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Preface:

The USSOCOM Tactical Trauma Protocols (TTPs) in many ways mirror the Department of Defense Tactical Combat Casualty Care (TCCC) Guidelines. However, the TTPs are also very unique in several ways. They recognize the advanced skills and knowledge of the SOF medic and consequently include recommendations for advanced interventions such as fresh whole blood collection and administration in the field, head injury management, fasciotomy, escharotomy, and sedation. They further take into consideration the unique and austere nature of the SOF environment by including recommendations for extended tactical field care.

Changes in 2012:
Added the Junctional Emergency Treatment Tool as an option to apply mechanical pressure for inguinal and proximal lower extremity bleeds not amenable to other means of hemorrhage control.
Added intranasal, intramuscular, and intravenous ketamine as options for pain management of combat casualties.
Changed the alternate chest decompression site at the 4th/5th intercostal space from the mid-axillary line to the anterior axillary line.
Modified the USSOCOM severe TBI management guidelines to establish consistency with new TCCC TBI guidelines.
Authorized the use of an incompletely filled blood collection bag as long as the total infusion time remains the same as that of a completely filled blood collection bag.
Replaced the MACE examination with the 2012 updated version.

Basic Management Plan for Care Under Fire

1. Return fire and take cover.
2. Direct or expect casualty to remain engaged as a combatant if able.
3. Direct casualty to move to cover and apply self-aid if able.
4. Try to keep the casualty from sustaining additional wounds.
5. Extricate casualties from burning vehicles or buildings and move to places of relative safety. Do what is necessary to stop the burning process.
   a. Direct casualty to control hemorrhage by self-aid if able.
   b. Use a CoTCCC recommended tourniquet for hemorrhage anatomically amenable to tourniquet application.
   c. Apply the tourniquet proximal to the bleeding site, over the uniform, tighten, and move the casualty to cover. Ensure that the slack is removed prior to cranking the windlass.
Basic Management Plan for Tactical Field Care

1. Immediately remove and render safe the weapons of any casualties with altered mental status.

2. If injuries requiring urgent transport are identified, request casualty evacuation assets as soon as the tactical situation permits. Minimizing the time to surgical care is critical to survival for serious combat injuries.

3. The acronym MARCH is recommended to guide the priorities in the Care Under Fire (control of life-threatening hemorrhage only) and Tactical Field Care phases:
   b. Airway – establish and maintain a patent airway.
   c. Respiration – decompress suspected tension pneumothorax, seal open chest wounds, and support ventilation/oxygenation as required.
   d. Circulation – establish IV/IO access and administer fluids as required to treat shock.
   e. Head injury / Hypothermia – prevent/treat hypotension and hypoxia to prevent worsening of traumatic brain injury and prevent/treat hypothermia.

4. Airway management:
   a. Conscious casualties:
      i. Allow conscious casualties with impending airway obstruction to assume any position that best protects the airway and permits self-control of secretions (including sitting up).
      ii. Chin lift or jaw thrust maneuver
      iii. Nasopharyngeal airway
   b. Unconscious casualties:
      i. Chin lift or jaw thrust maneuver
      ii. Nasopharyngeal airway
      iii. Place unconscious casualty into recovery position. Protect spine in blunt and blast trauma patients.
   c. If preceding measures are unsuccessful and airway protection is required:
      i. Normal anatomy: Consider supraglottic airway device or endotracheal intubation.
      ii. Abnormal anatomy:
         (a) Supraglottic airway
         (b) Intubation may be a viable option based on provider experience and patient presentation.
         (c) Surgical cricothyroidotomy (with lidocaine if conscious)
      iii. Use the definitive airway with which you are most experienced to increase likelihood of success.
   d. Failed airway: Surgical cricothyroidotomy and/or other rescue airway procedure
   e. Verify correct airway placement and patency:
      i. Self-inflating bulb syringe (e.g., Esophageal Intubation Detector)
      ii. End tidal CO₂ detector (capnography)
      iii. In austere or tactical settings where end tidal CO₂ detection and monitoring is not available or accessible, visualization of the tube passing through the glottis opening and auscultation of epigastric and lung sounds may be used.
      iv. Do not rely on auscultation or visual misting in the ET tube to confirm placement.
   f. An endotracheal tube inducer (ETTI – bougie) may be advanced through the tube to assess for "hang up" in the bronchial tree or tracheal ring clicks. Advancement of the ETTI without opposition suggests esophageal placement.
   g. Do not rely on the casualty to breathe independently through the airway device. Support ventilation using a bag valve mask (BVM) device. Automatic ventilation devices are an acceptable alternative if available.
5. Breathing:
a. Consider a tension pneumothorax in any casualty with respiratory distress or hypotension and known or suspected torso trauma.
   i. For suspected tension pneumothorax, decompress the chest on the side of the injury with a 14-gauge, 3.25 inch needle/catheter unit inserted into the second intercostal space at the mid-clavicular line.
      (a) Ensure that needle entry into the chest is not medial to the nipple line.
      (b) Ensure needle is not directed towards the heart.
      (c) Remove needle and leave catheter in place.
   ii. If unable to penetrate the anterior chest wall with the needle, consider the 4th or 5th intercostal space at the anterior axillary line on the affected side as an alternate decompression site.
      (a) Consider rolling the decompression site up to allow air to collect.
      (b) If the available needle is shorter than 3.25 inches, anterior-axillary line decompression is more likely to be successful than mid-clavicular line decompression.
      (c) Anterior-axillary catheters may be more prone to kinking due to adduction of the arm in litter casualties. Monitor closely for reaccumulation of tension pneumothorax.
   iii. Repeat decompression as required for worsening or recurring symptoms/signs.
   iv. Consider decompression of the opposite side of the chest if signs/symptoms do not improve.
   v. Consider small gauge thoracostomy device or chest tube if needle decompression is unsuccessful after two attempts at each site.
b. Treat all open and/or sucking chest wounds by immediately applying an occlusive material to cover the defect and securing it in place. Closely monitor the casualty for the potential development of a subsequent tension pneumothorax.

6. Bleeding:
a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC recommended tourniquet to control life-threatening external hemorrhage in anatomically amenable sites or for any traumatic amputation. Apply directly to the skin 2-3 inches above the wound.
b. For significant external hemorrhage not amenable to tourniquet application or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than 2 hours), use an approved hemostatic agent with a pressure dressing. Hemostatic dressings should be applied with at least 3 minutes of direct pressure.
c. If a lower extremity or groin/inguinal wound is not amenable to tourniquet use and bleeding cannot be controlled with hemostatic dressings, consider immediate application of mechanical direct pressure using an Abdominal Aortic Tourniquet (AAT™), Junctional Emergency Treatment Tool (JETT™), or Combat Ready Clamp (CRoC™).
d. Reassess prior tourniquet application.
   i. If initial tourniquet is over uniform and not functioning properly, apply a second tourniquet directly to skin proximal to the original one. Ensure that the slack is removed prior to cranking the windlass.
   ii. If a tourniquet is applied over the uniform, the uniform should be removed as soon as possible and the tourniquet placed 2-3 inches above the most proximal wound.
   iii. Tighten tourniquet until distal pulse is absent.
   iv. Add another tourniquet proximally if one tourniquet on skin does not control bleeding.
   v. Expose and clearly mark all tourniquet sites with the time of application using an indelible marker.
   vi. If other techniques (e.g., hemostatic or pressure dressing) are adequate to control bleeding, remove previously applied tourniquets. The goal is to remove tourniquets within 2 hours if possible.
e. Apply pelvic binder for treatment of suspected pelvic fracture.
7. Vascular access:
   a. Start an 18-gauge IV or saline lock if indicated.
   b. If resuscitation is required and IV access is unobtainable, use the intraosseous (IO) route.

8. Tranexamic Acid (TXA):
   a. If a casualty is anticipated to require significant blood transfusion (e.g., presents with hemorrhagic shock, one or more amputations, penetrating torso trauma, or evidence of severe bleeding), administer 1gm of TXA in 100cc Normal Saline or Lactated Ringer’s IV/IO over 10 minutes as soon as possible, but NOT LATER THAN 3 HOURS AFTER INJURY.
   b. Begin second infusion of 1gm TXA after Hextend or other fluid treatment.
   c. Do not administer TXA IV push since this may result in hypotension.
   d. Do not administer TXA through the same IV line as blood products (including recombinant Factor VIIa or fibrinogen) or Hextend.
   e. After administration of the first dose, mark on chest wall “1gm TXA given”.
   f. After administration of the second dose, change chest wall marking to “2 x 1gm TXA given”.

9. Fluid resuscitation:
   a. Assess for hemorrhagic shock. Altered mental status (in the absence of head injury) and weak or absent peripheral pulses are the best field indicators for shock.
   b. If not in shock:
      i. No IV/IO fluids required.
      ii. PO fluids permissible if the casualty is conscious and able to swallow.
   c. If in shock:
      i. Initiate IV/IO Hextend and titrate to effect.
         (a) In the absence of traumatic brain injury (TBI), use normal mental status as end point for resuscitation.
         (b) In the presence traumatic brain injury (TBI), use restoration of radial pulse or SBP > 90mmHg as end point for resuscitation.
      ii. Initiate resuscitation with 2 units of plasma if blood components are available. Continue resuscitation with Packed Red Blood Cells and plasma in a 1:1 ratio as required.
      v. Fresh whole blood may be used if component therapy is not available.
      vi. In the absence of blood products, use Hextend
      vii. In the absence of blood products and Hextend, use crystalloid.
   d. Continued resuscitation efforts must be weighed against logistical and tactical considerations and the risk of incurring further casualties. The goal of continued resuscitation is the restoration of normal vital signs in the setting of controlled hemorrhage.

10. Head injury management:
    a. Key aspects of field management of severe TBI are the prevention of hypoxia and hypotension. Ensure early establishment of a definitive airway, aggressively treat respiratory compromise, administer oxygen if available (to maintain oxygen saturation > 90% with the goal of 95%), and fluid resuscitate hypotension.
    b. Routine hyperventilation is NOT recommended. Maintain pCO2 between 35 – 40 mm Hg in the absence of evidence of herniation.
    c. Controlled hyperventilation may be considered as a temporizing measure for evidence of increasing intracranial pressure (ICP) and herniation (e.g., deteriorating mental status, unequal pupils, posturing, and irregular respiratory pattern).
      i. If end tidal CO₂ monitor is available, ventilate to achieve pCO₂ of 30-35 mmHg.
      ii. If end tidal CO₂ monitor is not available, ventilate at a rate of 20 per minute and a tidal volume of approximately 500ml.
      iii. Use the highest oxygen concentration (FiO2) possible for hyperventilation.
d. Hypertonic saline (3-5%) for evidence of increased ICP:
   i. Isolated TBI (hemodynamically stable) – administer 3-5% HS 250 ml IV/IO.
   ii. TBI with controlled external hemorrhage - administer 3-5% HS 250 ml IV/IO plus
       Hextend/other fluids as per 9c. (shock) if required.

e. Seizure prophylaxis for penetrating head trauma/depressed skull fractures:
   i. Fosphenytoin (Cerebyx®) 18mg/kg IV/IO at 100-150mg/min (slow IVP) if available.
   
   **Do not administer faster than 150mg/min since this may result in hypotension.**
   
   ii. Repeat 100mg IV/IO Q8H for maintenance.

f. Seizure management:
   i. Diazepam (Valium®) 5-10mg IV/IO q 5 min to maximum dose of 20mg.
   ii. OR Midazolam (Versed®) 5mg IV/IO q 5 min (no maximum dose).
   iii. Monitor casualty closely for apnea when administering benzodiazepines.
   iv. Fosphenytoin (Cerebyx®) 18mg/kg IV/IO at 100-150mg/min (slow IVP) if available for
       seizures refractory to benzodiazepines.
   
   **Do not administer faster than 150mg/min since this may result in hypotension.**

g. If cerebrospinal fluid (CSF) is identified leaking from the ears and/or nose, elevate the head
   30-60 degrees if the casualty’s other injuries permit and the casualty is hemodynamically
   stable.

h. If the casualty exhibits signs of increased ICP and is hemodynamically stable, consider
   elevating the head 30 degrees to improve venous outflow from the brain and decrease
   ICP. Do not elevate the head of a hypovolemic casualty since this will reduce cerebral blood
   flow.

i. Consider sedation of severe TBI after definitive airway established with midazolam (Versed)
   1-2mg/hour IV/IO if no evidence of shock or hypotension.

j. Antibiotic prophylaxis for penetrating head trauma:
   i. Ertapenem (Invanz®) 1gm IV/IO.
   ii. OR Ceftriaxone (Rocephin®) 1gm IV/IO.

k. Ensure casualty is evacuated to a facility with a neurosurgeon available.

l. For non-severe head injuries, see *Mild Traumatic Brain Injury (MTBI) Protocol.*

11. Abdominal evisceration:
   a. Control any visible hemorrhage from bowel using approved hemostatic agent or gauze.
   b. Irrigate gross debris off of exposed bowel.
   c. Attempt to gently reduce bowel back into abdominal cavity.
      i. If bowel is reduced, approximate skin (sutures or staples) and cover abdominal wound
         with dressing.
      ii. If bowel is unable to be reduced, cover bowel with moist dressing.

12. Penetrating eye trauma:
   a. Perform a rapid field test of visual acuity.
   b. Cover the eye with a rigid shield (not a pressure patch).
   c. Ensure antibiotics are administered as per Section 20.

13. Burns:
   a. Facial burns, especially those that occur in closed spaces, are often associated with airway
      involvement/inhalation injury. Aggressively monitor airway status and oxygen saturation in
      these patients. Consider early intubation or surgical cricothyroidotomy with sedation. See
      *Procedural Analgesia Protocol.*
   
   b. To cover burn areas, consider use of:
      i. Silver impregnated dressings.
      ii. Hydrogel dressings.
      iii. Dry sterile dressings.
   
   c. Fluid resuscitation for > 20% Total Body Surface Area (TBSA) 2nd/3rd degree burns:
i. Initiate IV/IO crystalloid administration according to “The Rule of Ten”.
   (a) Initial rate is 10ml per %TBSA per hour for a maximum casualty weight of 80kg.
   (b) Add 100ml/hr to the rate for each 10kg above 80kg.
   (c) Example: A 90kg casualty with 50% TBSA burn would receive an initial rate of
       \( (10\text{ml} \times 50)/\text{hr} + 100\text{ml}/\text{hr} \) or 600ml/hr.

ii. If crystalloid is not available, Hextend may be used for initial resuscitation.

iii. Resuscitation principles for hemorrhagic shock take precedence over burn resuscitation.
    See Section 8c. (shock) of Tactical Field Care.

d. If trained, consider escharotomy for:
   i. Circumferential extremity burns with compromised circulation.
   ii. Circumferential thoracic burns with compromised ventilation.
   iii. Limit escharotomy incision to depth of burn.

e. Do not administer prophylactic antibiotics for burns without other combat wounds.

f. Splint burned hands and feet in position of function with dressings separating digits.

g. Aggressive pain management for critical burn patients.

h. Aggressive hypothermia prevention management, especially for extensive burns.

i. All trauma care interventions can be performed through burned skin.

14. Inspect and dress all wounds.

15. Fracture/dislocation management:
   a. Attempt to reduce pulseless fractured extremities and dislocations.
   b. Dislocations with distal pulse may be reduced based on evacuation time and training/experience in procedure.
   c. Splint and recheck pulse.

16. Crush injuries:
   a. Severe and extensive crush injuries may be seen in patients trapped under an overturned vehicle or in a collapsed structure such as a bombed building.
   b. Entrapment may be prolonged due to the requirement for specialized rescue equipment.

17. Hypothermia management:
   a. Hypothermia will result in decreased clotting ability in the trauma casualty. Prevention is the key to management, since only limited rewarming is possible in the field.
   b. Minimize the casualty’s exposure to the elements. Keep protective gear on or with the casualty if feasible.
   c. Remove wet clothing and replace with dry garments if possible.
   d. Wrap casualty with available insulating material (e.g.: CoTCCC recommended commercial systems, sleeping bags, or anything that will retain heat and keeps the casualty dry).
   e. If resuscitation is required, use warmed IV fluids if possible.

18. Monitoring:
   a. Frequently reassess the casualty.
   b. Utilize available monitoring devices (e.g., pulse oximeter, cardiac monitor, etc.).

19. Analgesia:
   a. If able to fight, casualty should take pain medications carried in combat pill pack:
      i. Meloxicam (Mobic®) 15mg PO
      ii. Acetaminophen (Tylenol®) 1gm PO
   b. If unable to fight or there is need for opiate analgesia to control pain without IV access:
      i. Naloxone (Narcan®) should be available whenever administering opiates.
         Monitor for respiratory depression.
         (a) Continuous assessment of the patient who requires opiate reversal is required due to
             the potential differences in duration of action between naloxone (Narcan®) and the
             opiates.
      ii. Oral transmucosal fentanyl citrate (OTFC) 400-800 μg orally:
(a) Start with lower dose if unsure of response
(b) Tape OTFC lozenge to casualty’s finger as an added safety measure.
(c) Reassess in 15 minutes
(d) Repeat dose once if necessary.
iii. OR Ketamine 50 mg intranasal (using nasal atomizer device)
   (a) Repeat dose every 15 -30 minutes as necessary to control severe pain or until the casualty develops nystagmus

vi OR Ketamine 50 mg IM
   (a) Repeat dose every 15-30 minutes to 1 hour as necessary to control severe pain or until the casualty develops nystagmus (rhythmic eye movement back and forth)

c. If unable to fight or there is need for opiate analgesia to control pain with IV access:

i. Morphine sulfate 5-10mg IV/IO:
   (a) Reassess in 10 minutes.
   (b) Repeat dose as required.
   (c) For pain refractory to opiates, ketamine (Ketalar®) 20mg slow IV/IO over 1 minute, followed by 20mg increments every 30- 60 seconds until nystagmus occurs or a maximum total dose of 100 mg/hr.

ii. Ketamine (Ketalar®) 20 mg slow IV/IO push over 1 minute
   (a) Reassess in 5-10 minutes.
   (b) Repeat dose every 5-10 minutes as necessary to control severe pain or until the casualty develops nystagmus
   (c) Continue to monitor for respiratory depression and agitation
   (d) For agitation, consider midazolam (Versed®) 1 mg IV; may repeat in 15 minutes.

   a. Odansetron (Zofran®) 4-8mg IV/IO/IM/S L every 8 hours as needed for nausea.
   b. See Procedural Analgesia Protocol for analgesia for painful procedures.

20. Antibiotics:
   a. Prophylactic use is recommended for all open combat wounds.
   b. Prophylactic use is not recommended for burns in the absence of other concomitant combat wounds.
   c. If able to take oral medications, moxifloxacin (Avelox®) 400mg PO from combat pill pack.
   d. If unable to take oral medications, ertapenem (Invanz®) 1gm IV/IO/IM.

21. Cardiopulmonary resuscitation (CPR):
   a. Battlefield CPR for blunt, blast or penetrating trauma casualties, who have no pulse, respirations, or other signs of life, will not be successful and should not be attempted.
   b. Casualties with torso trauma or polytrauma, who have no pulse or respirations during TFC, should have bilateral needle decompression performed to ensure they do not have tension pneumothorax prior to discontinuation of care.
   c. CPR may be considered depending on the tactical situation in certain types of casualties:
      i. Severe hypothermia.
      ii. Chemical warfare agent/toxic exposures (if appropriate antidotes are available).
      iii. Crush syndrome (if ACLS treatments for hyperkalemia are available). See Crush Syndrome Protocol.
      iv. Electrocution.

22. Communication / Documentation of care:
   a. Explain procedures and treatments to casualty to reassure and reduce anxiety.
   b. Document clinical assessments, treatments rendered, and changes in casualty’s status on a SOF Casualty Card. Forward this information with the casualty to the next level of care.
Extended Tactical Field Care Considerations

1. The unique nature of SOF missions may require tactical field care lasting hours to days before evacuation can be achieved. Identify the potential for prolonged tactical field care during mission planning in order to prepare increased amounts of medical supplies (e.g., carried on vehicles) and/or resupply bundles. Extended Tactical Field Care is presumed to exist when evacuation cannot be performed within the 4-hour time frame doctrinally dictated for Priority patients.

2. Airway Management:
   a. Reverify airway patency and security in a consistent manner.
   b. Suction: Consider periodic suctioning of the oropharynx and endotracheal tube.
   c. Pulmonary toilet: Consider periodic saline flushes (2ml) to clear mucus/blood from ET tube.
   d. Local wound care at cricothyroidotomy site if applicable.

3. Respiratory Management:
   a. Place a small gauge thoracostomy device or chest tube placement if casualty required needle decompression previously.
   b. Apply negative pressure to chest tube if available, not exceeding -20cm water pressure.
   c. Consider rib blocks for pain management.
   d. If available, administer oxygen to maintain O₂ saturation > 90% (>95% for TBI).
   e. If patient is being ventilated, maintain strict bagging cycles (1 breath every 6-8 seconds) and a tidal volume of approximately 500ml to allow for complete exhalation and avoid stacking breaths.
   f. Consider the use of a ventilator/assist device if available. If the device permits, add physiologic positive end-expiratory pressure PEEP (3-5cm water).
   g. Consider sedation with midazolam (Versed) 1-2mg/hr IV/IO in casualties requiring prolonged intubation/ventilation if no shock or hypotension.

4. Flail chest management:
   a. Monitor for developing hypoxia secondary to pulmonary contusions.
   b. Casualty may require positive pressure ventilation.
   c. Ensure adequate analgesia. Consider rib blocks for pain management.
   d. These casualties frequently fatigue and require intubation/definitive surgical airway.

