(e)	Provides further treatment and antidotes as required.			
(5)	Classifies	delayed			
	(a)	Classifies patient as delayed when delay does not interfere with recovery, displays no symptoms after receiving antidote.			
	(b)	Checks patient for chemical agent contaminants and directs through shuffle pit if none are found.			

	(c)	Directs patient through ambulatory line to be decontaminated if contaminants are found and returns to duty if no further treatment is required.			
(6)	Classifies expectant				
	(a)	Classifies patient as expectant when casualty has a severe wound which is complicated with circulatory or respiratory problems and recovery is not expected.			
	(b)	Does not route thru decontamination line.			
	(c)	Places in the contaminated patient holding area.			
	(d)	Reassures patient and provides further treatment as time and tactical situation permits.			

Instructor Comments: