

**4P0X1 READINESS SKILLS
VERIFICATION LESSON PLAN
DRUG THERAPY**



4P0X1 RSVP LESSON PLAN DRUG THERAPY

INTRODUCTION:

OVERVIEW:

5a. Identify facts and general principles related to drug therapy for contingency and deployment situations accurately. STS: 12.2.9, 15.2, 15.3, 15.4

- 1) Mass immunizations, vaccines, and infectious diseases of war/natural disasters
- 2) Triage and casualty management
- 3) Management of burn injuries
- 4) Management of common battlefield injuries
- 5) Nuclear, biological, and chemical agents

TRANSITION:

5a. Identify facts and general principles related to drug therapy for contingency and deployment situations accurately.

1) Mass immunizations, vaccines, and infectious diseases of war/natural disasters.

a) Immunizations

i) Types of immunization

(1) Passive immunization

(a) Definition: Transfer of antibodies formed in one individual to another individual. This type of vaccination confers immunity quite rapidly. The duration of passive immunity is limited.

(b) Examples: Human immunoglobulin (Gamma Globulin), Hyperimmune Globulins (Rabies, Hep-B, tetanus, chicken pox)

(2) Active immunization

(a) Definition: Stimulation of an individual immune system by administration of a killed or weakened (attenuated) microorganisms (viri and bacteria), or their inactivated products (toxoids). Active immunity lasts for many years (sometimes for life). The onset of immunity from an active immunization is slower than that of passive immunizations (approx. 2-4 weeks).

(b) Examples:

(i) Toxoids: Diphtheria, tetanus, and plague

(ii) Bacterials: Pertussis, TB, cholera, and typhoid

(iii) Virals: Polio, measles, mumps, rubella, yellow fever, Hep-B, influenza, and rabies

(3) Administration: Intramuscular (usually deltoid) injection

ii) Immunization requirements: This will differ depending upon your deployment location. Contact Military Public Health **prior to your deployment** for specific medical intelligence regarding your location.

iii) Priority of care: In a mass-casualty situation, the injured must be prioritized to assure that the limited supplies and manpower are utilized in the best possible way. Description of each category follows.

b) Infectious diseases of war/natural disasters

i) Food-borne illness

(1) Examples:

(a) Bacteria: *Salmonella, shigella, campylobacter, yersina, E. coli, vibrio cholera, staphylococcus spp.*

(b) Parasites: Giardiasis, amebic dysentery, cyclospora, cryptosporidium

(2) Symptoms: Generally produce nausea, diarrhea, abdominal cramping plus vomiting, gastrointestinal bleeding, and fever.

(3) Treatment:

(a) General

(i) Rehydration

- Oral: Preferred method if patient can tolerate. World Health Organization standard formula: 1 liter water, 20 gm glucose, 3.5 gm table salt, 2.5 gm sodium bicarbonate, 1.5 gm potassium chloride. Commercial rehydration solutions (Pedialyte®, etc.) are also acceptable.

- Intravenous: Lactated Ringers (LR) or Normal Saline (NS) in severe cases

(ii) Supportive care: May need to support cardiovascular status (BP, HR, volume status) in severe cases.

(iii) Anti-diarrheal medications (loperamide, etc.): **Should not be used** in patients who are febrile or have bloody stools.

(iv) Prevention: Appropriate vaccination, careful management of food and water supplies, avoidance or appropriate preparation of high-risk foods.

(b) Bacterial infections: Antibiotics: levofloxacin 500mg PO QD or ciprofloxacin 500mg/ofloxacin 400mg PO BID for 3-5 days, can decrease duration of symptoms.

(c) Parasitic infections:

(i) Giardia: Metronidazole 250mg PO TID for 5 days

- (ii) Amebiasis: Metronidazole 750mg PO TID for 10 days followed by Iodoquinol 650mg PO TID for 20 days.
 - (iii) Cyclospora: Quinolones (as above)
 - (iv) Cryptosporidium: Paramomycin 1gm PO BID for 4 weeks (possible benefit).
- ii) Tropical and geographical medicine: Military Public Health will provide medical intelligence regarding relevant diseases in specific locations/situations.
- (1) Malaria:
- (a) Prophylaxis: Chloroquine (CQ) 500mg (300mg base) PO weekly 1-2 weeks before departure and 4 weeks after arrival. For areas with CQ resistance use mefloquine 250mg (228mg base) PO weekly 1 week before departure and 4 weeks after arrival.
 - (b) Treatment:
 - (i) P. vivax/P. ovale: CQ 1gm PO X1 dose, 500mg PO in 6H, then 500mg PO QD X2 days + primaquine 26.3mg PO QD X14 days (If CQ resistant: Halofantrine + Primaquine).
 - (ii) P. falciparum (CQ resistant):
 - PO: Quinine sulfate 600mg TID + doxycycline 100mg BID (both for 7 days).
 - NPO: Quinidine gluconate 10mg/kg IV over 1 hour then 0.02mg/kg/hr X72H.
- (2) Hepatitis A: Proper food and water handling can decrease risk of transmission. Vaccine available: Give gamma globulin 0.02ml/kg IM X1 dose if within 2 weeks of exposure.
- (3) Hepatitis B, C, D: Transmitted via blood and body fluids. Vaccine available for Hepatitis B.
- (4) Yellow Fever: Vaccine available
- (5) Schistosomiasis/Leptospirosis/Strongyloidiasis: Acquired via penetration of intact skin
- (a) Prevention: Avoid wading or swimming in endemic area (Schisto/Leptro) or lying on the ground in endemic areas (Strongloid).