5. Fluid management:
   a. Conscious: Instruct casualty to drink clear liquids up to 1L/hr; consider oral electrolyte supplementation if available.
   b. Unconscious: Insert Foley catheter and titrate IV/IO/NG/PR crystalloid fluids to maintain urine output of 30-50ml/hr.
      i. Clean water may be utilized in lieu of crystalloid for NG/PR infusion.
      ii. Maximum PR fluid infusion rate for stable patients is 200ml/hr.
      iii. Maximum PR fluid infusion rate for volume depleted patients is 500ml/hr.
   c. Critical burn (> 20% TBSA of 2nd/3rd degree burns):
      i. Insert Foley catheter.
      ii. Continue fluid resuscitation according to “The Rule of Ten”.
         (a) Initial rate is 10ml per %TBSA /hr for a maximum casualty weight of 80kg.
         (b) Add 100ml/hr to the rate for each 10kg above 80kg.
         (c) Example: A 90kg casualty with 50% TBSA burn would receive an initial rate of (10ml x 50)/hr + 100ml/hr or 600ml/hr.
      iii. Adjust fluid rate to maintain urine output of 30-50ml/hr.
      iv. Oral fluid administration may be acceptable in burns up to 40% TBSA if crystalloid supplies are limited. Larger burns are associated with ileus and significantly decreased
6. Wound care management:
   a. Irrigate and redress wounds (any potable water can be used for irrigation).
   b. Debride only obviously devitalized tissue.
   c. Change dressings every 24 hours. Consider converting to silver impregnated dressings to reduce frequency of dressing changes.
   d. Continue antibiotics. Repeat moxifloxacin (Avelox®) 400mg PO or ertapenem (Invanz®) 1gm IV/IO/IM every 24 hours.

7. Analgesia:
   b. Consider local blocks for pain management.

8. Nutrition management:
   a. Consider oral nutrition if evacuation will be delayed by over 24 hours.

9. Orthopedic/Compartment Syndrome management:
   a. Apply traction splints as required.
   b. Reassess fractures and splint in position of function.
   c. Check neurovascular status after any manipulation.
   d. Be suspicious of compartment syndrome in the following conditions:
      i. Fractures.
      ii. Crush injuries.
      iii. Vascular injuries.
      iv. Circumferential burns.
   e. Clinical signs of compartment syndrome:
      i. Pain out of proportion to injury.
      ii. Pain with passive motion of muscles in the involved compartment.
      iii. Pallor.
      iv. Paresthesias.
      viii. Pulselessness

   Be aware that peripheral pulses are present in 90% of patients with compartment syndrome.
   f. Consider use of compartment pressure monitor if available and trained in its use.
   g. Increasing swelling, decreasing motion, and increasing pain not responsive to analgesics in the appropriate clinical setting should raise the possibility of a developing compartment syndrome.
   h. Compartment syndromes make take hours to develop. For patients with suspected compartment syndrome, reevaluate every 30 minutes for 2 hours, then every hour for 12 hours, then every 2 hours for 24 hours, then every 4-6 hours for 48 hours.
   i. Extremity compartment syndromes may occur in the thigh, lower leg/calf, foot, forearm, and hand.
   j. Compartment syndrome management:
      i. Maintain extremity at level of heart. Do not elevate.
      ii. Loosen encircling dressings.
      iii. Urgent evacuation.
   k. Fasciotomy:
      i. Only consider if evacuation is delayed 6 hours or longer and fasciotomy is within the scope of the treating medic/ATP.
      ii. See Fasciotomy Protocol.

10. Special blast injury considerations:
    a. Tympanic membranes:
       i. Inspect for perforation if possible.
       ii. Presume perforation in the setting of post-blast hearing loss.
iii. Dexamethasone (Decadron) 10mg IV/IO/IM/PO QD x 5 days for hearing loss if not contraindicated by other injuries.

b. Lungs:
   i. Pulmonary overpressure may result in delayed lung injury.
   ii. Monitor patients closely for respiratory deterioration for at least 6 hours post-blast.
   iii. Sudden neurological deterioration in the setting of pulmonary blast injury may indicate an acute gas embolism and require evacuation to a facility with a hyperbaric chamber.

c. Abdomen:
   i. Blast overpressure may result in bowel injury and delayed perforation.
   ii. Acute abdominal pain, especially with evidence of peritoneal irritation, within 72 hours of blast exposure should be presumed to be a bowel perforation. See Abdominal Pain TMEM.

d. Spine:
   i. Patients involved in vehicular blasts or thrown by explosions are at high risk for spinal injury.
   ii. Maintain a high index of suspicion for spinal injury, especially in unconscious patients.

Basic Management Plan for Tactical Evacuation (TACEVAC) Care

1. Airway management:
   a. Confirm prior airway placement.
   b. Reassess and maintain airway patency including proper positioning and suctioning.
   c. Establish definitive airway if indicated and not previously done.

2. Breathing:
   a. Reassess patient for development of tension pneumothorax.
   b. Place a small gauge thoracostomy device or chest tube if:
      i. Patient requires multiple needle decompressions.
      ii. OR no improvement with needle decompression.
      iii. OR evacuation time is prolonged (greater than 1 hour).
      iv. OR evacuation requires transport at high altitude in unpressurized aircraft.
   c. If available, provide oxygen as needed to maintain O₂ saturation > 90% (> 95% for TBI).

3. Bleeding:
   a. Reassess patient and verify bleeding is controlled.
   b. Verify distal pulses are absent in extremities with tourniquets.
   c. Reassess if tourniquet is required or other hemorrhage control means are appropriate.

4. Vascular access:
   a. Reassess IV patency.
   b. Flush IV lines as required.
   c. Establish access if indicated and not previously done.

5. Tranexamic Acid (TXA):
   a. If a casualty is anticipated to require significant blood transfusion (e.g., presents with hemorrhagic shock, one or more amputations, penetrating torso trauma, or evidence of severe bleeding), if not already done, administer 1gm of TXA in 100cc Normal Saline or Lactated Ringer’s IV/IO over 10 minutes as soon as possible, but NOT LATER THAN 3 HOURS AFTER INJURY.
   b. Begin second infusion of 1gm TXA after Hextend or other fluid treatment if not already done.
   c. Do not administer TXA IV push since this may result in hypotension.
d. Do not administer TXA through the same IV line as blood products (including recombinant Factor VIIa or fibrinogen) or Hextend.

e. After administration of the first dose, mark on chest wall “1gm TXA given”.
f. After administration of the second dose, change chest wall marking to “2 x 1gm TXA given”.

6. Fluid resuscitation:
   a. Continue resuscitation with blood products, colloid, or crystalloid as indicated.
      i. Blood products are the preferred resuscitation fluid if available.
      ii. Plasma and Packed Red Blood Cells should be used in a 1:1 ratio.
      iii. Fresh Whole Blood may be used as an alternative if blood components are not available.
   b. Maintain a palpable radial pulse or systolic blood pressure of 90mmHg in all unconscious patients with non-compressible internal hemorrhage.
   c. Resuscitate to normal vital signs in the setting of controlled hemorrhage.

7. Head injury management:
   a. Continue to prevent hypotension and hypoxia.
   b. Administer 3-5% Hypertonic Saline 250ml IV/IO for severe TBI if not already done or patient is continuing to deteriorate rapidly as per Tactical Field Care Section 10 (head injury).
   c. Controlled hyperventilation may be considered as a temporizing measure for evidence of increasing intracranial pressure (ICP) and herniation (e.g., deteriorating mental status, unequal pupils, posturing, and irregular respiratory pattern).
      i. If end tidal CO₂ monitor is available, ventilate to achieve pCO₂ of 30-35 mmHg.
      ii. If end tidal CO₂ monitor is not available, ventilate at a rate of 20 per minute and a tidal volume of approximately 500ml.
   d. Seizure management:
      i. Diazepam (Valium®) 5-10mg IV/IO q 5 min to maximum dose of 20mg.
      ii. OR Midazolam (Versed®) 5mg IV/IO q 5 min (no maximum dose).
      iii. Monitor casualty closely for apnea when administering benzodiazepines.
      iv. Fosphenytoin (Cerebyx®) 18mg/kg IV/IO at 100-150mg/min (slow IVP) if available for seizures refractory to benzodiazepines.

   Do not administer faster than 150mg/min since this may result in hypotension.

8. Hypothermia management:
   a. Continue hypothermia prevention management or initiate if not already started.
   b. Utilize heating system on evacuation platform and avoid wind exposure.
   c. Use an IV warming device for all fluid administration.

9. Penetrating eye trauma:
   a. Apply rigid eye shield if not previously done.

10. Monitoring:
    a. Institute electronic monitoring of vital signs.

11. Check for additional wounds:
    a. Dress all wounds.

12. Continue analgesia as required.

13. Reassess fractures and neurovascular status:
    a. Attempt to reduce pulseless fractured extremities and dislocations and resplint.
    b. Consider use of traction splints as indicated.
14. Antibiotics:
   a. Initiate for all open combat wounds, including penetrating eye trauma, if not already given.

15. Consider use of pneumatic anti-shock garment (PASG) for stabilizing pelvic fractures.
   a. **WARNING**: DO NOT USE in patients with thoracic or brain injuries.
   b. If PASG not available, use pelvic binder if not already applied previously.

16. Air evacuation/altitude considerations:
   a. Monitor air pressure in extremity air splints during altitude changes.
   b. Replace air with saline in endotracheal tube cuffs.

17. Documentation of Care:
   a. Explain procedures and treatments to patient to reassure and reduce anxiety.
   b. Document clinical assessments, treatments rendered, and changes in patient status on a SOF Casualty Card. Forward this information with the casualty to the next level of care.
ADMINISTRATION OF BLOOD AND BLOOD COMPONENTS
PROTOCOL

SPECIAL CONSIDERATIONS:

1. Blood and blood components should only be administered by personnel who are trained in the proper procedure and the identification and management of transfusion reactions. As little as 30ml of incompatible blood or red blood cells (RBCs) can cause a fatal hemolytic reaction.

2. There is NO “universal donor” for whole blood; it must be ABO type specific.

3. Use only collection bags designed for the collection of whole blood (WB) and administration sets designed for the administration of blood and blood components. Failure to do so may lead to fatal thromboembolic events.

4. The only solutions approved by the FDA and AABB for use with blood and blood components are normal saline (NS) and Plasma-Lyte 148. Although Lactated Ringer’s (LR) and other solutions have been shown to be compatible under certain circumstances, they are not approved for use by the FDA or AABB.¹⁻⁴

5. Any time an incompatible solution has been administered use a new catheter and administration set or flush the catheter and administration set with 50ml of NS before administering blood.

6. Sterile technique must be followed when performing transfusions in the field to prevent subsequent infection.

INDICATIONS:
If the patient is in shock, especially in the presence of known or suspected non-compressible hemorrhage, then resuscitate with 2 units of plasma followed by PRBCs in a 1:1 ratio. If blood components are not available AND you are trained and comfortable with the procedure, collect and transfuse fresh whole blood. Resuscitate and attempt to maintain a palpable radial pulse or clinical improvement. If BP monitoring is available, maintain target systolic BP of 80-90mmHg (at least 90mmHg in the presence of TBI).

OVERVIEW:
1. Whole blood (WB) is blood that has not been modified except for the addition of an anticoagulant. WB provides the equivalent of Fresh Frozen Plasma (FFP), RBCs and Platelets (PLTs) in a 1:1:1 ratio. FWB will have a shelf-life of 24 hours and should be transfused immediately or stored at 33-43 degrees F (1-6 degrees C) within 8 hours after collection, unless otherwise directed by medical staff due to insufficient or no red blood cell (RBC) or plasma product inventory. It should be tested with rapid test kits to decrease the risk of infectious disease transmission. Identify a blood donor who is ABO identical with the intended recipient.

2. WB is sometimes referred to fresh whole blood (FWB) if it has been recently collected. However, there is no time standard as to when it is no longer considered to be fresh. It is also referred to as warm fresh whole blood (WFWB) when it is still warm following collection. WB is separated into different components.

Any separated component, including RBCs or Packed RBCs (PRBCs), is considered a blood component and therefore CANNOT be correctly referred to as blood. Blood refers to WFWB, FWB, and WB.
3. The following are in use by SOF medics.
   a. Fresh frozen plasma (FFP)
   b. Packed red blood cells (PRBCs)
   c. Warm fresh whole blood (WFWB)
   d. Fresh whole blood (FWB)
   e. Whole blood (WB)

4. Prior to initiation of transfusion, the following will be checked:
   a. Vital signs (T, P, R, BP). Measure, evaluate and record baseline vital signs. Every effort should
      be made to monitor temperature as an increase in temperature may be the first indicator of a
      transfusion reaction.
   b. Casualty blood type should be confirmed.
      i. In an emergency, establish ABO/Rh of recipients and donors via local testing or previous
         testing.
      ii. EldonCard® tests should ONLY be used to confirm previous results obtained using the
         ABO/Rh test tube method.

   Identification tags for ABO/Rh verification should be utilized as a last resort only. Accurate identification and verification of the donor’s blood and the intended
   recipient may be the single most important step in ensuring transfusion safety.
   c. Active warming loss prevention should be used to prevent casualty hypothermia.

TRANSFUSIONS:
1. Ideally blood products should be warmed to approximately 98.6 degrees F (37 degrees C) prior to
   transfusion. Do not exceed 102 degrees F (39 degrees C) as this may cause an inflammatory
   reaction and lyse some of the red cells.

   Do not use warmers directly against the fluid bag because of the risk of hemolysis or damage
   to the blood or blood product. Blood or blood components should not be warmed in a microwave,
   unless it is specifically designed for that purpose.

2. Blood and blood components may be pressure infused using a pressure infuser that encases the
   entire blood collection bag. Do not use a BP cuff for pressure infusion as they deliver uneven
   pressure.

   Do not exceed 300mmHg with the pressure infusion device.

3. The largest bore IV catheter should be used. An IO device may be used. Ensure that a strong flush
   is done and good flow is obtained prior to using an IO infusion.

4. When performing any administration of blood or blood components the patient should be continuously
   monitored for signs and symptoms of an immunologic blood transfusion reaction. The first 10-15
   minutes of any transfusion are the most critical.
   a. Anaphylactic Reaction
      i. Shock
      ii. Hypotension
      iii. Angioedema
      iv. Respiratory distress
   b. Acute Hemolytic Transfusion Reaction
      i. Acute Hemolytic Reaction usually has onset within 1 hour
      ii. Evidence of disseminated intravascular coagulopathy (DIC) – oozing from blood draw, IV
         sites.
      iii. Flushing, especially in the face
      iv. Fever and increase in core temp of more than 2 degrees F (1 degree C)
      v. Shaking, chills (rigor)
      vi. Flank pain or the acute onset of pain in the chest (retrosternal), abdomen and thighs
vii. Wheezing, dyspnea
viii. Anxiety, feeling of impending doom
ix. Nausea and vomiting
x. Hypotension
xi. Pain, inflammation, and/or warmth at the infusion site
xii. Red or Brown Urine (hemoglobinuria)-The onset of red urine during or shortly after a blood transfusion may represent hematuria (indicating bleeding in the lower urinary tract (tube #1 below) or hemoglobinuria (indicating an acute hemolytic reaction, tube #2 below). If freshly collected urine from a patient with hematuria is centrifuged, red blood cells settle at the bottom of the tube, leaving clear yellow urine supernatant (see tube #3 below). If the red color is due to hemoglobinuria, the urine sample remains red after centrifugation (see tube #4 below).


xiii. Alternatively, urine tests strips can reveal the presence of blood in the urine. This may represent hemoglobinuria (indicating an acute hemolytic reaction) or hematuria (indicating bleeding in the lower urinary tract).
xiv. Plasma in a sample of centrifuged anticoagulated venous blood is normally clear (tube #1 below), but will be pink-red if significant intravascular hemolysis (e.g., hemoglobinemia) has occurred within the previous few hours (tubes 2-4 below).
c. **Febrile Non Hemolytic Reactions**
   i. Fever not as severe as with an acute hemolytic reaction
   ii. Chills
   iii. Dyspnea

d. **Urticarial Reactions - Urticaria**

e. **Other transfusion related signs and symptoms**
   i. Flushing (especially in the face), urticaria, or edema
   ii. Increased pulse or respiratory rate
   iii. Nausea, vomiting or diarrhea
   iv. Pain and/or edema at the infusion site
   v. Headache
   vi. Feeling of impending doom

f. **Citrate Toxicity**
   i. Mild
      (a) Perioral and periorbital paresthesia
      (b) Metallic taste in the mouth
      (c) “Tingling” sensation around the mouth or in the extremities
   ii. Severe
      A. Carpopedal spasms
      B. Twitching
      C. Chills
      D. Stomach cramps
      E. Pressure in the chest
      F. Hypotension and possible cardiac arrhythmia
      G. Nausea and/or vomiting
      H. Tetany
      I. Laryngeal spasm
      J. Seizures
      K. Bradycardia
   iii. Treatment

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**Centrifuged Blood Samples Showing Clear Plasma and Worsening Levels of Hemolysis**

a. **Mild Toxicity** - Slow or stop transfusion until symptoms subside. Ensure proper mixture and concentration of citrate

b. **Severe Toxicity** - 10ml of a 10% solution of Calcium Gluconate SLOW IV push.

c. Do not rapidly infuse Calcium nor give more than one dose without the ability to monitor electrolytes. This may lead to cardiac arrhythmias.

5. **Treatment of Immunologic Blood Transfusions Reactions.**

   The first step in treating ALL transfusion related issues is to STOP the transfusion and save all of the blood products and equipment used for administration and typing for follow-up testing.

a. **Anaphylactic Reactions**

   i. Epinephrine 0.5ml of 1:1000 IM
   
   ii. Airway maintenance and oxygenation
   
   iii. Resuscitate hypotensive patients with IV fluids.

b. **Acute Hemolytic Transfusion Reaction (AHTR)**

   i. Immediately STOP the transfusion
   
   ii. Initial Treatment

   A. Secure and maintain airway
   
   B. Begin an IV infusion of Lactated Ringer’s (LR).

   **WARNING** DO NOT run any fluid through the line that was carrying blood.

   C. The goal of fluid resuscitation is to maintain a urine output of 100-200ml/hr until the urine is clear of hemolyzed RBCs.

   D. Administer mannitol 20% (Osmitrol®) 20gm IV over 5 minutes using a blood administration filter to prevent infusion of mannitol crystals. If diuresis does not occur, repeat the 20gm dose once. The patient should receive a Foley catheter to monitor urine output.

   E. If mannitol 20% (Osmitrol®) is unavailable or does not produce diuresis, administer furosemide (Lasix®) 40-80mg initially and titrate later doses to maintain urine output of 100-200cc/hr.

   F. However, if urine output is not obtained within 2-3 hours of administration of fluid, consider the development of Acute Renal Failure and discontinue further fluids.

   G. Consider using acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV (every 6 hours to treat discomfort associated with fevers. (Avoid the use of aspirin or other NSAIDS).

   H. Administer 25-50mg of diphenhydramine (Benadryl®) IM, or IV to treat the associated histamine release from AHTR and help manage the chills and rigor.

   **WARNING** Antihistamine (IV administration) must never be mixed with blood or blood products in the same transfusion lines.

   iii. SAVE the rest of the donor blood and any typing information available and evacuate with the patient. This will allow for ABO and further diagnostic testing at the medical treatment facility.

c. **Febrile Non Hemolytic Reactions**

   i. Treat with antipyretics. Acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV (avoid the use of aspirin and other NSAIDS).

   ii. If symptoms abate and there is no evidence of an acute hemolytic reaction consider restarting the transfusion.
iii. Pretreatment with antipyretics and antihistamines is recommended in this protocol and commonly done although there is no evidence that is decreases the incidence of fever and urticaria associated with transfusions.

d. Urticarial Reactions
i. Treat with 25-50mg diphenhydramine (Benadryl®) IM or PO.
ii. If symptoms abate and there is no evidence of an acute hemolytic reaction consider restarting the transfusion.

ADMINISTER FFP:
1. Keep FFP frozen at -0.4 degrees F (-18 degrees C) or below.
2. Do not rough handle FFP before thawing because the bags can be easily cracked, broken, or damaged.
3. FFP should be thawed in a water bath with the FFP bag wrapped in a plastic overwrap bag to protect the ports from contamination and to lessen the risk of contaminating the water bath if the FFP bag is broken or cracked (See Enclosure #2: Suggested Packing List). Thaw FFP at 98.6 degrees F (37 degrees C) or by using a method and/or equipment that is intended (validated) for such use. Do not exceed 107 degrees F (42 degrees C).
4. Turn the plasma during the thawing process and ensure that all fibrin clots are dissolved.
5. The plasma should be administered as rapidly as possible after thawing. Keep plasma refrigerated at 33-43 degrees F (1-6 degrees C) prior to administration.
6. Thawed plasma can be stored for 3 days at 33-43 degrees F (1-6 degrees C) and then should be returned to the MTF for use. If thawed plasma cannot be returned to and MTF for use then it should be discarded after storage at 33-43 degrees F (1-6 degrees C) for 5 days. Thawed plasma can only be kept for 30 minutes at room temperature (68-75 degrees F [20-24 degrees C]).
7. AB is the universal donor for plasma.
8. FFP is normally supplied as type AB or A.
9. Rh factor is not a concern when administering FFP.
10. Ensure compatibility of recipient.
11. Administer 2 units of FFP and then begin administering PRBCs in a 1:1 ratio if available. You may bolus or pressure infuse FFP immediately.

PERFORM A WHOLE BLOOD (FWB) TRANSFUSION:
1. LOCATE A SUITABLE DONOR.
   a. Identify a blood donor who is ABO identical with the intended recipient.
   b. Rh+ (positive) patients may receive either Rh+ (positive) or Rh- (negative) blood.
   c. Rh- (negative) patients should receive Rh- (negative) blood if possible.
   d. Rh- (negative) females with childbearing potential must be given priority for Rh- (negative) blood to avoid the risk of Rh sensitization.
   e. When appropriate, set up a “walking blood bank” with pre-screened donors prior to deployment.
   f. The single most important way of protecting the patient and donor is to conduct a thorough donor interview for infectious disease risk factors, determination and qualification of the health of the donor on the day of donation (see Enclosure #1: Donor Questionnaire).
   g. Donor should preferably be U.S. military.
   h. The safest donor candidate is one with recent laboratory confirmation of blood group/type and no evidence of transfusion transmissible disease. Prior blood donors are preferred.
   i. Females who have been pregnant in the past, even if they did not reach full term should only be used as a last resort because of the increased risk of Transfusion Related Acute Lung Injury (TRALI) (1 in 10,000-60,000).
   j. Personnel who have received blood transfusions in the past should only be used as a last resort because of the increased risk of a transfusion reaction.
   k. It is highly recommended, to perform rapid, on-site viral marker screening tests of potential blood donors using screening immunoassays for infectious diseases (e.g., HIV, HBsAg, HCV) before blood is transfused. If testing is not possible prior to transfusion, rapid, on-site viral marker testing should be performed as soon as possible and the results recorded appropriately. NSNs for rapid viral marker screening assays are listed in suggested packing list (See Enclosure #2: Suggested Packing List).
   l. Retrospective testing for infectious disease markers will be performed on all donor specimens. This testing will be completed at an FDA-approved, DoD laboratory IAW FDA/AABB standards.
   m. The donor should report to the nearest MTF capable of performing blood sample collection and processing IAW the applicable theater.
   n. Send donor pilot tubes to a supporting theater Blood Support Detachment for transport via established channels to an FDA-approved DoD reference testing laboratory. This should be done as soon as feasible.
   
   WARNING  GROUNDING procedure. Army Regulations (AR) and Air Force Instructions (AFI) both mandate that aircrew personnel not fly within 72 hours following blood donation. Office of the Chief of Naval Operations Instructions (OPNAVINST) prohibit aircrew personnel from being regular blood donors and mandates that aircrew personnel not participate in flight duties for 4 days following blood donation. OPNAVINST also mandates that flight personnel in combat or performing shipboard duties not donate blood for 4 weeks prior to flying and states that the flying unit commander must approve donations of blood, plasma or bone marrow by aircrew members. (AR 40-8 dtd 16 May 2007, AFI 11-202V3 dtd 22 October 2010, OPNAVINST 3710.7T dtd 23 November 2009). All other donors should be given light duty or quarters for at least 72 hours following donation.
   p. Every effort should be made to send all blood collection and administration equipment as well as all blood typing tests and any viral tests performed along with the patient for retrospective testing and documentation

2. Perform collection.
   a. Clean donor’s arm with povidone iodine or appropriate alternate antiseptic agent for at least one minute at least 3 inches in diameter from the anticipated site of the venipuncture.
b. Donor blood should be drawn from an arm vein into an in-date, intact commercial single unit whole blood collection bag. The bag is 600ml capacity and contains 63ml of CPD or CPDA-1 anticoagulant and is intended to collect 450ml of blood +/- 10%.

Do not overfill the bag as overfilling of the bag could lead to clotting.

c. Place a constricting band around the donor's arm or alternatively a blood pressure cuff inflated to 40-60mmHg.

d. Place a hemostat or pinch the line approximately 6 inches from the needle prior to removing the needle cap.

Failure to clamp or pinch the line prior to removing the needle cap could allow air to enter the line and prevent proper negative pressure generation in the collection bag and could lead to incomplete filling of the bag and contamination.

e. Perform venipuncture. Twist off the needle cover and inspect the needle for barbs or other defects. Pull the skin taut below the venipuncture site and insert the needle bevel up at an angle of 30-45 degrees. Pierce the skin with a smooth, quick thrust at the selected point of entry. When the bevel is completely under the skin, lower the angle of the needle to approximately 10 degrees or less and with a steady push, advance needle to penetrate the vein wall. Thread needle approximately ½ inch inside the vein to maintain a secure position and to lessen the chance of a clot forming. Consider performing the collection with the bevel of the needle down to prevent occlusion of the bevel opening by the vein wall, which can occur. This can be done by rotating the needle 180 degrees after inserting it bevel up. Alternatively, you can prop up the
needle using a rolled up 2-inch by 2-inch gauze or other item placed under the needle hub to keep the needle raised to the proper angle.

You may see little or no “flash” of blood in the collection line until you remove the clamp or pinch in the line. You should feel a “pop” when the vein is entered. If there is no flash when the clamp or pinch is removed then the needle may be partially withdrawn and venipuncture reattempted. **Do not fully remove the needle from under the skin without a clamp or pinch in the line because this may allow air to enter the line. Air in the line can prevent negative pressure from forming when the line is opened and the column of fluid is pulled down by gravity and could lead to incomplete filling of the bag.**

f. Place the collection bag below the donor’s heart and release the clamp or pinch in the line.

g. Consider removing the constricting band or blood pressure cuff as soon as blood flows adequately to prevent stasis.

**If the flow is sluggish, leave the constricting band in place longer.** This may be necessary to ensure good back pressure from venous return and will lessen the possibility of incomplete filling of the collection bag. Don’t leave the constricting band on for more than 3 minutes to prevent stasis.

h. Tape the needle down at the hub and tape the line to the patient’s skin to prevent it from being pulled out.

i. Begin rocking the bag as soon as blood flow begins and continue gently rocking the bag about every two minutes during collection to ensure thorough mixing of the citrate with the blood to prevent areas of high citrate concentration. Make every attempt to insulate the collection bag and keep it off of the ground in order to keep the collected blood warm.

j. Remove about 450ml of blood (enough so the bag is almost full). Overfilling the bag may cause clotting. A trip scale should be used for accuracy (measure 450 +/- 50gm plus weight of blood bag). Alternatively, an 11-inch piece of 550-cord (NSN 4020-00-246-0688) can be used to estimate when the blood collection bag is adequately filled. With the bag lying on a flat surface place the 11-inch piece of cord under the bag and wrap it around the width of the bag. When you are able to bring the ends of the cord together to the point where they will just barely meet without compressing or lifting the bag, the bag is adequately filled.

![Measurement - bring the ends of an 11-inch piece of cord together around the bag until they just meet.](image)
k. Also, a Terumo Single Blood Bag can be used (See Enclosure #2: Suggested Packing List). This bag already has a mark to indicate when a bag is filled. The bag is suspended from the collection line and is full when the level of collected blood reaches the full indicator mark.

Terumo Single Blood Bag

Blood Trip Scale Made from a Balance Beam Scale with Improvised Counterweight
(Photo courtesy LTC Shawn C. Nessen, MD)

Never collect more than one unit from an individual.
2. Once the bag is adequately filled, clamp the line with a hemostat near the collection bag and remove the needle. Then double knot the collection line between the hemostat and blood bag and cut between the knots.

3. If appropriate for the tactical situation, infuse 500ml of Hextend® into the donor for volume replacement.

4. Donor should lie down during collection because of the risk of syncope.

5. Donor should take food and drink immediately after donation.

6. Donor must wait at least 56 days between donations.

Make no attempt to bank blood. Collected blood should be transfused immediately, and must be used within 24 hours. Unused blood may be re-infused into the donor, but must be discarded after 24 hours. Do not attempt to re-infuse unused blood into the donor unless the collection bag has been completely filled or it may lead to citrate toxicity. **DO NOT RE-INFUSE BLOOD INTO THE DONOR IF YOU ARE IN DOUBT ABOUT THE IDENTITY OF THE DONOR. THE DONOR MUST SIGN THE BAG UPON COLLECTION AND YOU AND THE DONOR MUST CONFIRM THE SIGNATURE PRIOR TO RE-INFUSION. IF ANY DOUBT WHATSOEVER EXISTS, DISCARD THE COLLECTED BLOOD!**

7. If necessary, confirm blood types using the EldonCard® blood typing kit. Unless you have recent laboratory confirmation of blood group/type, confirmation using an EldonCard® is HIGHLY recommended.
   a. Once you have found a suitable donor and initiated a blood collection, confirm the donor and recipient blood types with an EldonCard® blood typing kit.
   b. Perform blood typing with an EldonCard® blood typing kit in accordance with the manufacturer’s instructions.

8. If you are performing a WB transfusion and there is any doubt about the ABO typing, consider performing a whole blood cross-match test if possible.
   a. If you have access to a method of separating the plasma from a blood sample, you can attempt to perform a whole blood cross-match. This increases the safety of a WB transfusion.

### Hand Cranked Centrifuge Connected to Cordless Drill Using Locally Manufactured Adapter
Close Up Photos of Locally Manufactured Adapter

b. After separating, take four drops of the recipient’s plasma and place them on a smooth white tile, glass slide or a clean smooth piece of glass.

c. Take one drop of whole blood from the donor and add it to the recipient’s plasma and gently mix using the tip of a needle or other sterile instrument.

d. If using a glass slide or piece of glass, place the mixture of plasma and whole blood against a bright white background.

e. Wait four minutes and observe the mixture for signs of agglutination. The test should be performed no colder than room temperature 68 degrees F (18 degrees C) and optimally at 98.6 degrees F (37 degrees C). Stirring the mixture should help determine if there is any agglutination. A magnifying lens can aid in determining if there is agglutination present.

Agglutination

If any sign of agglutination is present then the transfusion should not be performed.

CANINE CONSIDERATIONS

1. Canines have naturally occurring antibodies to the antigens that are found on their RBCs. These naturally occurring antibodies can cause IHTR the first time a FWB transfusion is performed.

2. Canines have an entirely different set of blood type antigens and cannot be typed using human blood typing supplies, but the aforementioned whole blood crossmatch procedure can be performed in the same manner. Optimally canines should be typed and crossmatched prior to transfusion. However,
due to the lower incidence of IHTR and for expediency the normal standard of care is to allow them to receive a blood transfusion from any potential donor provided neither the donor nor the recipient has ever received a blood transfusion.

3. Normally the same amount of blood is collected from a canine donor for transfusion (450ml). The donor must weigh 50lbs or more or the collection should not be conducted. A regular collection bag containing 63ml of CPD or CPDA-1 is used.

4. Human blood products cannot be used in canines.

**ADMINISTER BLOOD (WB, FWB, WFWB) OR PRBCs:**
1. Store WB and PRBCs at 34-43 degrees F (1-6 degrees C). WB should only be stored at these temperatures if is not going to be transfused immediately, but never longer than 24 hours. Refrigeration of WB has shown to decrease platelet function.

2. Ensure compatibility of recipient.

3. When administering PRBCs, the first choice is ABO type specific (identical) and Rh compatible. If this is not available, use O type blood.

![Type O blood is the “universal donor” for PRBCs.]

**PRBC Compatibility Diagram**

g. In a patient with a history of allergies or an allergic transfusion reaction, give (Benadryl®) 25-50mg IV (through a separate line), IM, or PO prophylactically just before or at the beginning of the transfusion.

**Antihistamine must never be mixed with blood or blood products.**

h. In a patient with a history of a febrile reaction acetaminophen (Tylenol®, Ofirmev® [IV]) 1gm PO, PR, or IV may be given prophylactically before the transfusion.

i. Prepare the blood or PRBCs and the blood administration set.
Always use an administration set specifically designed for the administration of blood and blood components. The administration set should filter between 170-260 microns. There is no set number of units that can be delivered before an administration set must be switched out. An administration set should be changed when it becomes clogged or after 24 hours. The number of units that an administration set can deliver before becoming clogged depends on the level of filtration and the amount of microagglutins that have formed. The older the blood or PRBCs the higher the amount of microagglutins there will be. A 170 micron set can reliably deliver 3-4 units of blood or PRBCs before the filter becomes clogged and must be changed. A 260 micron set can reliably deliver about 6-8 units of blood or PRBCs before it becomes clogged and must be replaced.

Y-Type Filtered Blood/Solution Set
(Retrieved from http://www.alarismed.com/images/products/42081e.jpg)

i. Close all three clamps on the “Y” tubing.
ii. Aseptically insert one of the tubing spikes into the container of NS. Invert and hang this container about 3 feet above the level of the patient to help prevent any backflow of blood into the saline.
iii. Open the clamp on the NS line, prime the upper line and filter and fill the drip chamber half full.
iv. Open the clamp on the empty line on which you will eventually hang the blood or PRBCs. NS will flow up the empty line to prime that portion of the tubing.
v. Once the blood line is primed with fluid, close the clamp on the blood line.
vi. Leave the clamp on the NS line open.
vii. Open the main roller clamp to prime the lower infusion tubing and then close it.
viii. Expose the port on the blood or PRBC pack and insert the remaining spike into the blood or PRBC port and hang the blood or PRBCs at the same level as the NS container.
ix. If “Y” type recipient tubing is not available, use regular infusion tubing for the NS and the available blood recipient tubing for the blood or PRBC pack. Prime each set with NS. Attach a sterile, large bore (16- or 18-gauge) needle to the end of the blood tubing, and “piggyback” the blood or PRBCs into the NS line below the level of the roller clamp. Hang the blood or PRBC pack at least 6 inches higher than the NS.

j. Connect the blood line.
   i. Patients receiving blood or blood components must have two IV sites in the event of complications or emergencies.
   ii. Establish one or two new IV sites as needed.
   iii. Use a large gauge IV catheter (14, 16, or 18) to enhance the flow of blood or PRBCs and prevent hemolysis of the cells.
   iv. If the patient already has two IV sites, aseptically switch one of the existing IV lines with the filtered blood line or piggyback the filtered blood line into an existing IV line.

k. Begin the infusion of blood or PRBCs.
   i. Attach the primed infusion set to the catheter, tape it securely, and open the main roller clamp.
   ii. Close the roller clamp to the NS, and open the roller clamp to the blood or PRBCs.

   Ensure you that you close the roller clamp to the NS prior to opening the roller clamp to the blood or PRBCs or the blood or PRBCs will flow into the NS. If the blood or PRBCs become mixed with the NS, shut off the roller clamp to the NS and deliver the blood or PRBCs.
   iii. The viscosity of PRBCs (especially if they are cold and using an in-line blood warmer) may cause difficulty in delivery through long tubing sets and filters. Using 300ml of NS to back fill the PRBCs will improve delivery. Whole Blood usually does not require dilution for effective delivery.
   iv. Adjust the flow rate with the main roller clamp.
i. Set the flow rate to deliver approximately 10-30ml of blood or PRBCs over the first 15 minutes.

ii. Monitor the vital signs every 5 minutes for the first 15 minutes and observe the casualty for indications of an adverse reaction to the blood or PRBCs.

Anytime an adverse reaction is suspected, immediately stop the blood or PRBCs and infuse NS through a completely separate catheter and IV line.

iii. If after the first 15 minutes no adverse reaction is suspected and the vital signs are stable, open the main roller clamp or set at the desired flow rate. You may bolus or pressure infuse the blood or PRBCs at this time.

l. Monitor and evaluate the patient throughout the procedure.
   i. Monitor vital signs every 15 minutes.
   ii. Compare the vital signs with previous and baseline vital signs.
   iii. Observe the casualty for changes that indicate an adverse reaction to the blood or PRBCs.
   iv. If a reaction is suspected, stop the blood or PRBCs, infuse LR through a separate IV line, and identify and treat the reaction.

When a transfusion reaction occurs or is suspected, no more fluid should be infused through the IV line or catheter. The unused blood or PRBCs and recipient tubing should be sent along with the patient for testing.

m. Discontinue the infusion of blood or PRBCs when the patient's vital signs have stabilized or the transfusion is finished.
   i. Close the clamp to the blood or PRBCs and open the clamp to the NS.
   ii. Flush the tubing and filter with approximately 50ml of NS to deliver the residual blood or PRBCs.
   iii. After the residual blood or PRBCs have been delivered, run the NS at a TKO rate or hang another solution, as needed.
   iv. Take and record the vital signs at the completion of the transfusion and continue to monitor until evacuation.

n. Document the procedure. Ensure you document the infusion of any blood or blood component, to include the number, component type, and blood type of units infused on the casualty card (DA FORM 7656) and send this with the patient to the MTF.

**DISPOSITION:**

*Urgent* evacuation is indicated for any casualty requiring the administration of blood or blood components.

*Urgent* evacuation is indicated in any patient who has an acute hemolytic reaction while undergoing a blood transfusion.

**REFERENCES:**


17. (S) CENTCOM THEATER BLOOD PROGRAM POLICY LETTER, 11 March 03.

18. Committee on Tactical Combat Casualty Care Guidelines, dtd 1 November 2010.

19. FM 4-02.70; NAVMED P-5120; AFMAN (I) 41-111, Standards for Blood Banks and Transfusion Services, Current Edition, American Association of Blood Banks.


31. *Transfusion Reactions*, Barbara A. O’Malley, M.D., Associate Director of Transfusion Medicine, Harper University Hospital, Detroit Medical Center, accessed 26 June 2011.


EMERGENCY WHOLE BLOOD DONATION RECORD
(Modified Version of the DD Form 572)

MTF/Location: ___________________________ Blood Unit Number

Donor's Full Name: _______________________

Donation Date: ___________________________

Branch: USA, USAF, U.S. Navy, U.S. Marine Corps

SSN: ___________________________ Sex: M / F

Date of Birth: ___________ Ht/Wt: ___________ AB/Rh (Blood Type):

Deployed Unit Location: ________________________ Redeployment Date: ________________________

Rank: ___________________________ Local DSN Phone: ___________________________

Current Residence: Bldg/Room #: ___________________________ Email: ___________________________

Home Address (State/Zip): ___________________________

Home Phone Number: ___________________________


Y 21. N Female Donors: Are you pregnant now, or have you been pregnant in the last 6 weeks?

Y 22. N Are you feeling well and healthy today?

Y 23. N Have you read and do you understand all the donor information presented to you, and have all your questions been answered?

Y 24. N Do you understand that if you are in a high risk group, you may have the AIDS virus and you can give it to someone else even though you may feel well and have a negative AIDS test?

Y 25. N Have you ever given blood under another name or Social Security Number?

Y 26. N In the past 8 weeks, have you given blood, plasma or platelets?

Y 27. N Have you ever been refused as a blood donor or told not to donate blood?

Y 28. N In the past 12 months, have you been under a doctor's care, had an illness, or surgery?

Y 29. N In the past 12 months, have you received blood, blood products, or a tissue transplant including any you may have donated for yourself (allogenic)?

Y 30. N In the past 3 years, have you had malaria?

Y 31. N In the past month, have you taken any pills or medications?

Y 32. N Have you ever been given growth hormone or received a data mater (or brain covering) graft?

Y 33. N Have you ever taken Etoinaine (Tegison) or Accrin (Soriatane)?

Y 34. N Have you ever had cancer, a blood disease, or a bleeding problem?

Y 35. N Have you ever had chest pain, heart disease, or lung disease?

(Use this section and reverse side of form to explain "Yes" answers above. With the exception of questions 22-24)

High Risk Oral Questions (30May2003) Asked By: _______________ Donor: Temp: ___________ F/°c

(< 99.6°F/37.5°C) BP: ___________ Pulse: ___________ HCT/Hgb: ___________

(< 180/100) (< 100 bpm) (> 38%) or 12.5 g/dL)

31. Medications: ___________________________

Malaria Prophylaxis: Daily (Doxycycline) Weekly (Mefloquine) N/A ___________

Your blood will NOT be tested for viral diseases prior to transfusion due to the emergency. If you have any reason to believe your blood may not be safe or you could answer yes to the high risk questions, please do not donate today. I have read and explained to me the high risk questions and am not in a high risk category, and feel my blood is safe to donate at this time.

I certify that I have answered the questions honestly, and feel my blood is safe to be transfused ___________________________

Donor's Signature

Phlebotomist: ___________________________ Start Time: ___________ Stop Time: ___________

(Should be < 15 minutes)

Bag Manufacturer: ___________________________ Lot #: ___________ Expiration date: ___________

Segment Number: ___________

The Modified DD Form 572 has been reviewed for completeness. If there are any risk factors that place the recipient at harm notify the ordering physician immediately for appropriate follow-up.

DD 572 (W3)

Version: 13 August 2009
Enclosure #1-QUESTIONNAIRE

DIRECT ORAL QUESTIONS

PREAMBLE
I am required to ask you some questions. If you do not understand a question, please ask me to explain it before answering. The reason for asking these questions is to determine your suitability as a volunteer blood donor. Your answers to these questions will be kept strictly confidential, but may result in you being asked not to donate blood, either temporarily or permanently. Do not respond until I have asked you the entire group of questions, which at that time may give me an answer—Yes or No.