(b) Treatment:

- (i) Schistosomes: Praziquantel 20mg PO BID X1 day (*S. haematobium*, *S. intercalatum*, *S. mansoni*), 20mg PO TID X1 day (*S. haponicum*, *S. mekongi*).
- (ii) Leptospirosis: PCM-G 20-24MU QD IV divided Q4-6H or doxycycline 100mg PO or IV Q12H.
- (iii) Strongyloidiasis: Ivermectin 200µg/kg/d PO X2 or albendazole 400mg PO QD X3 days.

(6) Type A Meningococcal meningitis: Vaccine available (does not cover serogroup B).

(a) Prophylaxis: Rifampin 600mg PO Q12 X4 doses or ciprofloxacin 500mg PO X1 dose or ceftriaxone 250mg IM X1 dose.

(b) Treatment: Ceftriaxone 2gm IV Q12HX14 days. For sever PCN allergy consider using chloramphenicol.

(7) Vector-borne encephalitides: Japanese encephalitis can be prevented by a vaccine. Other mosquito/tick borne conditions can be prevented via use of DEET/Permethrin.

(8) Miscellaneous: Other infections (rabies, polio, diphtheria, measles, plague, tuberculosis are common in certain locations. Appropriate vaccinations/prophylaxis should be obtained as required.

(9) Hemorrhagic Fevers: (Lassa, ebola, Congo-crimean, marburg, Korean machupo, hantavirus, etc.) are found in certain locations. Protection from exposure is the primary preventative method. Ribavirin may be useful in certain situations.

iii) Sexually transmitted diseases

(1) HIV: Transmitted through sexual contact

(2) Gonorrhea: Ceftriaxone 125mg IM X1 dose. Single oral doses of ofloxacin 400mg, ciprofloxacin 500mg, or cefixime 400mg. Patients should also be treated presumptively for *chlamydial* infections.

(3) *Chlamydial* urethritis: Doxycycline 100mg PO BID X7 days or azithromycin 1000mg PO X1 dose.

(4) Syphilis:

(a) If less than 1 year duration: Benzathine PCN 2.4MU X1 dose.

(b) If greater than 1-year duration: Benzathine PCN 2.4 MU IM Q week X3 weeks.

(c) Neurosyphilis: PCN-G 3-4MU IV Q4H X10-14 days. Those allergic to PCN MUST be desensitized and managed with PCN-G as above.

c) Pharmacy implications: Provision of appropriate pharmaceutical care will require obtaining/maintaining adequate quantities of relevant medications. Obtaining medical intelligence regarding area(s) of potential deployment is vital to proper preparation.

TRANSITION:

2) Triage and casualty management

a) Triage: The sorting of patients due to the severity of their injuries will allow patients to receive the best possible care for their specific condition. Triage also allows for the optimal utilization of scarce materials and manpower.

b) Triage categories are determined by a rapid examination of casualties by the triage officer. Qualified medical technicians assist this individual. It is important to know that in a real world scenario **one of these qualified medical technician could be you!!!**

c) Triage is an ongoing process. It must be repeated at regular intervals to allow for the reevaluation and reclassification of the casualties as their medical status changes.

d) Priority of care: In a mass-casualty situation, the injured must be prioritized to assure that the limited supplies and manpower are utilized in the best possible way. Description of each category follows.

(1) Minimal: Little care is needed to handle these types of casualties. Minimal patients are those suffering from minor injuries such as strains, sprains, minor lacerations and other simple injuries.

- Expected Pharmaceutical Needs:

- | | |
|-------------------------------|------------------|
| -- Topical preparations | -- Analgesics |
| -- Antibiotics | -- Disinfectants |
| -- Lidocaine (anesthetic) | -- NSAIDs |
| -- Cough and cold medications | |

(2) Delayed: Definitive care is needed for the management of these individuals, however the type of care required can safely be delayed. Care would be delayed until the more seriously injured casualties were treated. Delayed patients are those with injuries such as closed fractures, dislocations, major lacerations and eviscerations not actively bleeding, pneumothorax patients (AFTER CHEST TUBE PLACEMENT) and others.

- Expected Pharmaceutical Needs

- IV fluids
- Antibiotics
- IV antihypertensives
- Anti-anxiety medications
- Narcotics
- IV diuretics
- Psychotropics
- Sedatives

(3) Immediate: Definitive care is required immediately to save the life of the immediate patient. Immediate patients are those with major bleeding, pneumothorax, open fractures with active bleeding, major burns, and other life-threatening injuries.