GROUP A:
1. Do you have AIDS or have you ever had a positive test for the AIDS virus (HIV)?
2. Have you ever taken illegal drugs with a needle, even one time (including steroids)?
3. Have you ever taken clotting factor concentrates for a bleeding disorder such as hemophilia?
4. At any time since 1977, have you taken money or drugs in exchange for sex?
5. Male donors only: Have you had sex with another male, even one time since 1977? (A “Yes” answer to Group A is a PERMANENT DEFERRAL)

GROUP B:
1. Were you born in, have you lived in, or traveled to any African country since 1977?
   - No
     Proceed to Group B, Question 3
   - YES
     Was it any of these countries: Cameroon, Benin, Central African Republic, Chad, Congo, Equatorial Guinea, Kenya, Gabon, Niger, Nigeria, Senegal, Togo or Zimbabwe?
       - No
         Go to Group B, Question 3
       - YES – Travel Only
         Proceed to Group B Question 2
       - YES – Born or Lived in
         Document when, DEFER INDEFINITELY

2. When you traveled to (name of country) did you receive a blood transfusion, or any other medical treatment with a product made from blood?
   - NO
     Proceed to Group B, Question 3
   - YES
     DEFER INDEFINITELY

3. Have you had sex with anyone who was born in, or has lived in any African Country since 1977?
   - NO
     Proceed to Group C
   - YES
     Was it any of these countries: Cameroon, Benin, Central African Republic, Chad, Congo, Equatorial Guinea, Kenya, Gabon, Niger, Nigeria, Senegal, Togo or Zimbabwe?
       - NO to listed Countries
         Proceed to Group C
       - YES to listed Countries
         Document when, DEFER INDEFINITELY

(A “Yes” answer to Group B may be an Indefinite Deferral)

GROUP C:
1. Have you had sex in the last 12 months, even once, with anyone who has AIDS or has had a positive test for the AIDS virus?
2. Have you had sex in the last 12 months, even once, with anyone who has ever taken illegal drugs with a needle (including steroids)?
3. Have you had sex in the last 12 months, even once, with anyone who has taken clotting factor concentrates for a bleeding disorder such as hemophilia?
4. At any time in the last 12 months have you given money or drugs to someone to have sex with you?
5. At any time in the last 12 months, have you had sex with someone who has taken money or drugs in exchange for sex?
6. In the past 12 months, have you had a positive test for syphilis?
7. In the last 12 months have you had syphilis or gonorrhea or have you been treated for syphilis or gonorrhea?
8. In the last 12 months, have you received blood or blood products?
9. In the last 12 months, have you been incarcerated in a correctional institution (including jail or prison) for more than 72 consecutive hours?
10. In the last 12 months, have you taken (snorted) cocaine through your nose?
11. Female donors only: In the past 12 months, have you had sex with a man who had sex with another man, even one time since 1977? (A “Yes” answer to Group C is a TEMPORARY DEFERRAL for 12 months following the event)

GROUP D:
1. Have you at any time since 1980 injected Bovine (Beef) Insulin?
   - NO
     Proceed to Group D, Question 3
   - YES
     Document when, DEFER INDEFINITELY

Direct Oral Questions January 10, 2010
Army Blood Program Policy Letter 2010-01-02
# Enclosure #2 - SUGGESTED PACKING LIST

## SUGGESTED MINIMUM EQUIPMENT FOR BLOOD COLLECTION AND ADMINISTRATION

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<tr>
<th>Item Description</th>
<th>National Stock Number (NSN)</th>
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<tr>
<td>BLOOD COLLECTING AND DISPENSING BAG, CPD</td>
<td>6515-01-523-5964</td>
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<tr>
<td>COLLECTION BAG, TERUMO®</td>
<td>6515-01-480-2307</td>
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<tr>
<td>NITRILE GLOVES, OD Medium:</td>
<td>6515-01-521-7501</td>
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<tr>
<td></td>
<td>Large: 6515-01-521-7505</td>
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<td></td>
<td>X-Large: 6515-01-521-7508</td>
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<tr>
<td>Item Description</td>
<td>Part Number</td>
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<td>-------------------------------------------------------</td>
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<tr>
<td>PAD, ISOPROPYL ALCOHOL IMPREGNATED</td>
<td>6510-00-786-3736</td>
</tr>
<tr>
<td>PAD, POVIDONE-IODINE IMPREGNATED</td>
<td>6510-01-010-0307</td>
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<td>TOURNIQUET, NONPNEUMATIC (CONSTRUCTING BAND)</td>
<td>6515-01-146-7794</td>
</tr>
<tr>
<td>SPONGE SURGICAL, STERILE, 2X2 INCH</td>
<td>6510-01-530-9413</td>
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<td>ADHESIVE TAPE, SURGICAL</td>
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<td>NYLON CORD PIA-C-5040/MIL-C-5040, TYPE III, 11 INCH</td>
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<td>BLOOD RECIPIENT SET, INDIRECT TRANSFUSION</td>
<td>6515-01-128-1407</td>
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<tr>
<td>BLOOD TYPING CARD (ELDONCARD®)</td>
<td>6550-01-511-9294</td>
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**ADDITIONAL EQUIPMENT FOR COLLECTION AND ADMINISTRATION OF BLOOD AND BLOOD COMPONENTS**
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<th>Item</th>
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<tr>
<td>FORCEPS, HEMOSTATIC</td>
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<td>UNDERPAD, BLUE (CHUX)</td>
<td>6530-01-027-0179</td>
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<tr>
<td>STOPCOCK, IV THERAPY, 3 WAY</td>
<td>6515-00-864-8864</td>
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<tr>
<td>BIORAPID HBSAG BIOKIT (SPAIN)</td>
<td>6550-08-133-2246</td>
</tr>
<tr>
<td>BIORAPID HCV BIOKIT (SPAIN)</td>
<td>6550-08-133-2247</td>
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HIV 1/2 RA ORAQUICK 6550-01-526-7424

ORAQUIK HCV 6550-01-589-9845

ONSITE (CTK) HBSAG (HEP B) 6550-01-472-6534

MALARIA RAPID DIAGNOSTIC DEVICE (MRDD) 6550-01-554-8536

TEST KIT, SYPHILIS DETECTION 6550-01-511-0291
PLASMA OVERWRAP BAGS 6515-01-511-3624

THAWING SYSTEM, PLASMA (4 UNIT) 6640-01-510-3136

Golden Hour Container

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<td>Woodland Marine Pixel</td>
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<tr>
<td>Desert Pattern</td>
<td>6530-01-505-5306</td>
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<tr>
<td>Woodland Army</td>
<td>6530-01-505-5301</td>
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<tr>
<td>Thermal Chamber, Replacement Part</td>
<td>6530-01-505-5311</td>
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</table>

BLOOD PRODUCT REFRIGERATOR/FREEZER 4110-01-506-0895
CENTRIFUGE, LABORATORY, HAND OPERATED

ADAPTER, DRILL, HAND OPERATED CENTRIFUGE

LOCAL MANUFACTURE
CRUSH SYNDROME PROTOCOL

SPECIAL CONSIDERATIONS:
1. Be aware of development of crush syndrome starting as early as 4 hours post injury.
2. These medications are not part of the standard ATP aid bag and require development of a separate crush injury kit.

The principles of hypotensive resuscitation according to TCCC DO NOT apply in the setting of extremity crush injury requiring extrication.

In the setting of a crush injury associated with non compressible (thoracic, abdominal, pelvic) hemorrhage, aggressive fluid resuscitation may result in increased hemorrhage.

With extremity injuries, tourniquets should NOT be applied during Phase 1 unless there is hemorrhage that is not controllable by other means.

Be aware of development of cardiac dysrhythmias due to hyperkalemia immediately following extrication.

DEFINITION:
Massive, prolonged crush injury resulting in profound muscle and soft tissue damage places the patient at significantly increased risk for developing circulatory and renal complications.

MANAGEMENT:
PHASE 1: IMMEDIATE (while attempting extrication):
1. Maintain patent airway (NPA, OPA, etc.) and adequate ventilation.
2. Monitor O₂ sat with pulse ox and administer high flow oxygen if available.
3. Give initial bolus of 1-1.5L of NS PRIOR to attempts at extrication and continue at 1.5L/hr. Ringer’s lactate is not recommended due to the potassium content.
4. Maintain urine output at greater than or equal to 200cc/hr. If possible, insert Foley catheter.
5. Assess and reassess mental status.
6. Follow Pain Management Protocol (TMEP)
7. Consider prophylactic antibiotics – Ertapenem (Invanz) 1gm IV.
8. Utilize Propack or AED cardiac monitoring if available.
9. Mannitol (administer 1–2gm/kg at a rate of 5gm/hr). Ensure urine output has been established prior to using Mannitol.
PHASE 2: IMMEDIATELY PRIOR TO EXTRICATION:

10. Immediately prior to extrication, apply tourniquets to crushed extremities, if possible.

Phase 2 Recommended Additional Resuscitative Drugs

11. Sodium Bicarbonate – give 1mEq/kg IV immediately prior to extrication (Bristojet 1–2 amps). Additional dosing of Sodium bicarbonate may be required if dysrhythmias or cardiac arrest persist after giving calcium chloride or gluconate

PHASE 3: IMMEDIATELY FOLLOWING EXTRICATION

Cardiac Dysrhythmias or Arrest

12. CPR should be initiated if cardiac arrest develops following extrication. DO NOT follow the TCCC guidelines on cardiac arrest.

13. If extrication is greater than 4 hours OR in the presence of dysrhythmias, administer Calcium Chloride (1gm, 10ml of 10% solution) or Calcium Gluconate (1gm, 10ml of 10% solution).

14. Calcium should not be given in bicarbonate containing solutions due to precipitation of calcium carbonate.

15. Additional dosing of Sodium bicarbonate may be required if dysrhythmias or cardiac arrest persist after giving calcium chloride or gluconate

15. Following extrication, once the patient is stabilized, be prepared to treat hyperkalemia as tourniquets are released.

DISPOSITION:

Urgent Surgical evacuation
FASCIOTOMY PROTOCOL

**SPECIAL CONSIDERATIONS:**
1. Compartment syndromes require a high index of suspicion.
2. Do not attempt these procedures if not trained or qualified.

**SIGNS AND SYMPTOMS**
1. Be suspicious of compartment syndrome in the following conditions:
   A. Fractures
   B. Crush injuries
   C. Vascular injury
   D. Circumferential burns
   E. Multiple penetrating injuries (fragmentation)
   F. Blunt trauma
2. Clinical signs: Accurate diagnosis requires a high rate of suspicion.
   A. "Classic: Late Signs – 5Ps"
      1) Pain
      2) Pallor
      3) Pulselessness: Be aware that peripheral pulses are present in 90% of patients with compartment syndrome.
      4) Paresthesia
      5) Paralysis
   B. More common acute findings
      1) Increasing pain
      2) Pain out of proportion to injury
      3) Pain with passive motion of muscles in the involved compartment
      4) Pallor
      5) Paresthesia (numbness)
   C. Increasing swelling, decreasing motion, and increasing pain not responsive to pain medication in the appropriate clinical setting should raise the possibility of a developing compartment syndrome.
   D. Compartment syndromes may take hours or days to develop. For patients with suspected compartment syndromes, re-evaluate q 30min for 2hrs, then q 1hr for 12 hrs, then q 2hr for 24 hrs, and then q 4-6hr for 48 hrs.
   E. Compartment Syndromes may occur in the: thigh, lower leg/ calf, foot, forearm, or hand

**MANAGEMENT**
1. Orthopedic/Compartment Syndrome Management.
2. Apply traction splints as necessary.
3. Assess fractures and splint in position of function.
4. Check neurovascular status after any manipulation.
5. Use compartment pressure monitor if available
   A. Perfusion pressure = diastolic blood pressure – measured intramuscular pressure
      1) Perfusion Pressure < 30mm is diagnostic for compartment syndrome
      2) Hypotensive patients have a lowered diastolic pressure and may have increased susceptibility to developing a compartment syndrome.
   B. Repeat measurements if clinically indicated or if patient is obtunded due to narcotic use or head injury.
6. Non Surgical Treatment
   A. Pain Management: See Pain Management TMEP
1) Increasing pain medication requirements may mask development of a compartment syndrome

2) Narcotic doses which decrease the Soldier’s level of consciousness and cause drowsiness will oversedate a patient so that the increasing pain of a compartment syndrome is not recognized.

B. Elevation – Maintain extremity at level of the heart. **DO NOT ELEVATE.**

C. Loosen encircling dressings

7. Surgical (Fasciotomy)
   A. See **Procedural Analgesia Protocol** prior to doing procedures

   B. Only consider fasciotomy if:
      1) Evacuation is delayed 6 hrs or longer
      2) **AND** fasciotomy is within the scope of practice of the treating medic
      3) **AND** the following indications exist:
         a. Pain with passive motion of the involved muscle group
            i. Increasing pain with decreasing response to pain meds
            ii. Increasing swelling and tightness in the involved compartment
      4) **OR** There are elevated compartment pressures as defined above (#5).

   C. Fasciotomy may be a limb saving procedure in the proper clinical setting. When done for the wrong reasons, or done incorrectly, the potential for serious complications exists.

   D. Procedure: Utilize **Procedural Analgesia Protocol**
      1) Thigh: anterior skin incision, ID muscle fascia and split fascia only
      2) Lower leg/ Calf:
         a. Anterior and Lateral Compartments:
            i. Identify the anterior tibial crest and then identify the fibula. Make the skin incision from the proximal third to the distal third of the foreleg. The incision is located approximately 2cm anterior to the fibula.

            **Fig 1:** The incision is anterior to the fibula. The lines on the foot are used ONLY for a foot compartment syndrome.

            ii. Identify the intermuscular septum if possible. Make the anterior fascial incision parallel to the tibial crest and about 1 inch lateral to the tibial crest. The fascial incision should be the length of the skin incision. This releases the anterior compartment. To release the lateral compartment, identify the intermuscular septum approximately half way between the fibula and the anterior tibial crest. Posterior to
this septum, incise the fascia from the proximal aspect to the distal third of the foreleg.

**Fig 2:** Identify the tibia, fibula and the intermuscular septum. Make the Fasciotomy incisions anterior and posterior to the septum.

b. Posterior Compartment:
   i. Make an incision at the posteromedial aspect of the calf from the proximal muscle distally to the distal third of the foreleg. ID the fascia and split the fascia of the superficial muscles. To release the deep posterior compartment, develop the interval between posterior border of the tibia and the superficial posterior compartment. Proceed deep along the posterior border of the tibia. Identify the deep posterior compartment and release the fascia. Be careful of the deep neurovascular structures.

**Fig. 3:** The dotted line represents the palpable tibial border and the solid line on the tibia represents the incision line. The solid line on the foot is done ONLY for foot compartment syndromes.
3) Foot: Make longitudinal incisions between the metacarpals along the dorsal aspect of the foot as shown in figure 1. Identify the underlying fascia and incise it. Make a medial foot incision as shown in figure 3 and incise the underlying fascia.

4) Forearm: Make 20cm longitudinal incisions along the dorsal and volar aspects of the forearm. Identify the underlying fascia and split the fascia. Avoid cutting tendons and nerves.

![Fig. 4: Dorsal arm incision for forearm dorsal compartment release. Dorsal hand incisions used only for hand compartment syndrome.](image)

5) Hand: Make a 5cm longitudinal incision between the 2nd and 3rd, and the 3rd and 4th metacarpals on the dorsal aspect of the hand as shown in figure 4. Avoid cutting the extensor tendons. Split the underlying fascia.

E. Leave all wounds open and apply dressings.
F. Urgent evacuation
MILD TRAUMATIC BRAIN INJURY (MTBI)

SPECIAL CONSIDERATIONS:
1. Mandatory events requiring MACE:
   a. Personnel in a vehicle associated with a blast, collision or rollover
   b. Personnel within 150 meters of a blast
   c. Personnel with a direct blow to the head
   d. Command directed evaluation
2. NOT allow a patient with a mTBI to return to duty while they are symptomatic. This puts them at significant risk for greater injury (to include death) if they sustain another head injury while still symptomatic.
3. mTBI is primarily a clinical diagnosis. If you do not feel that a patient is back to their baseline, do not allow them to RTD and consult a medical provider

SIGNS AND SYMPTOMS:
1. Red Flags (Symptoms):
   A. Neurological
      1) Witnessed loss of consciousness
      2) Amnesia/memory problems
      3) Unusual behavior/combative
      4) Seizures
      5) Worsening headache
      6) Cannot recognize people
      7) Disoriented to time and/or place
      8) Abnormal speech
   B. Eyes
      1) Double vision
   C. General
      1) 2 or more blast exposures within 72 hours
      2) Repeated vomiting
      3) Weakness
      4) Unsteady on feet

MANAGEMENT:
1. Consider mTBI (concussion) in anyone who is dazed, confused, “saw stars”, lost consciousness (even if just momentarily) or has memory loss that results from a fall, explosion, motor vehicle crash or any other event involving abrupt head movement, a direct blow to the head or other head injury.
2. Triage and treat other injuries as required. As soon as tactically feasible evaluate for mTBI.
3. Red Flags present
   a. If red flags are present - consult with medical provider for possible urgent evacuation.
4. Administer MACE
   a. If MACE <25 or symptoms persist despite rest and appropriate treatment consult with medical provider for possible priority evacuation.
   b. If MACE is normal:
      i. Recommend 24 hour rest and re-evaluate
5. Follow Service specific, DVBIC, JTTG guidelines
6. Contraindications:
   a. If possible, avoid the use of Cox 1 NSAID medication (Motrin/ibuprofen, Aleve/naprosyn) due to effects on platelets and a potentially increased risk of bleeding. If COX 1 NSAIDS are the only medication available and the patient has no red flags they MAY be used to treat the headache.
   b. Avoid the use of tramadol (Ultram) due to its effects on platelets, increased bleeding and altered level of consciousness.
   c. Avoid the use of diphenhydramine (Benadryl) due to possibly alteration of the patient’s level of consciousness.
   d. Avoid the use of narcotics due to alteration of the patient’s level of consciousness.
DISPOSITION:

- **Urgent** evacuation in the presence of Red Flags
- **Priority** evacuation in the presence of MACE <25 and persistent symptoms despite appropriate treatment and rest
- **Routine** evacuation MACE persistently <25 OR MACE >25 and persistent symptoms despite appropriate treatment
NEUROGENIC / SPINAL SHOCK PROTOCOL

SPECIAL CONSIDERATIONS:
1. Neurogenic shock refers to the triad of hypotension, bradycardia, and peripheral vasodilation resulting from severe autonomic dysfunction and the interruption of sympathetic nervous system control in acute spinal cord injury. Hypothermia is also characteristic.
2. Neurogenic shock should be considered a diagnosis of exclusion in the setting of trauma.
3. Decreased vascular resistance with resultant warm extremities (depending on surrounding air temperatures) as opposed to cool extremities with hemorrhagic/hypovolemic shock.
4. Neurogenic shock typically occurs with spinal cord injuries at or above T6.
5. Neurogenic shock needs to be differentiated from hemorrhagic/hypovolemic and spinal shock.
   a. Hemorrhagic/hypovolemic shock tends to be associated with tachycardia.
   b. Spinal shock is defined as the complete loss of all neurologic function, including reflexes and rectal tone, below a specific level that is associated with autonomic dysfunction. It is a state of transient physiologic (rather than anatomic) reflex depression of cord function below the level of injury with associated loss of all sensorimotor functions. An initial increase in blood pressure due to the release of catecholamines is noted, followed by hypotension. Flaccid paralysis, including of the bowel and bladder, is observed. Sometimes sustained priapism develops. These symptoms tend to last several hours to days until the reflex arcs below the injury level begin to function again.

SIGNS AND SYMPTOMS:
1. Presents after spinal cord injury with either complete or incomplete paralysis
2. Hypotension
3. Bradycardia (as opposed to tachycardia with hypovolemic shock
4. Priapism
5. Altered mental status
6. Oliguria
7. Loss of bowel/bladder control
8. Warm extremities below the point of injury (dependent on environmental air temperature)
9. Hypothermia

MANAGEMENT:
1. Obtain IV/IO access.
2. Stabilize spine as required to prevent neurologic deterioration.
3. Oxygen with pulse oximetry monitoring.
4. If respiratory distress exists due to high cervical spinal cord injury, secure airway (NPA, ETT, surgical airway).
   a. Intubate using in-line stabilization.
   b. Consider surgical cricothyroidotomy (with local lidocaine) for unstable cervical injury.
5. If patient is hypotensive:
   a. Give 1 liter of normal saline or Ringer’s lactate IV/IO bolus. Consider additional fluids if still hypotensive to maintain palpable radial pulse or systolic blood pressure > 90mmHg.
   b. Hextend 500ml boluses may be used if crystalloids are unavailable to maintain palpable radial pulse or systolic blood pressure > 90mmHg.
   c. Maximum of 2 liters of IV fluid (or 1 liter of Hextend).
   d. In cases of suspected neurogenic/spinal shock (without evidence of uncontrolled hemorrhage), if there is no blood pressure increase after 2L of crystalloid or 1L of Hextend, give epinephrine as directed in #6.
6. **Push-dose epinephrine:**

   **WARNING:**
   a. **DO NOT GIVE UNDILUTED (1:1,000) EPINEPHRINE INTRAVENOUSLY.**
   b. Take a 10ml syringe and draw up 1ml of 1:1,000 epinephrine.
   c. Then draw up 9ml of Normal Saline into this syringe.
   d. Waste 9ml of this mixture, then draw up 9ml more of normal saline into the same syringe.
   e. Final concentration is 10ml of 1:100,000 epinephrine, 10mcg/ml.
   f. Administer 0.5–2ml (5–20mcg) IV/IO to maintain radial pulse or systolic blood pressure > 90mmHg.

7. Skin breakdown begins within 30 minutes in the immobilized, hypotensive patient; therefore frequent turning and padding of bony prominences is critical.

8. If available, atropine 0.5–1mg IV/IO push if patient is bradycardic. Repeat as necessary every 3-5 minutes to maximum dose of 3mg.
   a. Atropine doses < 0.5mg may cause a paradoxical bradycardia.

9. Manage hypothermia.

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**Disposition:**
1. **Urgent** evacuation.
2. Maintain spine stabilization throughout transport.
PROCEDURAL ANALGESIA PROTOCOL

SPECIAL CONSIDERATIONS:
1. Intended for performing brief, significantly painful procedures such as chest tube insertion or fracture reduction.
2. Prior to initiating this protocol, the following should be accomplished:
   A. Vascular access.
   B. Airway equipment, suction, and bag valve mask device immediately available and with reach.
   C. Monitoring equipment (if available) on and attached to patient (if tactically feasible).
3. Concomitant administration of narcotics and benzodiazepines increases the risk for respiratory depression and hemodynamic instability. Use caution. Do not use in patients with shock or hypotension.
4. Once the protocol has been initiated, monitor patient vigorously.

SINGLE AGENT
1. Morphine 5mg IV/IO every 5 min to a maximum total dose of 30mg. Repeat every 30-60 minutes as necessary.
2. In the event of respiratory depression, administer naloxone (Narcan®) in 0.1mg IV/IO increments until respiratory effort is adequate.

DUAL AGENT
1. Midazolam (Versed®) 2mg IV/IO over 1 minute, followed by 0.5-1mg increments after 5 minutes to a maximum total dose of 4mg.
2. PLUS Ketamine (Ketalar®) 20mg IV/IO over 1 minute, followed by 20mg increments every 30-60 seconds until nystagmus occurs or a maximum total dose of 100mg.
2012 USSOCOM Tactical Trauma Protocols

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TACTICAL MEDICAL EMERGENCY PROTOCOLS (TMEP)

For SPECIAL OPERATIONS ADVANCED TACTICAL PARAMEDICS (ATPs)

JANUARY 2013

USSOCOM OFFICE OF THE COMMAND SURGEON
DEPARTMENT OF EMERGENCY MEDICAL SERVICES AND PUBLIC HEALTH
7701 Tampa Point Boulevard
Management of medical emergencies is best accomplished by appropriately trained physicians in an Emergency Department setting. However, Special Operations Combat Medics (SOCMs) may often find themselves in austere tactical environments where evacuation of a teammate to an MTF for a medical emergency would entail either significant delays to treatment or compromise the unit’s mission. Although SOCM trained medics are not routinely authorized by the services to treat non-traumatic emergencies, in many SOF situations, training SOCMs to treat at least some medical emergencies may result in both improved outcome for the individual and an improved probability of mission success. The disorders chosen have one of the following properties in common: they are relatively common; they are acute in onset; the SOCM is able to provide at least initial therapy that may favorably alter the eventual outcome; and the condition is either life-threatening or could adversely affect the mission readiness of the SOF operator.

The Protocols outlined in the following pages carry the following assumptions:

A. The SOCM medic is in an austere environment where a medical treatment facility or a unit sick call capability is not available. If a medical treatment facility or a medic authorized to treat patients independently is available, then the patient should be seen in those settings rather than by a SOCM medic.

B. Immediate evacuation may not be possible and, even if it is, may still entail significant delays to definitive treatment. The medical problem may worsen significantly if treatment is delayed.