- Expected Pharmaceutical Needs

- Narcotics
- Cardiac medications
- Sedatives
- IV fluids
- Volume expanders (Hespan, albumin)
- Anesthesia medications

(4) Expectant: These patients are so seriously injured that there is little chance of survival even with dramatic medical intervention. Expectant patients would monopolize the time of large numbers of health care professionals. The care of these patients would severely tax the limited amount of medical supplies. In a contingency or natural disaster scenario it is better to expend the limited resources on those that can be saved.

(a) Expectant patients are separated from the other categories and managed compassionately with pain control and other appropriate interventions. These patients, as in all categories, are re-evaluated as their condition dictates. If the situation changes and it becomes possible to expend greater effort, these patients are treated.

(b) Expectant patients include those suffering from major head trauma, major spinal cord injuries, burn injuries covering greater than 50% of the body, serious blood loss, serious injuries of multiple organ systems and other life threatening injuries.

-- Expected Pharmaceutical Needs

- IV narcotics
- Anti-anxiety medications
- Sedatives

- e) Rapid examination of casualties: this rapid screening procedure is vital for the effective triage of casualties. It is designed to quickly obtain required information. Important steps in this process are as follows.
 - i) Remove the patient's clothing. This allows you to visually inspect all areas of the patient. This should always be accomplished to check for covered injuries or hidden explosives and other dangers.
 - ii) ABC's, (airway, breathing, circulation) just like CPR. Assure that the patient has a patent airway, is breathing, and has a heartbeat. If the answer to any of the questions is NO – initiate proper procedures (clear airway, rescue breathing, chest compressions, etc.)
 - iii) Check vital signs; Pulse, respiration and blood pressure. Information obtained from these actions provides valuable data regarding the condition of the patient.
 - iv) Inspect the entire patient. Check all sides of the patient. This is done to assure that all wounds are noted and treated. This should be done cautiously in patients with head/spinal injuries.

TRANSITION

3) Management of burn injuries

- a) Burn victims must be appropriately triaged and cared for with the minimum expenditure of scarce resources and personnel. The goal of medical care in wartime is to return as many to duty in as short of time as possible. Burn care must be organized with this goal in mind. The care of burn victim should be designed to accomplish the following goals.
 - (1) Return as many to duty as soon as possible
 - (2) Salvage life and function
 - (3) Maximize the use of personnel and material resources
- b) Triage
 - i) Burn casualties are triaged (and re-triaged as necessary) following the basic principles of the triage process.

- ii) Burn triage is based on expected survival and this is correlated with depth of the burn and the percent body surface area (%BSA) burned. Generally, an individual with greater than 50% BSA burns is classified as expectant.

(1) Depth of burn

- (a) First degree burns: Skin is dry but no blisters or swelling will occur. Skin is reddened and extremely painful. Peeling will usually occur. This is the most common type of all burns. Flash, flame, liquid, or the sun causes this type of burn.
- (b) Second degree burn: Skin appears moist and mottled, ranges from the color of white to cherry red. The involved area is blistered and extremely painful. Several layers of skin are involved. This type of burn results from contact with hot liquids or solids, flash or flame contact to clothing or skin, chemical substances, or the sun.
- (c) Third degree burns: Skin becomes dry and leathery with charred blood vessels often visible. All layers of the skin are involved. This type of burn results from contact with hot liquids or solids, flame, chemicals, or electricity.

- (2) Percent BSA burned: The % BSA burned can be estimated by using the “Rule of Nines”. In this calculation various areas of the body are given values of nine, or multiples of nine. The head and neck is counted as 9, each arm as 9, anterior and posterior trunks as 18 each and each leg as 18. The genitalia and perineum make up the remaining 1 percent. Each burned body area is counted to yield an estimated % BSA burn value.

- iii) Inhalation injuries: Inhalation injuries represent a serious additional insult to the burn patient. These injuries can result in a mortality two to three times greater than expected. This type of injury occurs due to the inhalation of noxious and hot gasses and particles. Inhalation injuries should be suspected if the patient has burns to the face, head, or neck. These injuries may result in marked swelling of the airway and lungs, along with infectious and associated respiratory complications.

c) Treatment of burn injuries

- i) Initial care involves general resuscitation and management of the ABC's
- ii) Start two large bore (16-18 gauge) peripheral IV's as soon as possible. Burn trauma may necessitate cut down technique. These patients require large volumes of replacement fluid. A 70 kg patient with 50% BSA will require approximately 14 liters of Lactated Ringers (LR) in the first 24 hours after injury.
- iii) Appropriate burn wound care often involves protective isolation due to the destruction of the major barrier to infection – the skin. Wounds should be covered

with sterile material. Silver sulfadiazine is an appropriate antibacterial for burn wounds. Other agents (bacitracin, neosporin) may be used as needed.

d) Pharmacy implications

- i) Large quantities of IV fluids are required. LR is the preferred fluid. Assure that all available sources of LR and similar fluids are exploited to provide adequate stock of these items.
- ii) Large quantities of silver sulfadiazine will be required. Assure that all available sources of silver sulfadiazine are exploited to provide adequate stock of this item.
- iii) The most common infections resulting from burn injuries involve *Streptococcus* species. The most appropriate antibiotics for infections resulting from those organisms are the penicillins. Inhalation injuries can result in other types of infections requiring many extended spectrum and exotic antibiotics.
- iv) Large quantities of narcotic analgesics are required to control the serious pain associated with these injuries.

TRANSITION:

4) Management of common battlefield injuries

- a) Orthopedic injuries: Most battlefield injuries are likely to involve orthopedic structures. High energy injuries (car wrecks, falls, high-velocity projectile impacts) produce severe damage to the skeleton, surrounding soft tissue, and vital internal organs protected by the bones of the skeleton.
 - i) Definitions and examples;
 - (1) Fracture: any break in the continuity of a bone.
 - (a) Types of fractures
 - (i) Open fracture: fracture involving laceration of the overlying skin.
 - (ii) Closed fracture: fracture in which the skin has not been penetrated by the bone ends.
 - (iii) Displaced fracture: fracture, which produces deformity of involved limb.

(b) Signs and symptoms

- (i) Deformity of the involved limb
- (ii) Tenderness and pain
- (iii) Inability to use the involved limb
- (iv) Swelling and dislocation
- (v) Exposed bone
- (vi) Grating sound or feeling upon movement (crepitus)
- (vii) Exhibiting motion of limb that is not usually possible

ii) Care and treatment

- (1) Open fracture: Initial care involves control of any hemorrhage that may be present. Align limb in position near to normal and splint injury. Fluid retention is initiated if required. Pain control is also initiated. Later therapy involves extensive surgical debridement of the wound (under anesthesia) and surgical correction of the fracture (pins, fixators, etc.). Antibiotic therapy is initiated. The wound is covered with a nonocclusive dressing and immobilized in a cast. **THE WOUND IS NOT CLOSED AT THIS TIME.**
- (2) Closed fracture: The injury is reduced and aligned as accurately as possible. Cast is applied for immobilization. Elevation of injured extremity is desirable. Pain control is initiated. Monitor for signs of skin breakdown under the cast.
- (3) Dislocation: Dislocated joint is repositioned in the original conformation. This procedure will produce extreme pain and should be accomplished under adequate anesthesia. The dislocation is then immobilized in a normal (tension-free position). Pain control and anti-inflammatory therapy is initiated.
- (4) Sprains and strains: Injured area may be immobilized. Patient is usually instructed to avoid using the damaged extremity. Pain control and anti-inflammatory therapy may be helpful.

iii) Pharmacy implications

- (1) Antibiotic requirements: Cefazolin, gentamycin, others
- (2) Pain control: meperidine, morphine, oxycodone with acetaminophen, acetaminophen with codeine

- (3) Non-steroidal anti-inflammatories: ibuprofen, aspirin, others
- b) Penetrating injuries and eviscerations: The high-velocity projectiles commonly used in modern warfare frequently produce these types of injuries.
 - i) Definitions and examples
 - (1) Penetrating injuries: These injuries involve the penetration of various body areas with a foreign object. Penetrating injuries can involve high-velocity projectiles, explosives, or debris. These injuries commonly involve several body structures: skin, bones, and internal organs.
 - (2) Evisceration injuries: Commonly resultant from explosives and high velocity projectiles. These injuries usually involve the internal organs of the chest and trunk (intestines, stomach, etc.). Evisceration injuries may also involve other organs such as the brain or the eyes.
 - ii) Care and treatment
 - (1) Penetrating injuries: Initial care involves maintaining vital signs (ABC's) and controlling bleeding. Patient must be examined for multiple wounds (entry and exit wounds). Wound must be thoroughly cleaned and debrided. Wound may be closed if indicated. Pain control, antibiotic therapy, and fluid replacement are initiated.
 - (2) Evisceration injuries: Initial care involves maintaining vital signs (ABC's) and controlling bleeding. Patient must be examined for multiple wounds (entry and exit wounds). Eviscerated organs **SHOULD NOT BE REPLACED**. Remove any visible, free debris. Cover the organs with a clean dressing soaked in sterile saline. Use water if that is all that is available; eviscerated organs will be placed in their normal positions. Pain control, antibiotic therapy and fluid replacement therapy should be initiated.
 - iii) Pharmacy implications:
 - (1) Antibiotics: ampicillin, gentamycin, metronidazole
 - (2) Analgesics: meperidine, morphine, fentanyl, oxycodone with acetaminophen
 - (3) IV fluids
 - (4) Advanced cardiac life support (ACLS) medications