C. The SOCM will contact a consulting physician as soon as feasible.

D. SOCM treatment will be done under the appropriate Protocol.

E. Medication regimens are designed to minimize the number of medications the SOCMs are required to learn and carry. Medications have been used for multiple conditions when feasible without compromising care.

F. Appropriate documentation of diagnosis and treatment rendered in the patient’s medical record will be accomplished when the unit returns to forward operating base.

G. Note these Protocols are not designed to allow SOCM medics to conduct Medical/ Civic Action (MEDCAP) missions independently.

H. Evacuation recommendations are based on the appropriate therapy per Protocol being initiated on diagnosis.

I. The definitions of Urgent, Priority, and Routine evacuations are based on the times found in Joint Publication (FM) 4-02.2 of 2, 4, and 24 hours respectively.

J. For any infection, limit contact and use universal precautions.

Changes for 2007:

A. The changes in the combat pill pack (Moxifloxacin (Avelox) and meloxicam), as recommended by the Committee on Tactical Combat Casualty Care (CoTCCC), have been changed in the TME Protocols. (2007)

B. The Fentanyl oral dosage of 800mcg, as recommended by the CoTCCC has been incorporated into the Pain Protocol. (2007)

C. The change in the IV antibiotics has also been changed to reflect medication availability.

D. When possible, alternate antibiotics or anti-emetics have been listed.

Changes for 2008:

A. The Cellulitis and Cutaneous Abscess Protocols were combined.

B. An Altitude Illness Protocol was created, combining AMS, HACE, and HAPE.

C. The Chest Pain was expanded to provide more guidance.

D. The following new protocols were added: Determination of Death and Envenomation.

E. The following medication changes were made: the use of Zithromax was decreased; Keflex, Quinine, Doxycycline, and Corticosporin Otic were removed.

F. The following medications were added: Amoxicillin/Clavulanic Acid (Augmentin), Rabeprazole (Aciphex), Septra DS, Salmeterol (Serevent), Rifampin, Toradol, and Benadryl Quikstrips.

G. The Meningitis Disposition typo error from 2007 was corrected.
H. Modifications were made to most of the TMEPS with respect to further refinement in recommendations.
I. The “Clinical Pearls” section was added.

Changes for 2009:
A. Crush Protocol added
B. Blast Protocol added
C. MACE added
D. Traumatic Brain Injury – Mild (mTBI) Protocol added
E. Bronchitis/Pneumonia: Disposition changed
F. Flank Pain: antibiotics modified (order of preference)
G. Joint Infection: antibiotics modified (order of preference)
H. Spontaneous Pneumothorax: indications for tube thoracostomy added
I. Urinary Tract Infections: antibiotics modified
J. Drugs added: Calcium Chloride, Calcium Gluconate, Sodium Bicarbonate, Mannitol
K. HIV PEP Protocol updated with new medications added: Atripla, Truvada, Viread, Kaletra
L. Behavioral Changes Protocol changed and midazolam (Versed) added
M. Seizure Protocol changed and midazolam (Versed) added

Changes for 2010:
A. K-9 Protocols added
B. Drugs added: tadalafil (Cialis), sildenafil (Viagra)
C. Altitude Illness changed to add tadalafil (Cialis) and sildenafil (Viagra)

Changes for 2011:
A. Trauma Protocols added
B. TMEP Seizure protocol updated to match Trauma Seizure protocol
C. Drugs added: fosphenytoin (Cerebyx), IV acetaminophen (Ofirmev), tranexamic acid (Cyklokapron)
D. Blast TMEP deleted and recommendations incorporated into the Tactical Trauma Protocols
E. Crush Syndrome TMEP moved to Tactical Trauma Protocols
F. Rewrite of majority of Tactical Medical Emergency Protocols
G. Expansion of Envenomation Protocols
H. Revision of Cold Injury Protocol
I. Revision of Heat Illness Protocol
J. Revision of K-9 Protocol
K. Administration of Blood Products Protocol added to Tactical Trauma Protocols
L. Neurogenic/Spinal Shock Protocol added to Tactical Trauma Protocols
M. IV push dose epinephrine authorized for Neurogenic/Spinal Shock Protocol and Septic Shock Protocol
Don’t Forget…
(Clinical Pearls)

When IV route is recommended, but not obtainable, consider IO, IM, PO, or PR unless contraindicated.

Currently available SL medication formulations include: Benadryl Quikstrips, Sudafed PE SL, Zofran ODT.

If crystalloids (normal saline or lactated Ringer’s) are recommended, but not available, substitute Hextend or Hespan if available.

**DO NOT** give Epinephrine IV unless given under the ACLS protocols or the Neurogenic/Spinal Shock Protocol

All IV medications may be given slow IV push with the exception of antibiotics, which should be in a drip, unless otherwise specified.

Remember to document dose and time of all medications so the receiving facility may be informed.

Do not use local anesthetic with epinephrine on the ears, nose, digits, or penis.

When oxygen is called for in the protocols, the authors realize that it is recommended, but may not be available.

Due to the high level of physical fitness of SOF personnel, there may be a prolonged period of mental lucidity and apparent stable vital signs despite a severe injury. Treat the injury, not the Operator!

Medical Documentation (SOAP note): In order to ensure proper care and medical information transfer during patient treatment a standardize format for medical documentation is required. The standard format is the SOAP note (Subjective, Objective, Assessment, and Plan).

**Subjective:** In the patient’s own words, describe the chief complaint. At a minimum you need to include the OPQRST (Onset, Palliative or Provocative, Quality, Radiation, Severity, and Timeline of symptoms). AMPLE (Allergies, Medication, Past medical and surgical history, Last meal, and Events leading up to this condition) history is also included in this section.

**Objective:** vital signs and physical examination findings. At a minimum you need to document pertinent positives and negatives, and measurements of injuries or lesions. Be as detailed as possible.

**Assessment:** a brief summary of your medical decision making to include what you think it is and what it is not. Include your differential diagnosis list in this section.

**Plan:** your course of treatment to include any medications, additional studies, consultation, rehabilitation, evacuation category and disposition of the patient.
ABDOMINAL PAIN

SPECIAL CONSIDERATIONS:
1. Common causes in young healthy adults include appendicitis, cholecystitis, pancreatitis, perforated ulcer, and diverticulitis.
2. Consider constipation/ fecal impaction as a potential cause of abdominal pain.
3. Consider bowel perforation if abdominal pain begins within 72 hours of a blast injury.

SIGNS AND SYMPTOMS SUGGESTIVE FOR URGENT EVACUATION:
1. Severe, persistent or worsening abdominal pain is the key sign
2. Rigid abdomen
3. Rebound abdominal tenderness
4. Fever
5. Absence of bowel sounds
6. Focal percussive tenderness
7. Uncontrollable vomiting
8. Presence of bloody vomitus or stools
9. Presence of black tarry stools
10. Presence of coffee ground vomitus

MANAGEMENT:
1. Start IV with normal saline (NS), 1 liter bolus, followed by NS 150cc/hr. Keep NPO except for medications or PO hydration.
2. Ertapenem (Invanz) 1gm IV qd
3. OR Ceftriaxone (Rocephin) 1gm IV qd. plus Metronidazole (Flagyl) 500mg PO q 8hr
4. Treat per Pain Protocol (DO NOT USE NSAIDS)
5. Treat per Nausea and Vomiting Protocol

DISPOSITION: Urgent evacuation to a surgical facility.

SIGNS AND SYMPTOMS SUGGESTIVE FOR CONTINUED OBSERVATION:
1. Epigastric burning pain
2. Present bowel sounds
3. Nausea and/ or vomiting
4. Absence of rebound tenderness
5. If diarrhea is present, treat per Gastroenteritis Protocol

MANAGEMENT:
1. Antacid of choice
2. Ranitidine (Zantac) 150mg PO bid OR Rabeprazole (Aciphex) 20mg PO qd
3. PO hydration

DISPOSITION: Observation and re-evaluation.
2. Priority evacuation if symptoms not controlled by this management within 12 hours.
ALLERGIC RHINITIS/ HAY FEVER/ COLD-LIKE SYMPTOMS

SPECIAL CONSIDERATIONS:
History of allergies to cedar, mold, pollen, etc.

SIGN AND SYMPTOMS:
1. Clear nasal drainage
2. Pale, boggy or inflamed nasal mucosa
3. With or without complaints of nasal congestion
4. Watery or red eyes
5. Sneezing
6. Normal temperature

MANAGEMENT:
1. Pseudoephedrine (Sudafed) 60mg PO q 4–6hr.
2. Diphenhydramine (Benadryl) 25–50mg PO q 6hr if tactically feasible. (Drowsiness is a side-effect.)
3. Increase oral fluid intake.

DISPOSITION:
None applicable
ALTITUDE ILLNESS

SPECIAL CONSIDERATIONS

ACUTE MOUNTAIN SICKNESS (AMS)
1. Usually occurs at altitudes of 8,000ft and higher.
2. Consider pretreatment when rapid ascent to altitudes above 8,000ft may occur:
   A. Acetazolamide (Diamox) 125mg bid started 24 hours before ascent
   B. Dexamethasone (Decadron) 4mg PO bid started 24 hours before ascent for patients allergic to sulfa drugs
3. Consider pretreatment if rapid ascent above 11,500ft occurs (as with airlifts):
   A. Dexamethasone (Decadron) 4mg PO q 6hr within 24 hours of ascent plus acetazolamide (Diamox) 125mg PO bid (if not allergic to sulfa)
4. Symptoms may occur as quickly as 3 hours after ascent.
5. Can avoid onset by limiting initial ascent to no higher than 8,000ft then 1,000ft. per day thereafter. The key to prevention is slow, gradual ascent.

HIGH ALTITUDE CEREBRAL EDEMA (HACE)
1. Rare below 11,500ft.
2. Headache is common at altitude. Ataxia and altered mental status at altitude are HACE until proven otherwise.

HIGH ALTITUDE PULMONARY EDEMA (HAPE)
1. Caused by the hypoxia of altitude, HAPE is the most common cause of death from altitude illness.
2. Usually occurs above 8,000ft. Respiratory distress at high altitude is HAPE until proven otherwise.
3. Nifedipine (Procardia) is recommended as prophylaxis in personnel who have a history of previous HAPE and are required to operate at altitude. Acetazolamide (Diamox), sildenafil (Viagra), tadalafil (Cialis), dexamethasone (Decadron), salmeterol (Serevent), and albuterol (Proventil) may be considered if nifedipine is not available.

HACE AND HAPE MAY COEXIST IN THE SAME PATIENT!

SIGNs AND SYMPTOMs:
1. AMS is generally benign and self-limiting, but symptoms may become debilitating. Worsening condition should prompt consideration of a more life-threatening condition (HAPE or HACE).
   A. AMS: Diagnosis is made in presence of headache AND one or more of the following: anorexia, nausea, vomiting, insomnia, dizziness, lassitude, or fatigue
   B. No correlation with fitness level (likely genetic predisposition)
2. HACE: Unsteady, wide, and unbalanced (ataxic) gait and altered mental status are hallmark signs.
3. HAPE: Dyspnea at rest is the hallmark signs. Other symptoms may include cough, crackles upon auscultation, tachypnea, tachycardia, fever, central cyanosis, or low oxygen saturation disproportionate to the elevation level.

MANAGEMENT:
1. Halt ascent. Immediately descend at least 3,000ft for HACE, HAPE, or refractory AMS if tactically feasible.
2. IF AMS SYMPTOMs PRESENT
   A. Acetazolamide (Diamox) 250mg PO bid UNLESS PATIENT IS ALLERGIC TO SULFA
B. Dexamethasone (Decadron) 4mg PO q 6hr if patient is allergic to sulfa

If Dexamethasone (Decadron) is administered, no further ascent until asymptomatic for 24 hours after last Dexamethasone dose.

3. IF HACE SYMPTOMS PRESENT: ATAXIA OR ALTERED MENTAL STATUS
   A. Administer supplemental oxygen to bring SaO₂ above 90% (if available)
   B. Dexamethasone (Decadron) 8mg IV/ IM STAT, then 4mg IV / IM q 6hr
   C. Individuals with HACE should not be left alone and especially not be allowed to descend alone.

4. IF HAPE SYMPTOMS PRESENT: SHORTNESS OF BREATH AT REST
   A. Administer supplemental oxygen to bring SaO₂ above 90% (if available)
   B. Nifedipine (Procardia) 30mg SR q 12hr or 20mg SR q 8hr if blood pressure is stable
      1) IF NIFEDIPINE IS NOT AVAILABLE: sildenafil (Viagra) 50mg q 8hr, or tadalafil (Cialis) 10mg q 12hr
         2) Do not use Nifedipine in HACE; the drop in blood pressure may worsen the symptoms of this condition.
   C. Consider Salmeterol (Serevent) 2 inhalations q 12hr or albuterol (Ventolin) 2 inhalations q 6hr as an adjunct treatment.
   D. Minimize patient exertion during descent for HAPE since this will exacerbate symptoms.

5. Treat per Pain Management Protocol, but avoid the use of narcotics since they may depress respiratory drive and worsen high altitude illness.


7. For signs or symptoms of either HAPE or HACE: If immediate descent is not tactically feasible and a GAMOW bag is available, use a GAMOW bag in 1 hour treatment sessions with bag inflated to a pressure of 2psi (approximately 100mmHg) above ambient pressure. Four or five sessions are typical for effective treatment. GAMOW BAG TREATMENT IS NOT A SUBSTITUTE FOR DESCENT.

8. Treat per Dehydration Protocol.

**DISPOSITION:**
1. Most cases of AMS are relatively mild, resolve in 2-3 days, and do not require evacuation.
2. Avoid vigorous activity for 3-5 days.
3. Priority evacuation for AMS patients that worsen despite therapy.
4. Urgent evacuation for patients with suspected HACE or HAPE.
5. Individuals who have recovered from HACE or HAPE should not re-ascend without medical officer clearance.
ANAPHYLACTIC REACTION

SPECIAL CONSIDERATIONS:
1. Acute, widely distributed form of shock which occurs within minutes of exposure to an allergen.
2. Primary causes include insect envenomation, medications, and food allergies.
3. Death can result from airway compromise, inability to ventilate, or cardiovascular collapse.
4. The Medic's responsibility is to know if members in the unit have such a condition. Moreover, the Medic must also ensure that the member has some sort of anaphylaxis kit and is trained to use it.
5. Consider localized allergic reaction. Anaphylaxis is a life-threatening emergency.

SIGNs AND SYMPTOMS:
1. Wheezing (bronchospasm)
2. Dyspnea
3. Stridor (laryngeal edema)
4. Angioedema
5. Urticaria (Hives)
6. Hypotension
7. Tachycardia

MANAGEMENT:
FOR PATIENTS WITH SIGNS AND SYMPTOMS OF AIRWAY INVOLVEMENT AND/OR CIRCULATORY COLLAPSE:

1. Epinephrine is the mainstay of therapy.
   A. Administer Epi-Pen
   B. OR epinephrine 0.5mg (0.5ml of 1:1000 IM). DO NOT USE INTRAVENOUSLY
   C. Repeat epinephrine q 5 minutes prn

2. Oxygen with pulse oximetry monitoring

   WARNING: If severe respiratory distress exists, aggressive airway management with bag-valve-mask and airway adjuncts (oral and nasopharyngeal airways). Intubate early if no response to epinephrine.

3. IV normal saline TKO (saline lock).
   A. Administer 1-2 liters normal saline bolus for hypotension;
   B. Titrate to establish systolic blood pressure > 90mmHg or palpable radial pulse if BP cuff not available.

4. Diphenhydramine (Benadryl) 50mg IV / IM / PO / SL.

5. Dexamethasone (Decadron) 10mg IV/ IM / PO.

6. If wheezing is present after epinephrine administration, consider Albuterol (Ventolin), 2-3 puffs q 5 minutes, repeat up to 3 times. The metered dose inhaler works best when used with a spacer (e.g., rolled up piece of paper, cardboard from toilet paper roll, etc).

7. Ranitidine (Zantac) 150mg PO bid.

DISPOSITION:
1. Urgent evacuation.
ASTHMA (REACTIVE AIRWAY DISEASE)

SPECIAL CONSIDERATIONS:
Other disorders to consider: anaphylactic reaction, spontaneous pneumothorax, HAPE, and pulmonary embolism.

SIGNS AND SYMPTOMS:
1. Wheezing
2. Dyspnea
3. Difficulty with speaking in full sentences.

MANAGEMENT:
1. Albuterol (Ventolin) (metered dose inhaler – works best when used with spacer), 2-3 puffs q 5 min, repeat up to 3 times.

2. IF THERE IS NO RESPONSE TO ALBUTEROL (Ventolin), Epinephrine 0.5mg (0.5ml of 1:1000 solution) IM (DO NOT INJECT INTRAVENOUSLY). May repeat one dose in 5-10 min.

3. Oxygen with pulse oximetry monitoring.

4. IV access with saline lock.

5. Dexamethasone (Decadron) 10mg IV / IM / PO.

6. If there is fever, pleuritic chest pain and productive cough, treat per Bronchitis/Pneumonia Protocol.

DISPOSITION:
1. Urgent evacuation if no response to treatment.
2. If the patient responds to management, observe for 4 hours.
   A. Return To Duty if there is no wheezing or dyspnea and normal oxygen saturation. Continue Albuterol (Ventolin) (2 puffs q 6hr) and re-evaluate in 24 hours. Continue Decadron 10mg IM qd for 4 days.
   B. Urgent evacuation if symptoms persist.
BACK PAIN

SPECIAL CONSIDERATIONS:
Motor weakness, saddle anesthesia, sensory loss, loss of bowel or bladder control in the setting of back pain is a neurological emergency requiring Urgent evacuation.

SIGNS AND SYMPTOMS:
1. Pain may worsen with movement.
2. Pain may radiate into legs.

MANAGEMENT:
2. Apply cold compress to painful area for 20-25 min tid.
3. Trigger point injections with local anesthetic (IF TRAINED). Lidocaine 1-2cc per trigger point. May repeat qd for 2 days.
4. Consider Diazepam (Valium) 5-10mg IM / IV / PO. Repeat once in 6-8hr prn.
5. Minimize activity initially, but encourage gradual stretching and return to full mobility as soon as tolerated.
6. If back pain is accompanied by fever and / or urinary symptoms, treat per Flank Pain Protocol.

DISPOSITION:
1. Evacuation is often not required if the back pain responds to therapy.
2. Routine evacuation for severe cases not responding to therapy.
3. Urgent evacuation for patients with neurological involvement (other than pain) such as:
   A. Weakness
   B. Bowel or bladder dysfunction
   C. Saddle anesthesia
BAROTRAUMA

SPECIAL CONSIDERATIONS:
1. Pulmonary Over-Inflation Syndrome (POIS) may occur from ascent from depth if compressed air was used or exposure to blast overpressure.
2. The most commonly affected site is the middle ear and tympanic membrane, but paranasal sinuses and teeth may be affected.
3. Pulmonary barotrauma occurs when compressed air is breathed at depth followed by ascending with a closed airway (i.e. breath-holding), and can cause pneumothorax or arterial gas embolism.

SIGNS AND SYMPTOMS:
1. Pain in the ear(s), sinuses, teeth.
2. Pulmonary over-inflation syndrome (POIS) may present with chest pain, dyspnea, mediastinal emphysema, subcutaneous emphysema, pneumothorax or AGE.
   A. Arterial gas embolism (AGE) – unconsciousness, paralysis, weakness, fatigue, large areas of abnormal sensations, convulsions. Symptoms usually occur within 10 minutes of surfacing after a dive or shortly after overpressure exposure (blast injury).
   B. In all cases of AGE associated pneumothorax it is possible and should not be overlooked.

MANAGEMENT:
1. If flying, descend to altitude until relief is felt (if feasible).
2. Middle ear
   A. If a tympanic membrane rupture is present or suspected, protect the ear from water or further trauma.
   B. Moxifloxacin (Avelox) 400mg PO qd if contamination is suspected
   C. Pseudoephedrine (Sudafed) 60mg PO q 4–6hr prn
   D. DO NOT use ear drops. If TM is not ruptured, use Afrin (oxymetazoline) nasal spray.
   E. Refer to higher level of care when feasible
3. Paranasal Sinus barotraumas.
   A. Pseudoephedrine (Sudafed) 60mg PO q 4-6hr prn
4. Pulmonary barotraumas (to include subcutaneous emphysema):
   A. If no respiratory distress, monitor patient closely. Use pulse oximetry if available
   B. If respiratory distress occurs – Treat per Spontaneous Pneumothorax Protocol
5. If Pulmonary Over Inflation Syndrome (POIS) is suspected, administer 100% oxygen and 1 liter normal saline IV 150cc/hr. Urgent evacuation to recompression chamber.
   
   WARNING
6. If an unpressurized airframe is used, avoid altitude exposure greater than 1000ft.
7. Treat per Pain Management Protocol. (Avoid narcotics if recompression is anticipated.)

DISPOSITION:
1. Urgent Evacuation for cerebral arterial gas embolus, POIS or pneumothorax with respiratory distress,
2. Mild to moderate middle ear, sinus, or pulmonary barotraumas without respiratory distress, observation and Routine evacuation.
3. Routine evacuation for consultation for Tympanic Membrane rupture.
NORMAL TYMPANIC MEMBRANE

PERFORATED TYMPANIC MEMBRANE

TRAUMATIC PERFORATED TYMPANIC MEMBRANE
PERFORATED TYMPANIC MEMBRANE EXPOSING TYMPANIC NERVE

TRAUMATIC PERFORATION OF TYMPANIC MEMBRANE
BEHAVIORAL CHANGES
(INCLUDES PSYCHOSIS, DEPRESSION AND SUICIDAL IMPULSES)

SPECIAL CONSIDERATIONS:
1. In a tactical setting consider sleep deprivation as a cause.
2. Etiologies are numerous and will often dictate the management; thus mental status changes could be caused by head trauma, metabolic and endocrine disease processes, environmental toxins, infections, combat stress disorder, hypoxia, hyperthermia, hypothermia, pharmaceutical agent use (i.e., mefloquine) or withdrawal.
3. Consider diabetic hypoglycemia as a cause of altered mental status.