- c) Psychological casualties: The stressors of the wartime environment affect both the physiological and the psychological well being of those involved. Proper care of these casualties is a must if there is to be hope of returning them to duty.
- (1) Definitions and examples: These casualties involve a wide range of conditions. These include combat stress, anxiety disorder, panic disorder, depression, insomnia, attempted suicide, and psychosis.
 - (2) Care and treatment: Mental health providers will give the definitive care for these individuals. Initial therapy involves preventing these individuals from injuring themselves or others.
 - (3) Pharmacy implications:
 - (a) Sedatives: diazepam, lorazepam
 - (b) Hypnotics: temazepam, triazolam
 - (c) Major tranquilizers: chlorpromazine
 - (d) Anti-anxiety agents: alprazolam, lorazepam
 - (e) Anti-depressants: amitriptyline, SRRI, buspirone
 - (f) Anti-psychotics: haloperidol
- d) Head and spinal cord injuries: Most wartime casualty situations will result in EXTREME shortages of manpower and material. This will require that these scarce resources be expended to treat those casualties that can be salvaged and potentially returned to duty. The majority of head and spinal cord injuries show little hope of fulfilling this goal. Therefore, many of patients are classified as expectant. The potentially dramatic high dose of methylprednisolone may significantly alter the prognosis (and therefore the triage classification) of many of these patients.
- i) Definition and examples: These casualties result from high-velocity injuries to the spine and/or head. Explosions, flying debris or a variety of traumatic situations, may also cause these injuries. Head and spinal cord injuries almost always involve some loss of basic life-sustaining functions such as respiration, heart function, and brain function. These patients may display varying degrees of paralysis and/or comatose states.
 - ii) Care and treatment: Initial care for these patients involves the maintaining of vital signs (ABC's). This is rapidly followed by a thorough examination to determine the nature and extent of injury. Fluid replacement therapy will usually be implemented at this time. As soon as the casualty is classified as expectant, the therapy changes from curative to palliative. The goal of palliative therapy is twofold: to make the patient as

comfortable as possible and to expend the smallest quantity of scarce medical resources. These patients are transferred to the expectant area where they are cared for and re-triaged as warranted.

iii) Pharmacy implications:

- (1) Injectable narcotics
 - (2) IV fluids
 - (3) Injectable tranquilizers and anti-anxiety medications
 - (4) IV methylprednisolone: if deemed appropriate by triage officer. Requires large doses: 30mg/kg over 15 minutes followed in 45 minutes by infusion of 5.4 mg/kg/hour for 23 hours.
- e) Public health issues: This area encompasses a wide variety of injuries, ailments and concerns common to life in a deployed setting. The specifics of this category will differ depending upon the location. This class of injury also includes many normal ailments that become far more difficult to treat in a wartime environment. Be assured that you will treat a large number of casualties resulting from this category of battlefield injury. These casualties will most likely include a significant number of your own people.

i) Common Problems

- (1) Snake bites
- (2) Insect bites
- (3) Poisonous plants
- (4) Water contamination
- (5) Food poisoning
- (6) Infections from locally endemic diseases
- (7) Injury due to temperature extremes
- (8) Minor traumatic injuries
- (9) Cold, flu, and general illness
- (10) New onset chronic conditions and poorly controlled pre-existing conditions

- ii) Care and treatment: Care is usually supportive and therapy symptomatic in nature. Specifics are dictated by the causative organism/factor/condition. **Excellent hygiene and site cleanliness are vital.** Many of these conditions/injuries can be avoided by exercising caution in the carrying out of many typical daily activities.

- iii) Pharmacy implications: The key to a successful pharmacy in this situation is adequate preparation. The majority of your casualties will come from the broad category of public health issues. The first step in the deployment process should be seeking out the military public health officer, obtaining as much information as possible about your location and those dangers inherent to that location, and rapidly obtaining as much of the required supplies as possible. **This must be one of your first priorities upon notification of deployment!!!** These problems may seem minor when compared to battlefield casualties, however keep in mind that they may result in the entire EMEDS facility being unable to perform their duties. Specific medications required will vary with location, a general list will include the following.
 - (1) Antimalarials
 - (2) Antidiarrheals
 - (3) Assorted antibiotics
 - (4) Selected anti-venom
 - (5) Selected vaccines, toxoids, and immunoglobulins
 - (6) Cough and cold medications
 - (7) Medications for chronic conditions: selected to match the needs of your EMEDS community and your expected patient population – including all base support personnel.
 - (8) NSAIDS
 - (9) Narcotics
 - (10) Sunscreen

TRANSITION:

5) Nuclear, biological, and chemical agents

a) Nuclear casualties: Nuclear weapons will produce huge numbers of casualties. This problem will be compounded by the fact that many aspects of the radiation syndrome are difficult to identify. Initial casualties will be from the blast and the thermal effects of the explosion. These casualties will be triaged and treated just like any other injury of this type.

i) Radiation syndrome (Radiation sickness): Can be divided into three phases.

(1) Acute incapacitation: Nausea, vomiting, malaise. Lasts several hours to a few days.

(2) Latent period: Normally symptom free. Duration varies with the degree of exposure. May last from a few hours to several weeks.

(3) Clinical radiation illness: Severity and symptoms are exposure related. Symptoms usually include bone marrow and central nervous system damage.

ii) Treatment:

(1) Hematopoietic system: (low to mid-lethal exposure): Antibiotics to prevent infection, whole blood (or platelets) to stabilize blood chemistry. This therapy is intended to allow the patient to survive until the bone marrow recovers.

(2) GI system (average acute dose of 800 RADS): Blood transfusion, antibiotics, and fluids. Bone marrow transplant would increase chance of survival.

(3) CNS (2000-3000 RADS): Symptomatic. If these patients survive long enough to be hospitalized, they are expectant.

iii) Pharmacy implications

(1) Large quantities of fluids

(2) Broad spectrum antibiotics

(3) Narcotics

(4) Sedatives

(5) Anticonvulsants

iv) Chemical casualties: Chemical warfare agents are classified into 4 basic groups: nerve agents, blister agents, blood agents, and choking agents. Chemical casualties may commonly have other battlefield trauma injuries.

(1) Nerve agents

(a) Types

- (i) Tabun (GA)
- (ii) Sarin (GB)
- (iii) Soman (GD)
- (iv) V/A agent (VX)

(b) Symptoms: Disruptions of acetylcholinesterase system. Onset of symptoms is rapid. These patients commonly present with the following symptoms:

- (i) Pinpoint pupils and difficulty focusing
- (ii) Headache
- (iii) Increased secretions from mucous membranes
- (iv) Nausea and vomiting
- (v) Loss of bowel and bladder control
- (vi) Convulsions, coma, respiratory arrest

(c) Treatment

- (i) Pretreatment prior to exposure (if possible) with pyridostigmine tablets
- (ii) Terminate exposure and evacuate as soon as possible
- (iii) Use atropine (titrate to secretions)
- (iv) Use 2-PAM Chloride. 1gm initially, repeat in 30 minutes. May repeat twice each 24 hours if respirations do not improve.
- (v) Treat pulmonary edema by suction and postural drainage. Avoid respiratory depressants.
- (vi) Treat convulsions, as needed, with diazepam 2-10mg IV at 1mg/min PRN
- (vii) Watch for shock and acidosis

- (d) Pharmacy implications
 - (i) Diazepam injections
 - (ii) Shock meds (Dopamine, dobutamine, epi, etc.)
 - (iii) Sodium bicarbonate
 - (iv) Atropine and 2-PAM chloride
- (2) Blister agents: These agents include a variety of chemicals intended to produce painful blistering of the skin upon contact. These agents can also produce systemic symptoms.
 - (a) Symptoms:
 - (i) Redness to the skin
 - (ii) Severe itching or burning
 - (iii) Irritation of the nose and throat
 - (iv) Difficulty breathing
 - (v) Formation of severe blisters within 2-24 hours
 - (vi) Immunosuppression and sepsis
 - (b) Treatment
 - (i) Terminate exposure and evacuate as soon as possible
 - (ii) Clean skin of all contaminants
 - (iii) Aspirate and debride ulcers
 - (iv) Treat pulmonary edema as needed
 - (v) Watch for shock and acidosis
 - (vi) Antibiotics (therapeutic not prophylactic)
 - (c) Pharmacy implications
 - (i) Shock meds (Dopamine, dobutamine, epi, etc.)

- (ii) Sodium bicarbonate
 - (iii)Antibiotics
 - (iv)IV fluids
 - (v) Pain medications
- (3) Blood Agents: These agents include several similar chemicals usually related to cyanide.
- (a) Symptoms: These chemicals kill by disrupting cellular respiration. Onset of symptoms is rapid; death may occur is as little as 1-2 minutes. These patients may show the following symptoms.
 - (i) Headache and dizziness
 - (ii) Confusion
 - (iii)Difficult, labored, and violent breathing
 - (iv)Convulsions
 - (v) Paralysis, coma, and death
 - (b) Treatment
 - (i) Terminate exposure and evacuate as soon as possible
 - (ii) Cyanide antidote or all component ingredients
 - (iii)Treat pulmonary edema
 - (iv)Treat shock and acidosis
 - (c) Pharmacy implication
 - (i) Cyanide antidote kits
 - (ii) Shock meds (Dopamine, Dobutamine, Epi, etc.)
 - (iii)Sodium bicarbonate
- (4) Choking agents: Generally contain chemicals related to phosgene “tear gas” and related compounds are also included

(a) Symptoms

- (i) Nose and throat irritation
- (ii) Profuse tearing
- (iii) Coughing
- (iv) Difficulty breathing
- (v) Pulmonary edema
- (vi) Respiratory failure (prolonged exposure)

(b) Treatment

- (i) Terminate exposure and evacuate as soon as possible
- (ii) Oxygen by mask
- (iii) IV steroids and antibiotics as needed
- (iv) Aminophylline/bronchodilators as needed
- (v) Treat shock and acidosis as needed

(c) Pharmacy implications

- (i) IV steroids
- (ii) Aminophylline/bronchodilators
- (iii) Antibiotics
- (iv) Shock meds (Dopamine, dobutamine, epi, etc.)

v) Biological casualties

(1) Types

(a) Anthrax

- (i) Treatment: Although effectiveness may be limited after symptoms are present, high dose antibiotic treatment with penicillin, ciprofloxacin, or doxycycline should be undertaken.