SIGNS AND SYMPTOMS:
1. Acute behavioral changes include withdrawal, depression, aggression, confusion, or other behavioral patterns atypical for the individual.
2. Psychosis is an acute change in mental status characterized by altered sensory perceptions that are not congruent with reality:
   A. Auditory and/or visual hallucinations
   B. May include violent or paranoid behavior
   C. Disorganized speech patterns are common
   D. May include severe withdrawal from associates

MANAGEMENT:
1. Remove all weapons or potential weapons from patient AND treating Medic.
2. Check pulse oximetry.
3. Place patient in safe environment under continuous surveillance.
4. Place either 1 tube of Glutose (oral glucose gel) or contents of one packet of sugar in the buccal mucosal region for possible hypoglycemia.
5. Take Temperature
   A. If Temperature is below 95 degrees, treat per Hypothermia Protocol
   B. If Temperature is above 101 degrees, treat per Meningitis Protocol
   C. If Temperature is above 103 degrees, treat per Meningitis and Hyperthermia Protocols
   D. **WARNING** IF MENINGITIS IS SUSPECTED OR IF THERE IS A DECREASE IN MENTAL STATUS, USE VALIUM WITH CAUTION, DUE TO POSSIBLE RESPIRATORY DEPRESSION, HYPOTENSION, AND MASKING OF PROGRESSION OF DISEASE RELATED ALTERED MENTAL STATUS.
6. For acute agitation, combativeness, or violent behavior, restrain patient with at least four individuals and give diazepam (Valium) 10mg IM. Repeat after 30 minutes prn.
   OR Midazolam (Versed) 5mg IM.
7. If sedated or restrained, maintain constant vigilance for a change in the hemodynamic status or loss of airway reflexes.

DISPOSITION:
Urgent Evacuation
BRONCHITIS/ PNEUMONIA

SPECIAL CONSIDERATIONS:
1. Consider high altitude pulmonary edema (HAPE) at high altitudes.
2. Consider pulmonary embolism (PE) and pneumothorax (fever and productive cough are atypical for these).

SIGNS AND SYMPTOMS:
1. Fever
2. Productive cough, especially with dark yellow, red tinged, or greenish sputum
3. Chest pain
4. Rhonchi may be present and breath sounds may be decreased over the affected lung
5. Dyspnea may be present in severe cases

MANAGEMENT:
1. Azithromycin (Zithromax) 500mg PO first dose then 250mg qd for 4 days OR Moxifloxacin (Avelox) 400mg PO qd for 7 days.
2. If unable to tolerate PO intake, Ertapenem (Invanz) 1gm IV / IM OR Ceftriaxone (Rocephin) 1gm IV qd.
3. Albuterol (Ventolin) by metered dose inhaler 2–4 puffs q 4–6hr.
5. If febrile, acetaminophen 1gm PO q 6hr.
6. Pulse oximetry monitoring.
7. Oxygen prn.
8. If at high altitude, see Altitude Illness Protocol and treat for HAPE.

DISPOSITION:
1. Urgent evacuation for severe dyspnea or hypoxia.
2. Observation or Routine evacuation as necessary.
CELLULITIS/CUTANEOUS ABSCESS

SPECIAL CONSIDERATIONS:
1. Superficial bacterial skin infection
2. Generally begins about 24 hours following a break in the skin, but more serious types of cellulitis may be seen as early as 6–8hr following animal or human bites.
3. If abscess formation occurs, only attempt I&D in the tactical setting IF:
   A. The abscess is clearly well demarcated, superficial, or can be discerned by ultrasound.
   B. Local anesthesia is available.

SIGNS AND SYMPTOMS:
1. Painful, erythematous, swollen, tender area.
2. Fever may or may not be present.
3. Typically, erythema spreads without treatment.
4. Rapidly spreading and very painful infections suggest the possibility of necrotizing fasciitis, a life-threatening infection of the deeper tissues that should be treated per Sepsis/Septic Shock Protocol.
5. Fluctuant, tender, well-defined mass indicates abscess formation.

MANAGEMENT:
1. Moxifloxacin (Avelox) 400mg PO qd for 10 days OR Amoxicillin/Clavulanic Acid (Augmentin) 875mg PO bid.
2. PLUS EITHER Trimethoprim-Sulfamethoxazole (Septra DS) 1 tab PO bid OR Rifampin (Rifadin) 600mg PO bid for 10 days.
3. Clean and dress wound and surrounding area.
4. Use a pen to mark the demarcation border of the infection and re-evaluate in 24 hours.
5. Limit activity until infection resolves.
6. Add Ertapenem (Invanz) 1gm IV / IM qd if worsening at 24 hours or no improvement at 48 hours of treatment.
7. IF ABSCESS IS PRESENT:
   A. Incise and drain (I&D) if the environment permits:
      1) Establish sterile incision site with Betadine
      2) Local anesthesia using Lidocaine
      3) Incise the length of the abscess cavity, but no further
      4) Incision should be parallel to skin tension lines if possible
      5) On initial treatment, leave wound open and pack with iodoform or dry sterile gauze, if available. On subsequent dressings, loosely pack the wound and leave gauze protruding to facilitate drainage (wick the wound). DO NOT SUTURE THE SITE.
   B. Bandage site and perform wound checks daily

DISPOSITION:
1. Re-evaluate daily and watch for progression of erythema while on antibiotics.
2. Cellulitis in critical areas (head, neck, hand, joint involvement, perineal) requires Priority evacuation.
3. Use of IV antibiotics requires Priority evacuation.
CELLULITIS

CELLULITIS WITH ABSCESS FORMATION
CHEST PAIN

SPECIAL CONSIDERATIONS:
1. This Protocol assumes no access to ACLS medications or monitoring/defibrillation equipment.
2. Since the ATP does not have access in the field to tests required to accurately determine the etiology of chest pain, early and rapid evacuation should be considered if tactically feasible. High risk etiologies include myocardial infarction (MI), unstable angina, pulmonary embolus, pericarditis, spontaneous pneumothorax, and esophageal rupture.

SIGNS AND SYMPTOMS - CARDIAC:
1. The presence of one or more of the following risk factors increases the likelihood of coronary artery disease: smoking, diabetes, hypertension, elevated cholesterol, obesity, family history of MI at a young age, and patient age over 40.
2. The following are signs and symptoms suspicious for myocardial infarction as the etiology for chest pain:
   A. Substernal chest pain that may radiate to the left arm, neck, or jaw
   B. Pain described as pressure or squeezing
   C. Pain exacerbated with exertion and relieved with rest
   D. Associated dyspnea, diaphoresis (sweating), nausea, lightheadedness, or syncope
   E. Tachycardia, irregular heart rhythm, or severe bradycardia
   F. Bilateral rales/crackles in the lungs on auscultation
   G. Significant hypertension or hypotension

MANAGEMENT:
1. **Aspirin (ASA) 325mg PO (non-enteric coated) – chew to speed absorption.**
2. **IV access with saline lock. Administer 250–500cc normal saline boluses as needed to correct hypotension with frequent reassessment.**
3. **Morphine sulfate 5mg IV initially, then 2mg q 10–15 min prn for pain unless hypotension is present. Maintain a minimum BP of 90mmHg systolic (palpable radial pulse).**
4. **Oxygen with pulse oximetry monitoring.**
5. **Avoid all exertion. Allow the patient to rest in a position of comfort. Frequently reassess the patient including hemodynamic status.**

OTHER ETIOLOGIES OF CHEST PAIN:
1. The following signs and symptoms MAY suggest a GI etiology such as gastroesophageal reflux disease (GERD): dyspepsia, dysphagia, burning quality to chest pain, exacerbated by laying flat, foul or brackish taste in mouth. A trial of antacids or ranitidine (Zantac) 150mg PO bid may be useful if evacuation will be delayed.
2. Severe chest pain following forceful vomiting may indicate esophageal rupture. Administer IV normal saline 150cc/hr and Ertapenem (Invanz) 1gm IV and evacuate as Urgent.
3. Sudden onset of pleuritic chest pain with dyspnea may indicate pulmonary embolus or spontaneous pneumothorax. Auscultate the lungs. Unilaterally diminished breath sounds suggest pneumothorax which may require decompression. Administer oxygen, establish IV access, administer Aspirin 325mg PO for suspected PE, and evacuate as Urgent.
4. The following signs and symptoms MAY suggest a musculoskeletal etiology: pain isolated to a specific muscle or costochondral joint pain exacerbated with certain types of movements, non-central chest pain reproduced upon palpation. A trial of NSAIDs such as Ibuprofen (Motrin) 800mg PO tid may be useful if evacuation will be delayed.
5. Chest pain with gradual onset and exacerbated by deep inspiration and accompanied by fever and productive cough **MAY** indicate lower respiratory tract infection. Consider treatment per *Bronchitis/ Pneumonia Protocol*.

**DISPOSITION:**
1. *Urgent evacuation.*
2. Evacuation platform should include ACLS certified medical personnel and the equipment, supplies, and medications necessary for ACLS care.
3. Do not delay evacuation if unsure of chest pain etiology. Strongly consider early contact with a medical officer or medical treatment facility for consultation. Frequently reassess the patient suspected of a non-cardiac etiology to ensure stability and accuracy of the diagnosis.
COLD INJURY

SIGNs AND SYMPTOMs:
1. Hypothermia (Decreased core temperature)
   A. Mild – Shivering, poor co-ordination
   B. Moderate – Cessation of shivering, disorientation, slurred speech, confusion
   C. Severe - Unconscious
2. Freezing Cold Injury (Frostbite)
   A. Superficial – Skin is firm, but not hard; painful, red skin
   B. Deep – Painless, grey appearing skin. Skin is hard, white, grey, ashen, waxy in appearance
3. Non freezing cold injury
   A. Itching. Pale, cool, blotchy wet skin. Mild ulcerations may be present. Numbness and tingling sensations

MANAGEMENT:
1. Non freezing cold injury;
   A. Gently dry, do not rub involved area. Elevate feet, warm torso, hydrate orally, dry socks. NSAIDS may help. Evacuation depends on ambulatory ability.
2. Freezing Cold Injury
   A. Do not walk on frozen feet / toes unless necessary for preservation of life
   B. Do not rub with snow/ice
   C. Do not vigorously massage tissue
   D. Do not use space heaters or dry heat sources (fire, MRE heaters, hand-warmers, etc)
   E. Ibuprofen, 800mg PO tid (Consider other NSAIDs if ibuprofen is not available)
   F. If thawed, refreezing will most likely result in amputation
   G. Once thawing has occurred, expect intense pain requiring narcotic use. Follow Pain Management Protocol
   H. If refreezing likely:
      1) Do not attempt to thaw frostbitten tissue
      2) Protect tissue from further injury by wrapping with dry Kerlix
         a. Separate digits with dressing
   I. Refreezing not likely:
      1) Superficial
         a. Warm water immersion
         b. Warm extremity in axilla or groin
         c. Drainage of clear blisters may be considered
         d. Apply soft kerlix type dressing
      2) Deep
         a. Warm water immersion (104-108°) until tissue is soft (approximately 30 minutes)
         b. Apply loose dry dressing prior to transport
         c. Pain Management per Pain Management protocol
         d. Do not drain hemorrhagic blisters
3. Hypothermia
   A. Move to warm environment, remove any wet clothing and begin rewarming (Blizzard Blanket, Ranger Rescue Wrap, etc.)
   B. Shield from wind
   C. If able to tolerate PO, provide food and hydrate patient
   D. Mild: exercise in place
   E. Moderate / Severe:
      1) Do not exercise patient. Maintain supine position on insulation
      2) Do not give patients food or oral fluids
      3) If IV fluids are indicated, administer glucose-containing IV fluids warmed to 40°C (101.6°F) or 1 amp of D50

SPECIAL CONSIDERATIONS:
1. Refreezing after thawing results in a high probability of amputation.
2. Check for 60 seconds for pulse and respirations due to bradycardia.
4) Begin active rewarming (Blizzard Blanket, Ranger Rescue Wrap, etc.)
5) If unconscious:
   a. Avoid sudden movements and rough handling due to increased ventricular fibrillation risk
   b. Assure airway patency
   c. Check for 60 seconds for pulse and respirations due to bradycardia
   d. If not breathing, begin ventilations
   e. If no pulse, begin chest compressions only if patient will not arrive in medical facility in 3 hours.

References:
SOF Medical Handbook, 2009

**DISPOSITION:**
1. *Urgent* evacuation for moderate/severe hypothermia cases to a facility capable of active rewarming and resuscitation.
2. *Priority* evacuation for cases of freezing cold injuries (frostbite).
3. *Routine* evacuation for cases of non-freezing cold injury which are non-ambulatory.
4. Evacuation not necessary for cases of non-freezing ambulatory cold injuries
### CONSTIPATION/ FECAL IMPACTION

#### SPECIAL CONSIDERATIONS:
1. Differential diagnosis includes acute appendicitis, volvulus, ruptured diverticulum, bowel obstruction, pancreatitis, or parasitic infections.
2. Acute onset, severe pain, point tenderness, and fever indicate etiologies other than constipation or fecal impaction.

#### SIGNS AND SYMPTOMS:
1. Recent history of infrequent passage of hard, dry stools or straining during defecation.
2. Abdominal pain, which is typically poorly localized with cramping.
3. If pain becomes severe and is associated with nausea / vomiting and complete lack of flatus or stools, consider a bowel obstruction.

#### MANAGEMENT:
1. Bisacodyl (Dulcolax) 10mg PO tid prn
2. Avoid narcotics as this will exacerbate the constipation.
3. For impacted stool or no relief with above measures, give normal saline enema 500ml via lubricated IV tubing. (Pt should retain solution for two minutes before evacuating contents)
4. If above measures fail, perform digital rectal examination to check for fecal impaction. If fecal impaction is present, perform digital disimpaction, if trained.
5. Increase PO fluid intake.
6. Increase fiber (fruits, bran, and vegetables) in diet if possible.
7. If severe pain, rigid board-like abdomen, fever, and/ or rebound tenderness develop, or moderate to large amounts of blood are present in the stool, then treat per Abdominal Pain Protocol.

#### DISPOSITION:
1. Evacuation is usually not required for this condition.
2. Routine evacuation if no response to therapy.
CONTACT DERMATITIS

SPECIAL CONSIDERATIONS:
1. Insect bite(s) as a differential diagnosis - also accompanied by itching, but with discrete red papular lesions(s).
2. Cellulitis as a differential diagnosis - bright red, painful, non-pruritic, and typically becomes steadily worse without antibiotics.
3. Fungal infection as a differential diagnosis – not always pruritic; infection site(s) slowly enlarge without therapy.
4. Effects are particularly dangerous if contact in or around the eyes.

SIGNS AND SYMPTOMS:
1. Acute onset
2. Skin erythema
3. Intense itching (pruritis)
4. Edema, papules, vesicles, bullae, discharge, and / or crusting may be visible.

Management:
1. Change clothes when possible and bag original clothes until they can be machine washed.
2. Wash area with mild soap and water.
3. Apply cold wet compress to affected area to help decrease itching.
4. If available, apply 1% hydrocortisone cream to the affected area and cover with a dry dressing to help prevent spread to other parts of the body or clothing.
5. In severe cases, Dexamethasone (Decadron) 10mg IM / PO qd for 5 days.
   A. IF POISON IVY, OR OTHER PLANT-ASSOCIATED DERMATITIS IS SUSPECTED, TAPER DOSE OVER 14 DAYS (10MG FOR 5 DAYS, 8MG FOR 2 DAYS, ETC)
6. Give Diphenhydramine (Benadryl) 25–50mg PO q 6hr prn itching, if tactically feasible. (Sedation may occur)

DISPOSITION:
1. Evacuation not needed for mild cases.
2. Priority evacuation for severe symptoms: intra-oral, eye involvement, or >50% body surface area (BSA) involvement.
3. Monitor for secondary infection; treat per Cellulitis Protocol if suspected on the basis of increasing pain, redness, or purulent crusting.
CORNEAL ABRASIONS/ CORNEAL ULCERS/ CONJUNCTIVITIS

SIGN AND SYMPTOMS:
1. History of eye trauma or contact lens wear
2. Eye pain – typically becoming worse over several days
3. Eye redness
4. Tearing
5. Blurred vision
6. Light sensitivity
7. Fluorescein stain positive
8. White or gray spot on cornea for corneal ulcer (usually need tangential penlight exam to see)
9. For sudden onset of eye pain after trauma in a patient with LASIK surgery, consider LASIK flap dislocation

MANAGEMENT:
1. Remove contact lens if worn.
2. Tetracaine 0.5%, 2 drops in the affected eye for pain relief. Do not dispense to patient.
3. Check for foreign body to include eyelid eversion. Irrigate with normal saline prn.
4. Gatifloxacin (Zymar) 0.3% drops – 1 drop in the affected eye qid while awake.
6. Reduce light exposure, stay indoors if possible - sunglasses if not possible.
7. For corneal abrasions: monitor daily for worsening signs and symptoms of a corneal ulcer (increasing pain and development of a white or grey spot at abrasion site). **DO NOT PATCH.**
8. Assess using fluorescein drops daily — abrasions should get progressively smaller. Continue antibiotic drops until 24 hours after cornea becomes fluorescein negative (no bright yellow spot).
9. **IF CORNEAL ULCER PRESENTS:** Increase Gatifloxacin (Zymar) drops to q 2hr and **Priority evacuation.**

DISPOSITION:
1. Evacuation may not be needed for corneal abrasion if improving with treatment.
2. **Urgent evacuation** for LASIK flap dislocation
3. **Priority evacuation** for Corneal Ulcer
EYE PATHOLOGY

CONJUNCTIVITIS

PARTIALLY DISLOCATED LASIK FLAP
(Notice smooth semicircular dye stained cut at the 4-6 o’clock position on the corneal margin. This represents the surgical incision that has failed to completely heal).
Instillation of fluorescein dye into the eye.

Notice faint green irregular line on cornea that represents the fluorescein stain of the abrasion.

Notice the triangular-shaped abrasion at the 10 o’clock position on the cornea, stained with fluroscein.

CORNEAL ABRASION DIAGNOSED USING FLUORSCEIN STAIN
CORNEAL ULCER
(White area on cornea that is visible WITHOUT fluorescein dye)
**COUGH**

**SPECIAL CONSIDERATIONS:**
Usually viral etiology, but may also occur with high altitude pulmonary edema (HAPE) and pneumonia.

**SIGNS AND SYMPTOMS:**
1. Cough with or without scant sputum production
2. Often accompanied by other signs and symptoms of upper respiratory tract infection (i.e., sore throat and rhinorrhea).

**MANAGEMENT:**
1. Treat symptomatically (using Cepacol lozenges or other appropriate medications) when the findings on history and physical do not suggest pneumonia.
2. Albuterol (Ventolin) metered dose inhaler 3–4 puffs q 4hr may also help control coughing.
3. Encourage PO hydration.
4. Avoid respiratory irritants (smoke, aerosols, etc).
5. If associated with URI symptoms, treat per Allergic Rhinitis Protocol.
6. If at altitude, pull balaclava over nose and breathe through it for warm humidified air.

**DISPOSITION:**
1. Evacuation is usually not required.
2. If accompanied by fever, chest pain, dyspnea, and/or colored sputum (green, dark yellow, or red-tinged), treat per Bronchitis/Pneumonia Protocol.
DEEP VENOUS THROMBOSIS (DVT)

SPECIAL CONSIDERATIONS:
1. Risk factors include trauma, long airplane rides, high altitude exposure, and genetic predisposition.
2. May be confused with a ruptured Baker’s cyst in a tactical setting.

SIGNS AND SYMPTOMS:
1. Asymmetric pain and swelling in a lower extremity (often the calf muscles).
2. Warmth over affected area.
3. Increased pain in the affected calf muscles with dorsiflexion of the foot (Homans’ Sign).

MANAGEMENT:
1. Monitor patient with pulse oximetry (sudden decrease in oxygen saturation suggests a pulmonary embolism.)
2. ASA 325mg PO
3. If sudden chest pain or respiratory distress occurs, consider pulmonary embolus and administer oxygen if available.
4. Immobilize the affected extremity.

DISPOSITION:
1. *Priority evacuation* if no respiratory distress or chest pain.
2. *Urgent evacuation* if respiratory distress or chest pain are present
DEHYDRATION

SPECIAL CONSIDERATIONS:
1. Troops in the field are often chronically dehydrated.
2. Prolonged missions, acute diarrhea (gastroenteritis), viral / bacterial infections, and environmental factors (heat stress or strenuous activity) all may exacerbate dehydration.
3. May also occur in cold or high altitude environments.

SIGNS AND SYMPTOMS:
1. Lightheadedness (worse with sudden standing)
2. Mild headache (especially in the morning)
3. Dry mucosa
4. Decreased urinary frequency and volume
5. Dark urine
6. Degradation in performance

MANAGEMENT:
1. Increase oral fluids if tolerated.
   A. If available, use carbohydrate/ electrolyte drink mixes for fluid replacement diluted to a 1:4 solution.
   B. Avoid fluids containing caffeine.
2. If unable to tolerate PO fluids, use an initial bolus of 1 liter normal saline IV, followed by repeat attempt at PO hydration. If still unable to tolerate PO hydration, repeat 1 liter bolus of normal saline IV. If normal saline is not available, use available IV fluids.

DISPOSITION:
1. Monitor closely for recurrence of dehydration.
**DENTAL PAIN**

**SPECIAL CONSIDERATIONS:**
1. Most common causes are deep decay, fractures of tooth crown/root, acute periapical (root end) abscesses, or pericoronitis (pain associated with an impacted wisdom tooth).
2. If tooth pain occurs during flight, consider barodontalgia and refer to the *Barotrauma Protocol*

**SIGNS AND SYMPTOMS:**
1. Intermittent or continuous pain (usually intense), heat or cold sensitivity
2. Visibly broken / cracked tooth
3. Severe pain on percussion
4. Intraoral swelling / abscess
5. Partially erupted wisdom tooth
6. Lost filling

**MANAGEMENT:**
1. Treat per *Pain Management Protocol*.

2. If signs and symptoms of infection are present, administer Amoxicillin/Clavulanic Acid (Augmentin) 875mg PO bid for 7 days **OR** Azithromycin (Z-pak) 500mg PO initially followed by 250mg PO qd x 4 days.

3. If gums appear swollen and red, encourage increased oral hygiene and warm saline rinses bid.

4. If filling is lost, consider temporary filling/patch.

**DISPOSITION**
1. Evacuation usually not necessary.
2. *Routine* evacuation if not responding to therapy.
## DETERMINATION OF DEATH / DISCONTINUING RESUSCITATION

### SPECIAL CONSIDERATIONS:
1. Immediate determination of death is appropriate in a trauma patient without pulse or respirations in the setting of multiple casualties when resuscitative efforts would hinder the care of more viable patients.
2. Patients that are struck by lightning, have hypothermia, cold-water drowning, or intermittent pulses may require extended cardiopulmonary resuscitation.
3. It is assumed that personnel do not have access to ECG, or other monitoring equipment to evaluate heart rhythm, or deliver countershocks.