(ii) Prophylaxis: Oral ciprofloxacin or doxycycline for known or imminent exposure. An FDA-licensed vaccine is available.

(b) Botulinum

(i) Treatment: Early administration of trivalent licensed antitoxin or heptavalent antitoxin may prevent or decrease progression to respiratory failure.

(ii) Prophylaxis: Pentavalent toxoid vaccine is available for those at high risk of exposure.

(c) Ricin

(i) Treatment: Management is supportive and should include treatment for pulmonary edema. Gastric lavage and cathartics are indicated for ingestion, but charcoal is of little value for large molecules such as ricin.

(ii) Prophylaxis: There is currently no vaccine or prophylactic antitoxin available for human use. Use of protective mask is currently the best protection against inhalation.

(d) Small Pox

(i) Treatment: At present there is no effective drug therapy and treatment of a clinical case remains supportive.

(ii) Prophylaxis: Immediate vaccination (vaccinia virus) or revaccinations should be undertaken for all personnel exposed

(e) Viral hemorrhagic fevers (VHF)

(i) Treatment: Intensive supportive care may be required. Antiviral therapy with ribavirin may be useful in several of these infections. Convalescent plasma may be effective in Argentine hemorrhagic fever.

(ii) Prophylaxis: The only licensed VHF vaccine is the yellow fever vaccine. Prophylactic ribavirin may be effective for Lassa fever, Rift Valley fever.

(f) Brucellosis

(i) Treatment: Antibiotic therapy with doxycycline plus rifampin or doxycycline in combination with other medications for six weeks is usually sufficient in most cases. More prolonged regimens may be required for patients with complications of meningoenzephalitis, endocarditis, or osteomyelitis.

(ii) Prophylaxis: There is no human vaccine available against brucellosis, although animal vaccines exist. Treatment should be considered for confirmed biological warfare exposure.

(g) Q Fever

(i) Treatment: Q fever is generally a self-limited illness even without treatment, but tetracycline or doxycycline should be given orally for 5-7 days to prevent complications. Q fever endocarditis (rare) is much more difficult to treat.

(ii) Prophylaxis: Drug therapy started too early during the incubation period may delay, not prevent the onset of symptoms. Therefore, tetracycline or doxycycline should be started 8-12 days post exposure and continued for 5 days.

(h) Typhoid

(i) Treatment: Antibiotic therapy with ampicillin, trimethoprim-sulfamethoxazole, or ciprofloxacin is usually sufficient. Intravenous fluids and electrolytes may be given.

(ii) Prophylaxis: Injectable and oral typhoid vaccine is available.

(i) Plague

(i) Treatment: Early administration of antibiotics is critical, as pneumonic plague is invariably fatal if antibiotic therapy is delayed more than 1 day after the onset of symptoms. Choose one of the following: streptomycin, gentamycin, ciprofloxacin, or doxycycline for 10-14 days. Chloramphenicol is the drug of choice for plague meningitis.

(ii) Prophylaxis: For asymptomatic persons exposed to a plague aerosol or to a patient with suspected pneumonic plague, give doxycycline 100mg orally BID X7 days or the durations of risk of exposure plus one week. Alternative antibiotics include ciprofloxacin, tetracycline, or chloramphenicol. No vaccine is currently available for plague prophylaxis. The previously available licensed, killed vaccine was effective against bubonic plague, but not against aerosol.

(2) Pharmacy implications

(a) Vaccines (if provided or requested)

(b) Fluids

(c) Antibiotics

(d) Shock meds (Dopamine, dobutamine, epi, etc.)

(e) Pain medications

(f) Sedatives

TRANSITION:

SUMMARY:

5a. Identify facts and general principles related to drug therapy for contingency and deployment situations accurately.

- 1) Mass immunizations, vaccines, and infectious diseases of war/natural disasters
- 2) Triage and casualty management
- 3) Management of burn injuries
- 4) Management of common battlefield injuries
- 5) Nuclear, biological, and chemical agents

CONCLUSION:

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APPENDIX: Biological Warfare Agents – Vaccine, Therapeutics, and Prophylaxis