### SIGNS AND SYMPTOMS:
1. Obvious Death - Persons who, in addition to absence of respiration, cardiac activity, and neurologic reflexes have one or more of the following:
   - Decapitation
   - Massive crushing and/or penetrating injury with evisceration of the heart, lung or brain
   - Incineration
   - Decomposition of body tissue
   - Rigor mortis or post-mortem lividity

### MANAGEMENT:
1. In the setting of obvious death, resuscitative efforts should not be initiated.
2. If resuscitative efforts have been initiated, consider termination of resuscitation:
   - After 15 minutes (if the cause is unknown or due to trauma) or after 30 minutes (when the cause is due to hypothermia, electrical injury, lightning strike, cold water drowning, or other cause known to require a prolonged resuscitative effort) when:
     1) There is persistent absence of pulse and respirations despite assuring airway patency and effective ventilation as well as administration of resuscitative fluids and medications.
     2) Pupils are fixed and dilated. This is not applicable in the setting of lightning strikes or in the presence of drugs that cause pupil dilatation.
     3) No response to deep pain above or below the clavicles
     4) Absence of end-tidal CO₂, (either colorimetric or wave form) from a correctly placed endotracheal tube or alternative airway.
     5) Absence of cardiac activity on ultrasound examination.
3. If there is any question as to the discontinuation of resuscitative efforts, then a medical officer should be contacted for guidance.

### DISPOSITION
1. Evacuation of the remains when tactically feasible.
2. In the event of return of spontaneous circulation, Urgent Evacuation.
EAR INFECTION (INCLUDES OTITIS MEDIA AND OTITIS EXTERNA)

SPECIAL CONSIDERATIONS:
1. Infection of the middle or external ear may be viral or bacterial in etiology.
2. Increased pressure in the middle ear may cause intense pain and may result in rupture of the tympanic membrane (characterized by sudden decrease in pain and drainage from ear canal.)

SIGNS AND SYMPTOMS:
1. Otitis Media
   A. Ear pain
   B. Decreased hearing
   C. Inflamed, bulging ear drum on otoscope exam
2. Otitis Externa
   A. Ear canal drainage
   B. Pain on motion of tragus (outer ear)
   C. Cracked, red, inflamed external auditory canal

MANAGEMENT:
1. OTITIS MEDIA
   A. Moxifloxacin (Avelox) 400mg PO qd for 10 days OR Azitomycin. (Z-pac) 500mg PO initially followed by 250mg PO qd x 4 days.

2. OTITIS EXTERNA

3. A. Gatifloxacin (Zymar) drops, 5 drops tid – qid until symptoms remain resolved for 48 hours.

4. Treat per Pain Management Protocol

5. WARNING: If water immersion is anticipated, use ear plugs to prevent cold water entry which will cause vertigo.

DISPOSITION:
1. For uncomplicated cases, no evacuation is necessary.
2. Routine evacuation for complicated cases not responding to therapy
TYMPANIC MEMBRANE PICTURES

NORMAL TYMPANIC MEMBRANE
(No fluid levels, no bulging)
OTITIS MEDIA
(Notice erythematous, inflamed, bulging tympanic membrane)
OTITIS EXTERNA
Crusty weeping drainage from external auditory canal
## ENVENOMATION

### SNAKE ENVENOMATIONS

#### SPECIAL CONSIDERATIONS - GENERAL:
1. Toxic envenomations from a variety of sources, including insects, spiders, bees/wasps, scorpions, snakes, or marine life are all capable of causing life-threatening anaphylaxis and should be treated according to the *Anaphylaxis Protocol*. 

#### SPECIAL CONSIDERATIONS - SNAKES:
1. Only a minority of snakebites from toxic snakes involve severe, life-threatening envenomations.
2. Incision, excision, electrical shock, tourniquet, oral suction, and cryotherapy should **NOT** be performed to treat snakebites.
3. Suction device is not effective for removing snake venom from a wound. If previously placed, it should be left in place until patient reaches higher level of care.

#### SNAKE SIGNS AND SYMPTOMS:
1. Crotalidae (Pit vipers, rattlesnake, moccasin, bush master)  
   A. Sudden pain  
   B. Erythema  
   C. Ecchymosis  
   D. Hemorrhagic bullae  
   E. Bleeding from site  
   F. Metallic taste  
   G. Hypotension/shock  
   H. Swelling/edema  
2. Elapids (Coral snake, sea snake, mamba, cobra, taipan, kraits)  
   A. Cranial Nerve dysfunction (i.e., ptosis, difficulty swallowing)  
   B. Paresthesias  
   C. Fasciculations  
   D. Weakness  
   E. Altered mental status

#### MANAGEMENT OF SNAKE BITES:
1. If signs and symptoms of anaphylaxis present, treat per *Anaphylaxis Protocol*.
2. Supportive care as necessary
3. Treat per *Pain Management Protocol using narcotics*. **Avoid NSAID use.**
4. Treat per *Nausea and Vomiting Protocol*.
5. If toxic snakebite suspected (significant pain, edema, evidence of coagulopathy or neurologic signs/symptoms):  
   A. Minimize activity and place on a litter  
   B. Remove all constricting clothing and jewelry  
   C. Start IV in unaffected extremity  
   D. Monitor and record vital signs and extent of edema every 15–30 minutes  
   E. IV crystalloid for hypotension as necessary  
   F. Immobilize affected limb in neutral position  
   G. A compression wrap (proximal to distal) may be helpful with an elapidae (neurotoxic) snake (cobra, mamba, coral snake), but is not indicated with crotalidae (pit viper) bites.
H. **WARNING** The need for a fasciotomy is difficult to determine in a snake bite unless compartment pressures have been taken.

I. **WARNING** Cold therapy and suction therapy is contraindicated in snakebites.

**DISPOSITION:**
1. *Urgent* evacuation if treated for anaphylaxis.
2. *Urgent* evacuation for elapid bites or if evidence of severe envenomation (systemic signs and symptoms, progressive ascending edema) exists.
3. Evacuation not required for crotalid bites if signs and symptoms do not indicate anaphylaxis or development of severe envenomation after four hours of observation.

**MARINE ENVENOMATIONS**

**SPECIAL CONSIDERATIONS:**
1. Envenomation results from stings by jellyfish, fire corals, sting rays, sea urchins, bristle worms, fish spines, sea snakes, etc.
2. Jellyfish account for the vast majority of envenomations, which occur with contact to stinging cells on tentacles.
3. Stingrays are the most common cause of envenomation by marine vertebrates.
4. Sea snake venom is 2-10 times more potent than cobra venom, but only about 25% of those bitten develop symptoms (due to an inefficient delivery system and small mouth).
5. All of these envenomations are more likely to occur in intratidal regions, reefs, and surf zones.

**SIGNS AND SYMPTOMS:**
1. Envenomation by jellyfish:
   A. Contact with jellyfish tentacles causes immediate, intense sharp and burning pain, followed by local, linear erythematous eruption.
   B. Severe stings can cause anaphylactic reaction, hematuria, vomiting, syncope, hypotension, or paralysis.
2. Envenomation by fire coral is similar to jellyfish, but less severe and rarely causes complications. Pain symptoms usually resolve within 12 hours.
3. Envenomation by stingray:
   A. Spine on tail contains retro-serrated teeth, with a venom gland along the groove.
   B. Envenomation causes immediate, intense pain at site of injury out of proportion to what it looks like, edema.
   C. Pain tends to peak 30-60 minutes after puncture and can last for several days.
   D. Rare systemic symptoms include limb paralysis, hypotension, and bradycardia.
4. Envenomation by sea urchin:
   A. Frequently cause multiple deep puncture wounds when stepped on.
   B. Puncture and envenomation causes immediate, intense pain, erythema and local swelling.
   C. If more than 15-20 punctures are present then severe systemic symptoms can occur.
5. Envenomation by bristleworms:
   A. Is caused by contact with bristle-like setae on feet of animal.
   B. Contact is like brushing against a cactus plant and may result in many fine bristles embedded in the skin.
   C. Causes painful inflammation, which is almost never serious.
6. Envenomation by fish spines:
   A. First symptom is usually immediate localized pain out of proportion to clinical manifestations, lasting minutes to hours.
B. Puncture wound is usually cyanotic, with surrounding erythema and edema
C. Pain is often noted in proximal lymph nodes.
D. Symptoms can progress to delirium, malaise, nausea, vomiting, and elevated temperature.
E. Infrequently leads to shock and death.

7. Envenomation by sea snake bites:
A. Fang and teeth marks consist of small puncture wounds and may number from 1–20.
B. Latent period of 10 minutes to several hours between bite and onset of symptoms.
C. May initially present with mental status changes, including euphoria, anxiety or restlessness.
D. Progresses to dry throat, nausea, vomiting, generalized weakness and paralysis, leading to respiratory distress/failure.

8. Envenomation by blue-ringed octopus bite:
A. Bite is painless and may go unnoticed.
B. Patient may become paralyzed with respiratory distress.
C. Symptoms are usually rapid in onset and extremely variable in severity.

MANAGEMENT:
1. Stings (Jellyfish, Sea Wasp)
   A. Remove stinger, tentacles, etc if possible with gloved hand, forceps or tape.
   B. Immediately flush with dilute acetic acid (vinegar). Alternative flush is isopropyl alcohol and seawater. Do not use fresh water.
   C. Topical lidocaine
   D. Topical steroids
   E. Follow Pain Management Protocol

2. Bites (Sea snakes, blue ringed octopus) – See Envenomation Protocol

3. Punctures (Sea urchin, stingray, fish spines, bristleworms)
   A. Remove all penetrating foreign bodies with gloved hand, forceps or tape.
   B. Irrigation with cold seawater.
   C. Soak the affected area in nonscalding water (110–115°F) for 30-90 minutes to inactivate toxins
   D. Ultrasound or xray (if available for retained foreign body)
   E. Antibiotics for deep puncture wounds: Moxifloxacin.
   F. Follow Pain Management Protocol

DISPOSITION:
1. Urgent evacuation if evidence of severe envenomation (cardiovascular collapse, anaphylaxis, paralysis, ascending edema of limb)
2. Evacuation not required if signs and symptoms do not indicate severe envenomation after 24 hours of observation.

INSECT / ARTHROPOD ENVENOMATIONS

SPECIAL CONSIDERATIONS – Insect / Arthropod Bite:
1. In cases of suspected black widow spider bites, consider other causes for acute abdominal pain

HYMENOPTERA (BEE, WASP, HORNET) SIGNS AND SYMPTOMS:
1. Pain
2. Swelling / edema
3. Puncture site(s) from stinger or fangs
4. Warmth
5. Erythema
6. Signs of anaphylaxis

**MANAGEMENT:**
1. If signs and symptoms of anaphylaxis present, treat per *Anaphylaxis Protocol*.
2. Remove stinger by scraping from side.
3. Apply ice or cold water.
4. Apply topical 1% hydrocortisone cream.
5. Apply topical lidocaine.
6. Ibuprofen 800mg PO tid x 7 days
7. Diphenhydramine (Benadryl) 25–50mg q 6hr prn PO / IV.

**ARTHROPOD (Spider)**
1. Black Widow (Red hour glass on back)
   A. **SIGNS AND SYMPTOMS:**
      1) Pinching bite followed by local swelling and burning
      2) Large muscle group spasms/tremors
      3) Abdominal pain and/or rigidity within 60 minutes
      4) Nausea and vomiting
      5) Diaphoresis
      6) Hypertension
      7) Tachycardia
   B. **MANAGEMENT:**
      1) Treat per *Pain Management Protocol (narcotic analgesia)*
      2) Diazepam (Valium) 2-10mg PO q 6-8hr or 5-10mg IV/IM for relief of muscle spasm
      3) Diphenhydramine (Benadryl) 25–50mg q 6hr prn PO / IV.
2. Brown Recluse (Notice violin shape on back)
A. **SIGNS AND SYMPTOMS:**
1) Local pain and ulceration at site within 2-8 hours with surrounding erythema
2) Hemorrhagic vesicle progressing to slowly enlarging eschar
3) Fever, chills, nausea, joint pain

B. **MANAGEMENT:**
1) Elevate bite site
2) Avoid strenuous activity
3) Treat per *Pain Management Protocol (narcotic analgesia)*
4) Diphenhydramine (Benadryl) 25–50mg q 6hr prn PO / IV.
5) Use an antibiotic appropriate for MRSA if cellulitis exists.

**SCORPION SIGNS AND SYMPTOMS:**
1. Local pain, swelling, and erythema
2. Nausea and vomiting
3. Paresthesias
4. Tongue fasiculations
5. Sympathetic (tachycardia, hypertension, hyperthermia) or parasympathetic (hypotension, bradycardia, hypersalivation, incontinence) overdrive at development
6. Seizures
7. Agitation
8. Blurry vision/Rotary eye movements

**MANAGEMENT:**
1. Treat per *Pain Management Protocol*
2. Treat per *Nausea and Vomiting Protocol*
3. Apply ice packs to bite site
4. Supportive care as necessary
5) Diphenhydramine (Benadryl) 25–50mg q 6hr prn PO / IV.

**DISPOSITION**
1. *Urgent* evacuation for development of abdominal rigidity
2. *Urgent* evacuation for development of systemic signs.
3. *Urgent* evacuation for anaphylaxis
4. *Routine* evacuation for tissue necrosis of brown recluse bite
5. Evacuation typically not required for localized insect stings and scorpion bites.
EPISTAXIS

SPECIAL CONSIDERATIONS:
1. Common at high altitude and in desert environments due to mucosal drying.
2. May be anterior or posterior
3. Posterior epistaxis may be difficult to stop and may cause respiratory distress due to blood flowing into the airway. This type of epistaxis is uncommon in young healthy adults. It is more commonly seen in older, hypertensive patients.

SIGNS AND SYMPTOMS:
1. Nosebleed
2. Often previous history of nosebleeds

MANAGEMENT:
1. Clear clots and other material from airway (if required) by having patient sit up, lean forward, and blow his/her nose. Pinch nose as shown and have patient lean forward.
2. IF BLEEDING CONTINUES:
   A. Oxymetazoline (Afrin) nasal spray 2 squirts in each nostril then pinch anterior area of nose firmly for full 10 minutes WITHOUT RELEASING PRESSURE.
   B. If bleeding continues, insert oxymetazoline (Afrin) soaked nasal sponges (or small pieces of hemostatic gauze) bilaterally along the floor of the nasal cavity. Continue pinching the nose just below the nasal bridge for 10 minutes.
3. Once bleeding has stopped (after 30 minutes), remove the oxymetazoline (Afrin) nasal sponge (or hemostatic gauze) and apply mupirocin (Bactroban) to the affected nostril bid - tid.
4. Normal saline IV TKO prn (based upon severity of nose bleed)
5. IF BLEEDING CONTINUES
   A. Prepare 14 French Foley catheter. (Tip is cut to minimize distal irritation.)
   B. Advance catheter along floor of nose (straight in) until visible in mouth.
   C. Fill balloon with 5cc of normal saline.
   D. Retract catheter until well opposed to posterior nasopharynx.
   E. Add an additional 5cc of normal saline to balloon.
   F. Clamp in place without using excessive anterior pressure.
   G. Moxifloxacin (Avelox) 400mg PO qd until packing is removed.
   H. LEAVE BALLOON AND PACKING IN PLACE FOR 72 HOURS.

DISPOSITION:
1. Priority evacuation for severe epistaxis not responding to therapy or if Foley catheter is used.
2. Evacuation may not be required if epistaxis is mild, anterior, and resolves with treatment
FLANK PAIN
(INCLUDES RENAL COLIC, PYELONEPHRITIS, KIDNEY STONES)

SPECIAL CONSIDERATIONS:
1. May proceed to life-threatening systemic infection.
2. May be associated with testicular torsion. Ensure normal external GU exam first.

SIGNS AND SYMPTOMS:
1. Urinary Tract Infection
   A. Dysuria
   B. Polyuria
2. Back pain
3. Flank pain
4. Nausea/vomiting
5. Costovertebral angle tenderness
6. Fever
7. Hematuria

MANAGEMENT:
2. Treat per Nausea and Vomiting Protocol.
3. Treat per Dehydration Protocol.
4. If fever present:
   A. Moxifloxacin (Avelox) 400mg PO qd OR Amoxicillin/Clavulanic Acid (Augmentin) 875mg PO bid
   B. Ceftriaxone (Rocephin) 1gm bid IV / IM OR Ertapenem (Invanz) 1gm IV / IM if unable to tolerate PO or unresponsive to oral treatment.

DISPOSITION:
Priority evacuation for persistent flank pain and/or fever
**Fungal Skin Infection**

**Special Considerations:**
1. Insect bite(s), eczema, and contact dermatitis as differential diagnosis – are also accompanied by itching, but have discrete red papular lesion(s).
2. Cellulitis as a differential diagnosis – is bright red, painful, not pruritic, and typically becomes steadily worse without antibiotics.
3. Acute contact dermatitis as a differential diagnosis – is diagnosed by intense itching, skin erythema and a history of environmental exposure.

**Signs and Symptoms:**
1. Skin erythema
2. Pruritis is variable
3. Slow spreading
4. Borders of the erythematous plaques are generally irregular and/or circumscribed.
5. Often initially diagnosed as contact dermatitis but gets worse with use of steroids (those without antifungal agent added).
6. Most common sites of infection are feet ("athlete’s foot" or tinea pedis), groin ("jock itch" or tinea cruris), scalp (tinea capitus), and torso or extremities ("ring worm" or tinea corporis).

**Management:**
1. Fluconazole (Diflucan) 150mg PO once per week for four weeks (total of four doses in the absence of a cure, or 1 dose after clinically clear). If not resolved after 4 weeks, refer to physician.
2. Clean rigorously with mild soap without injuring the skin.

**Disposition**
Evacuation is usually not required for this condition.
FUNGAL SKIN INFECTIONS
ATHLETE’S FOOT (FUNGAL INFECTION – Tinea Pedis)
GASTROENTERITIS

SPECIAL CONSIDERATIONS:
1. Etiology of acute diarrhea is often viral, but bacterial or parasitic infections are common in the deployed environment.
2. Emerging fluoroquinolone resistance among enteropathogenic E. Coli and Campylobacter makes azithromycin the new primary agent for therapy.
3. Consider antibiotic-related diarrhea if on antibiotics at onset.
4. Consider parasitic infection if symptoms persist for 3 or more days.
5. Must rule out malaria if fever and GI symptoms exist in a malarious area.

SIGNS AND SYMPTOMS:
1. Acute onset of nausea, vomiting, and diarrhea
2. Fever may or may not be present.

MANAGEMENT:
1. Loperamide (Imodium) 4mg PO initially, then 2mg PO after every loose bowel movement with a maximum dose of 16mg per day.

WARNING
2. Do not use loperamide in the presence of fever or bloody stools.

3. Azithromycin (Zithromax) 500mg PO qd for 3 days or Moxifloxacin (Avelox) 400mg PO qd for 3 days.


5. Treat per Dehydration Protocol.

6. If diarrhea persists after 3 days of therapy, or diarrhea develops while already on antibiotics, give Metronidazole (Flagyl) 500mg PO tid for 10 days.

DISPOSITION:
1. Urgent evacuation if grossly bloody stools or circulatory compromise
2. Priority evacuation if dehydration occurs despite above therapy.
3. Routine evacuation if diarrhea develops while already on antibiotics,
HEADACHE

SPECIAL CONSIDERATIONS:
1. The number of differential diagnoses for the acute headache is large and includes disorders that encompass the spectrum of minor to severe underlying disorders.
2. Consider altitude sickness, intracranial bleeds, meningitis and carbon monoxide poisoning.

SIGNS AND SYMPTOMS:
1. If the headache is atypical for the patient, check for elevated blood pressure (if possible), fever, neck rigidity, visual symptoms, mental status changes, motor-sensory deficits, and hydration.

MANAGEMENT:
1. If the patient has fever, nuchal rigidity, photophobia, petechial rash, or nausea and vomiting, treat per Meningitis Protocol.
2. Treat per Pain Management Protocol (to exclude use of narcotics).
3. If headache is accompanied by nausea and/or vomiting, treat per Nausea and Vomiting Protocol.
4. Oxygen if other therapies are ineffective.
5. If dehydration is suspected, treat per Dehydration Protocol.
6. If at altitude, treat per Altitude Illness Protocol.

DISPOSITION:
1. Evacuation is usually not required if the headache responds to therapy.
2. Acute headache in the presence of fever, severe nausea and vomiting, mental status changes, focal neurological signs, or preceding seizures, loss of consciousness, or a history of “it’s the worst headache in my life” constitutes a true emergency and requires Urgent evacuation. Also consider Urgent evacuation for anyone without a prior history of headaches if their pain is severe.
HEAD AND NECK INFECTION
(INCLUDES EPIGLOTTITIS AND PERITONSILLAR ABSCESS)

**SPECIAL CONSIDERATIONS:**
1. Most common causes in young healthy patients include odontogenic (dental origin) cutaneous sources or post-injury (wound or fracture) infections.
2. These infections may progress rapidly from minor to airway/life-threatening.

**SIGNS AND SYMPTOMS:**
1. Pain, fever and malaise
2. Intra/extra oral swelling
3. Difficulty opening mouth
4. Pus
5. Difficulty swallowing
6. Airway compromise

**MANAGEMENT:**
1. Manage airway and breathing first!
2. Place patient in position of comfort.
3. Monitor pulse oximetry.
4. Oxygen prn
5. IV access
6. Amoxicillin/Clavulanic Acid (Augmentin) 875mg PO bid for 7 days OR Ceftriaxone (Rocephin) 1gm IV / IM qd for 7 days.
8. Consider Dexamethasone (Decadron) 10mg IV for any airway involvement.
9. Avoid airway manipulation unless absolutely necessary.
10. Have cricothyroidotomy kit available BEFORE ATTEMPTING INTUBATION.
11. If airway intervention is indicated, make a single attempt at intubation if feasible.
12. If intubation is attempted, do not make any repeat attempts. If intubation has failed, the next step is a cricothyroidotomy (using lidocaine if conscious).