DISEASE	VACCINE	DRUG THERAPY	DRUG PROPHYLAXIS	COMMENTS
Anthrax	Bioport vaccine (licensed) 0.5 mL SC @ 2, 4 wk, 6, 12, 18 months then annual boosters	Ciprofloxacin 400mg IV q8-12h	Ciprofloxacin 500mg PO bid X4 wk; if unvaccinated, begin Initial doses of vaccine	Potential alternates for Rx: gentamycin, erythromycin, and chloramphenicol
		Doxycycline 200mg IV, then IV q8-12h	Doxycycline 100mg PO bid x4 wk plus vaccination	
		Penicillin 2 million units IV q2h		PCN for sensitive organisms only
Cholera	Wyeth-Ayerst Vaccine 2 doses 0.5 mL IM or SC @ 0, 7-30 days, then boosters Q 6 months	Oral rehydration therapy during period of high fluid loss		Vaccine not recommended for routine protection in endemic areas (50% efficacy, short term)
		Tetracycline 500mg q6h3d		Alternates for Rx: erythromycin, trimethoprim and sulfamethoxazole, and furazolidone
		Doxycycline 300mg once, or 100mg q 12 h x 3 d		Quinolones for tetra/doxy resistant strains
		Ciprofloxacin 500mg q12hx3d Norfloxacin 400mg q12x3d		
Q Fever	IND 610 – inactivated whole cell vaccine given as single 0.5ml s.c. injection	Tetracycline 500mg PO q6hx5-7d	Tetracycline start 8-12 post-exposure x5d	Currently testing vaccine to determine the necessity of skin testing prior to use
		Doxycycline 100mg PO q12hx5-7d	Doxycycline start 8-12d post-exposure x5d	
Glanders	No vaccine available	Antibiotic regimens vary depending on localization and severity of disease	Post-exposure prophylaxis may be tried with TMP-SMX	No large therapeutic human trials have been conducted owing to the rarity of naturally occurring disease
Plague	Geer inactivated vaccine (FDA licensed) is no longer available: 1.0 mL IM; 0.2 mL IM 1-3 mo later; 0.2 mL boosters @ 6, 12, 18 months after dose 3 then q 1-2 years	Streptomycin 30mg/kg/d IM in 2 divided doses x10d (or gentamycin)	Doxycycline 100mg PO bid x7d or duration of exposure Ciprofloxacin 500mg PO bid x7d Doxycycline 100mg PO bid x7d	Plaque vaccine no protective against aerosol challenge in animal studies
		Doxy 200mg IV then 100mg IV bid x10-14d		Alternate Rx: trimethoprim-sulfamethoxazole
		Chloramphenicol 1gm IV qid x10-14d		Chloramphenicol for plague meningitis

Tularemia	IND – Live attenuated vaccine: one dose by scarification	Streptomycin 30mg/kg IM divided BID x10-14d Gentamycin 3-5mg/kg/d IV x10-14d	Doxycycline 100mg PO bid x14d Tetracycline 500mg PO QID x14d	
<u>DISEASE</u>	<u>VACCINE</u>	<u>DRUG THERAPY</u>	<u>DRUG PROPHYLAXIS</u>	<u>COMMENTS</u>
Brucellosis	No human vaccine available	Doxycycline 200mg/d PO plus rifampin 600-900mg/d PO x6wk Ofloxacin 400/rifampin 600mg/d PO x6wk	Doxycycline and rifampin x 3wk	Trimethoprim-sulfamethoxazole may be substituted for rifampin; however, relapse may reach 30%
Viral Encephalitis	VEE DOD TC-83 live attenuated vaccine (IND) 0.5 mL SC x1 dose VEE DOD c_84 (formalin inactivated TC-83) (IND) 0.5 mL for SC at 0 & 28 d EEE inactivated (IND): 0.5 mL SC at 0 & 28d WEE inactivated (IND): 0.5 mL SC at 0, 7, & 28d	Supportive therapy: analgesics and anticonvulsants prn	NA	TC-83 reactogenic in 20% No seroconversion in 20% Only effective against subtypes 1A, 1B, and 1C C-84 vaccine used for non-responders to TC-83 Immunogenic. Multiple immunizations are required
Viral Hemorrhagic Fevers	AHF Candid #1 vaccine (x-protections for BHF) (IND) RVF inactivated vaccine (IND)	Ribavirin (CCHF/arenaviruses) 30mg/kg IV initial dose 15mg/kg IV q6hx4d 7.5mg/kg IV q8hx6d Passive antibody for AHG, BHF, and Lassa fever		Aggressive supportive care and management of hypotension very important
Smallpox	Wyeth calf lymph vaccina vaccine (licensed): 1 dose by scarification	No current Rx other than supportive; Cidofovir (effective in vitro); animal studies ongoing	Vaccinia immune globulin 0.6 mL/kg IM (within 3d of exposure, best within 24 h)	Pre and post exposure vaccination recommended if >3 years since last vaccine
Botulism	DOD pentavalent toxiod for serotypes A-E (IND): 0.5 mL deep SC @ 0, 2, & 12 wk, then yearly boosters	Dod heptavalent equine despeciated antitoxin for serotypes A-G (IND): 1 vial (10 mL) IV CDC trivalent equine antitoxin for serotype A, B, E (licensed)		Skin test for hypersensitivity before equine antitoxin administration

Staphylococcus Enterotoxin B	No vaccine available	Ventilatory support for inhalation exposure		
Ricin	No vaccine available	Inhalation: supportive therapy G-I gastric lavage, superactivated charcoal, cathartics		
DISEASE	VACCINE	DRUG THERAPY	DRUG PROPHYLAXIS	COMMENTS
T-2 Mycotoxins	No vaccine available		Decontamination of clothing and skin	