**DISPOSITION**
1. *Urgent* evacuation if any airway compromise is present.
2. *Routine* evacuation if no airway compromise and the infection is not widespread.
# HEAT ILLNESS

## SPECIAL CONSIDERATIONS:
1. Dehydration often accompanies heat illness
2. Colloids (Hextend) should be avoided in favor of crystalloids.
3. Heat Stroke is a life-threatening effect of hyperthermia and characterized by altered mental status and elevated core temperature typically > 104° F.
4. Patients are at risk for multisystem organ failure, and careful monitoring is essential even after return to normothermia.

## SIGNS AND SYMPTOMS:
1. Generally involve physical collapse or debilitation during or immediately following exertion in the heat.
2. Heat Exhaustion: Temp generally < 104° F, headache, dizziness, nausea, tachycardia, and normal mental status

## MANAGEMENT:
1. Early rapid cooling reduces mortality and morbidity, and should be initiated as soon as possible. Cooling should be the primary goal before transport.
2. Place in cool area and remove clothing.
   - For Heat Stroke: The best option for rapid cooling is full body ice water immersion (keeping head elevated out of water). If this is unavailable, a continual dousing of cold water (as would occur in a cold shower or with ice water-soaked towels) provides the fastest cooling rate. A less ideal option is to spray the patient with water plus rapid air movement provided by a fan. Apply these active cooling measures until the core temperature reaches 102° F.
3. Place 1 tube Glutose (oral glucose gel) or 1 packet of sugar in buccal mucosal region.
4. Treat per Dehydration Protocol. Heat stroke and heat exhaustion with associated severe muscle pain and/or cola colored urine, will typically require 2-3 liters of crystalloids and continued IV hydration to obtain a urine output of 200mL/hr.
   - If the patient is unconscious after exercising on a hot day, and you do not have a core temperature available, limit fluid resuscitation to 1000 cc of crystalloid unless hemodynamically unstable.
5. Treat per Nausea and Vomiting Protocol.
6. For cola colored urine or severe muscle pain, treat per Rhabdomyolysis Protocol

## DISPOSITION:
1. Urgent evacuation for Heat Stroke
2. Routine evacuation for Heat Exhaustion
HIV POST EXPOSURE PROPHYLAXIS

SPECIAL CONSIDERATIONS:
1. Initiation of the highly active antiretroviral therapy (HAART) should ideally occur within 2 hours of exposure, but still has some effect up to 72 hours after exposure.
2. Antiretrovirals have a significant side-effect profile, including nausea, vomiting, and diarrhea.
3. Obtain a sample of the source’s blood for HIV and hepatitis testing, if possible.
4. Use of a commercially available Rapid HIV Test Kit that uses either an oral specimen or whole blood is recommended for source testing to determine if HAART therapy should be initiated. This should occur within 1-2 hours. The test requires 20-40 minutes to obtain results. The use of one of the following FDA approved Rapid HIV Test kits is recommended (as of 2009):
   A. whole blood, plasma or oral fluid:
      1) OraQuick Advance Rapid HIV 1/2 Antibody Test
   B. whole blood or serum/plasma:
      1) Uni-Gold Recombigen HIV Test
      2) Clearview HIV 1/2 Stat-Pak
      3) Clearview Complete HIV 1/2 Test

HIGH RISK EXPOSURES:
1. Percutaneous injury (needle stick or other contaminated penetrating injury).
2. Exposure or exchange of body fluids with persons at high risk for HIV.
3. Transfusion of blood products that have not undergone standard U.S. blood bank or equivalent testing for transmissible diseases.
4. When attempting to evaluate a high risk exposure, take into account the source of the bodily contamination. For example, blood from a fellow Soldier would fall into a low risk category for exposure.

MANAGEMENT:
1. Wash area with soap and water to clean area and minimize exposure.
2. Use a Rapid HIV Test Kit to determine if therapy should be initiated. In high risk situations, do not delay initiation of therapy if the test kit is not available. HIV PEP should be started within 1–2 hours of exposure.
3. Consult with unit medical officer ASAP to discuss the case and obtain further guidance after any significant exposure.
   A. If the Rapid HIV Test is positive, initiate PEP.
   B. If high-risk exposure occurs and a Rapid HIV Test is unavailable, initiate PEP.
   C. If a Rapid HIV Test is negative, seek medical officer guidance to determine the need for PEP.
4. Choose only 1 of the following drug treatment options.
   A. Atripla (emtricitabine/tenofovir/efavirenz), 1 PO qd
      1) 52% incidence of CNS side-effects
      2) Known to cause birth defects. Category D drug. Be sure that a female patient has a negative pregnancy test prior to administration of Atripla.
   B. OR Combivir® (lamivudine and zidovudine) 1 tablet PO bid AND Viread (tenofovir) 300mg PO qd
   C. OR Truvada (emtricitabine/tenofovir) 1 PO qd AND Kaletra (lopinavir/ritonavir) 4 pills PO qd, taken simultaneously
D. **OR** Truvada (emtricitibine/tenofovir) 1 PO qd **AND** AZT (Zidovudine) 300mg PO bid

1) **WARNING** Possible antagonism with decreased effectiveness.

E. **OR** Combivir® (Lamivudine and Zidovudine) 1 tablet PO bid **AND** Viracept® [Nelfinavir] 1250mg PO bid

1) **WARNING** Older regimen. Replaced by options 4a and 4b.

5. Do not use alcoholic beverages after Combivir administration.

6. For GI side-effects of medication, treat per *Nausea and Vomiting Protocol*

7. Maintain hydration and nutrition status.

**DISPOSITION:**

1. **Urgent** evacuation if a significant exposure occurs and HAART is not available.

2. **Routine** evacuation if HAART is available and Rapid HIV Test is positive.

3. Consult unit medical officer to determine the need for, and the priority of evacuation, if high-risk exposure has occurred and a Rapid HIV Test is negative.
INGROWN TOENAIL

SPECIAL CONSIDERATIONS:
1. Consider toenail removal only if close follow-up is possible.
2. **WARNING** DO NOT USE local anesthetic with epinephrine.

SIGNS AND SYMPTOMS:
1. Pressure over the nail margins increases the pain.
2. Inflammatory or infectious responses are generally localized.
3. Partial or complete nail removal is typically indicated in chronic inflammation / infection, with severe pain of both medial and lateral nail folds, especially if the condition has lasted one month or greater.

MANAGEMENT:
1. Partial/complete toenail removal:
   A. Clean the site with soap, water, and betadine.
   B. Perform a digital block at the base of the toe using lidocaine 1% **WITHOUT EPINEPHRINE**.
   C. Apply constricting band to base of toe.
   D. The lateral one fourth or one fifth of the nail plate is identified as the site for the partial lateral nail removal. This area is usually where the nail curves down into the toe. The physician uses a nail splitter or bandage scissors, cutting from the distal (free) end of the nail straight back (proximally) beneath the proximal nail fold (Figures 1 and 2). A straight, smooth, new lateral edge to the nail plate is created. When the scissors cut through the most proximal edge of the nail beneath the cuticle, a “give” can be felt.

**Figures 1 and 2:** Lateral nail avulsion. (A) An ingrown nail is seen with lateral nail fold hypertrophy on the left side of the nail. After administering digital or local anesthesia, scissors, a scalpel blade, or a nail splitter can be used to cut proximally and create a smooth, straight edge. Some physicians prefer to slide a flat nail elevator beneath the nail before making this cut in an effort to reduce trauma to the
nail bed. (B) The free lateral nail now is grasped with a hemostat or clamp and removed. (C) The lateral nail bed and matrix are now exposed for ablation.

E. Bluntly dissect the nail from the underlying matrix with a flat object, elevate the nail and grasp it with a hemostat or forceps, removing the piece. Remove the fragment by rotating outwards (towards the nail fold at the side of the nail), while pulling straight out towards the end of the toe. 
   **Be sure that all of the nail fragment is removed.**
F. Clean the nail grooves to remove any debris.
G. Remove constricting band.
H. Control bleeding with direct pressure and dry the underlying nail bed.

2. **Mupirocin (Bactroban) 2% ointment to exposed nail bed.**

3. Dress with a non-adherent dressing and dry bandage.

4. Instruct the patient to wash the area daily.

5. Recheck wound and change dressing daily.

6. Instruct patient to wear less constricting shoes and to trim their nails straight across. Optimal care is to limit walking and marching for 3–5 days.

7. **Treat per Pain Management Protocol.**

8. **Systemic antibiotics are typically not needed in these procedures; however, consider using Moxifloxacin (Avelox) 400mg PO qd for 10 days, OR Amoxicillin/Clavulanic Acid (Augmentin) 875mg PO bid for 10 days if an infection is suspected (increasing pain, redness, and swelling).**

**DISPOSITION:**

1. Evacuation is usually not required if the condition responds to therapy.
2. The nail bed may have serous drainage for several weeks, but will usually heal within 2–4 weeks.
JOINT INFECTION

SIGN AND SYMPTOMS:
1. History of adjacent penetrating trauma or infection
2. Single red, swollen joint
3. Fever
4. Pain

MANAGEMENT:
1. IV access
2. Ceftriaxone (Rocephin) 2gm IV / IM bid OR Ertapenem (Invanz) 1gm IV / IM qd.
   A. If evacuation is prolonged and pain is unresponsive to analgesia, consider draining joint (if properly trained)
4. IMMOBILIZE THE JOINT.

DISPOSITION:
Priority evacuation

Joint is swollen, with a tense effusion, and overlying erythema extending beyond the joint. Exam will most likely also have tender, swollen groin nodes in this patient with an infected knee joint.
# K-9 EVALUATION AND TREATMENT

## VITAL SIGNS OF CANINES:

1. **Temperature:**
   - A. Normal Rectal Temp is 100-102.5° F.
   - B. Temperature after exercise: 103-106° F.

2. **Pulse**
   - A. Normal pulse rate will vary from 60-80bpm. Can beat up to 130 with exercise.
   - B. The pulse rate and respiration rate will vary from dog to dog, and will also vary if the dog is at rest or working.
   - C. The femoral artery is located on the inside of a dog’s rear thighs. Take your hand as if you were passing someone a plate, grab the dog on the rear of their thigh with your fingers inside the thigh, and palpate the artery.

3. Normal respiration rate for an adult dog will vary between 10-40 respirations per minute

4. Capillary refill time: less than 2 seconds.

5. Mucous membrane color: generally pink.

### SPECIFIC WEIGHT RELATED DRUG DOSES ARE AT THE END OF THIS PROTOCOL

### MOST DOG HANDLERS WILL CARRY A DRUG CARD FOR THE DOG.

## MONITORING:

1. **Pulse Ox** – Placed on tongue, ear, or other non pigmented, highly vascular area (lip)
2. **EKG** – Alligator clips behind each elbow and above left knee. If you do not have alligator clips place the buttons or leads behind the largest pad on the foot using.
3. Animals do not have palpable carotid pulses. You can obtain a femoral pulse in the inguinal crease.

## IM INJECTION SITES:

1. Gluteal muscles

![Diagram of injection sites](image.png)
**IV SITES:**

Usually the easiest/best vein to use for a K-9 IV is the one found on their forelegs. The cephalic vein is located on the middle of the foreleg. This is the most commonly used vein for fluid administration and IV delivery of drugs.

If the person occluding the vein for you rolls it laterally, this will place the vein directly on top of the dog’s leg, easing access.

Maintain a firm hold on the dogs leg as you place the catheter, as they will pull away from you while placing the catheter.

Start distally on the vein. If you blow the vein, move more proximally and attempt the IV.

In the hind leg, the lateral saphenous vein is used. This vein is harder to maintain and secure.

In both procedures use plenty of tape to secure the IV line. Your patient will try to pull it out. If they are ambulatory, movement will often dislodge the IV. IVs in conscious dogs must be monitored.
PRE-HYDRATION FLUID THERAPY:
1. Handlers may pre-load prior to event (approximately 2 hours prior to event to allow for absorption)
2. Normal Saline or Lactated Ringer’s Solution, 500ml SQ
3. Administer SQ between the shoulder blades

HYDRATION STATUS:
1. Normal Hydration: Pick up skin and release. It should return to the position that it was, within 1 second.
   A. Capillary Refill Time (CRT) is measured by pressing on the gums over the canine tooth. Using one finger, press down firmly until the gums turn white under your finger and release. Also, note the normal color of your dog’s gums and mouth. Dog’s gum color may vary from black, pink, reddish brown or any combination of colors.
2. Dehydration:
   A. 6-8% dehydration – loss of skin elasticity, tacky gums, mildly prolonged CRT
   B. 10-12% dehydration – tented skin, dry gums, prolonged CRT, sunken eyes, increased HR, rapid/weak pulses
3. Dehydration Fluid Replacement
   A. Estimate dehydration
      1) 5% give 800ml bolus IV
      2) 10% give 1500ml bolus IV
   B. Fluid choice is normal saline or Lactated Ringer’s Solution
   C. The best technique to rehydrate the dog is through oral consumption.

RESTRAINT (SOF medical personnel should work with handler to learn muzzling techniques):
1. Always muzzle dog when working on them.
2. Physical restraints with muzzles or improvised muzzles
   A. Field expedient muzzle:
      1) Kerlix is wrapped around the snout several times and then tied behind the head.
2) The leash is wrapped around the snout

3. Chemical restraint if needed to protect handler and medic
   A. Dexdomitor (if not traumatic injury) reversed with Antisedan. Dexdomitor after onset gives 20-30 minutes of good sedation when administered with labeled dose.
   B. Morphine can be used for sedation and restraint at 30-50mg IM.
K-9 HEAT INJURIES

SPECIAL CONSIDERATIONS:
1. Heat injuries are life threatening for an animal.
2. Dehydration accompanies heat injuries.
3. Crystalloids are preferred over colloids. However, use of colloids is better than nothing.

HEAT EXHAUSTION

SIGNS AND SYMPTOMS:
1. Recent activity and history,
2. Rectal temp maybe over 105
3. Fast and shallow panting that does not slow in a couple of minutes
4. Heart rate may be over 140 bpm
5. Brick red mucous membranes
6. Pulse may be bounding or thready and weak
7. Dog looking for a cool place to lay down or just stops working

HEAT STROKE

SIGNS AND SYMPTOMS:
1. Recent activity and history
2. Temp over 106° F
3. Pale gums
4. Rapid and shallow breathing
5. Collapse
6. Weak
7. Uncoordinated
8. Seizures
9. Vomiting
10. Diarrhea

MANAGEMENT:
1. Shade or AC
2. Wet down or submerge in cool water. If possible fan dog afterwards.

WARNING
Do not put a wet dog in the kennel. This will create a sauna like effect upon the dog.

3. Alcohol on pads
4. Cool ice packs under groin and arm pits.
5. IV fluid therapy.
6. Continuous monitoring until temp drops to below 103° F.
K-9 HIGH ALTITUDE SICKNESS AND PULMONARY EDEMA

SPECIAL CONSIDERATIONS:
Typically not seen in dogs, but may occur

SIGNS AND SYMPTOMS:
1. Reduced appetite
2. Listlessness
3. Reduced activity levels
4. “Mildly dusky” tongue color/pale gums
5. Brown or pink tinted fluids from mouth or nose
6. Lung sounds (fluid in lungs)

PROPHYLAXIS:
1. Acetazolamide (Diamox),
   A. 250mg PO bid 24 hours prior to ascent and continued for 48 hours after maximum altitude is reached.
   B. If the 500mg sustained release tablet is used, dose is 500mg PO every 24 hours.

TREATMENT:
1. Descend from altitude and treat symptoms
2. Oxygen
   a. Example of blow by oxygen administration
      b. Put O2 line in a cage/Vari kennel and cover with a poncho line, rain coat, etc...
3. Dexamethasone, 4mg IV / IM/ PO q 6hr
4. Albuterol inhaler can be attempted
   A. Apply field expedient muzzle as shown.
   B. Improvise a nebulizer by using a plastic bag or paper bag. Open the bag, squirt the albuterol into the bag. Place the bag over the muzzle and let the dog breath a few breaths from the bag.
K-9 TRAUMA MANAGEMENT

SPECIAL CONSIDERATIONS:
1. Control bleeding first based on K9-TCCC standards and guidance for humans.
2. Follow MARCHE protocol

SIGNS AND SYMPTOMS for Shock:
1. Pale color in gums, capillary refill time greater than 2 seconds
2. Dry lips and gums, dehydration
3. Excessive drooling in some poison cases
4. Weak femoral pulse
5. Rapid heart rate of 150-200 beats per minute
6. Cool extremities
7. Hyperventilation, rapid breathing generally over 25 breaths per minute
8. Confusion, restless, anxiousness
9. General weakness

Advanced stages of shock:
1. Continued depression and weakness to the point of not being able to move or becoming unresponsive or unconscious
2. Dilated pupils
3. Capillary refill time greater than 4 seconds
4. White mucous membranes
5. Body temperature below 98° F, taken rectally.

MANAGEMENT:
1. MARCHE Protocol

2. Massive hemorrhage: Control bleeding per TCCC standards

3. Airway
   A. An injured dog or an animal in shock may not recognize you. The dog may bite you out of pain or fear. If the dog is having trouble breathing or panting heavily, **DO NOT** apply a muzzle. If a muzzle is placed on the dog it must be monitored at all times and removed at the first sign of overheating or vomiting. Get help, if possible from someone who can help hold the dog, so you can do an examination and/or treat the dog.
      1) Carefully pull the tongue out of the animal's mouth.
      2) **WARNING** Even an unresponsive dog may bite by instinct!!
      3) Make sure that the neck is reasonably straight; try to bring the head in-line with the neck.
      4) **WARNING** Do not hyperextend in cases where neck trauma exists
   B. Visibly inspect the airway by looking into the mouth, and down the throat for foreign objects occluding the airway. Unlike human CPR, rescuers may reach into the airway and remove foreign objects that are visible
   C. Attempt 2 rescue breaths, by closing the mouth, and performing mouth-to-nose ventilations.
D. If spontaneous breathing fails to occur, reposition the neck and try step C again.
E. Intubation if necessary to assure airway

1) Do not attempt to intubate a conscious animal, personnel must have prior training. ET tube size can range from 7-10.

F. If intubation is not possible, then attempt cricothrotomy.
G. After achieving a patent airway, one must determine whether the animal is breathing, and whether this breathing is effective.

H. AIRWAY CONSIDERATIONS:
   1) Size 9 or 10mm cuffed endotracheal tube, secure with gauze or IV tubing. Tie over nose.
   2) Passive flow airway – secure air line to muzzle.
   3) Field expedient masks.
   4) Dogs do not tolerate nasal trumpets.

4. Respirations
   A. Look, Listen, and Feel
   B. If not breathing, ventilate the animal by closing the mouth, and performing mouth-to-nose ventilations.
   C. Ventilate at 20 breaths per minute.
   D. If available, use supplemental oxygen
   E. Needle thoracentesis: Place the dog in the lateral recumbent position, go mid way between sternum and spine between the 7th and 9th ribs.

5. Circulation
   A. Be sure that there are no major (pooling/spurting blood) points of bleeding. Control as necessary.
   B. Hemorrhagic Shock Fluid Resuscitation (Administration Routes):
      1) Preferred is IV
      2) Secondary route is SQ
      3) Tertiary route is IO (ileum or tibia)
   C. Oxyglobin
      1) One 125ml bag in first half hour
      2) Repeat x 1 if necessary
   D. Incorporate crystalloids and colloids as needed
      1) Bolus of crystalloid, 700ml IV, reassess and repeat a maximum of 2 times
      2) Bolus of colloid, 700ml IV, reassess and repeat a maximum of 2 times
   E. Blood transfusion (dog-to-dog), if available.
   F. Monitor for circulatory overload

6. Hypothermia: Prevent loss of body heat

7. Antibiotic Therapy for Penetrating Wounds
   A. Ceftriaxone (Rocephin) 1gm IV / IM daily
   B. OR Ertapenem (Invanz) 250mg IV / IM three times a day
K-9 RDX (C-4) INGESTION

**SIGNS AND SYMPTOMS:**
1. Tonic – clonic convulsions
2. Coma
3. Lethargy
4. Confusion
5. Muscle spasms
6. Nausea / vomiting
7. Abdominal tenderness
8. Cardiac arrhythmias

**TREATMENT:**
1. If recognized immediately after ingestion, induce vomiting (prior to the occurrence of clinical signs) with hydrogen peroxide, 30cc PO. Repeat dose in 15 minutes.
2. Control seizures with diazepam (Valium), 5mg IV bolus for a 30kg dog. Repeat as necessary to a maximum of 4 doses.
3. Ipecac is contraindicated in the treatment of K-9 toxic ingestion.
4. If you have time during evacuation, initiate IV fluids.

**DISPOSITION:**
Evacuation to veterinarian immediately for follow up or supportive care.
LOSS OF CONSCIOUSNESS (WITHOUT SEIZURES)

SPECIAL CONSIDERATIONS:
1. The most common cause of loss of consciousness in healthy adults is orthostatic hypotension (associated with sudden standing) or vasovagal syncope (associated with sudden adverse stimulus – injections are a common cause).
2. Also consider hypoglycemia, anaphylactic reaction, medication, recreational drug use, head trauma, hyperthermia, hypothermia, myocardial infarction, lightning strikes, and intracranial bleeding.

SIGNS AND SYMPTOMS:
Unconsciousness

MANAGEMENT:
1. Follow BLS guidelines.

2. Management of orthostatic hypotension and vasovagal syncope is accomplished by placing the patient in a supine position, ensuring the airway is open. Patients experiencing these two disorders should regain consciousness within a few seconds. If they don’t, consider other etiologies and proceed to the steps below.

3. Pulse oximetry monitoring.

4. Oxygen.

5. Place either 1 tube Glutose (oral glucose gel) in buccal mucosal region.

6. Consider IV access.

7. Naloxone (Narcan) 0.8mg IV / IM. Repeat q 2–3 min prn to max dose of 10mg if opiate use is suspected.

8. If no response treat per appropriate Protocol per Special Considerations #2.

DISPOSITION:
1. Urgent evacuation, unless loss of consciousness due to orthostatic hypotension or vasovagal hypotension.

2. The evacuation package should include personnel certified in Advanced Cardiac Life Support (ACLS), with equipment, supplies and medications necessary for ACLS care.
MALARIA

SPECIAL CONSIDERATIONS:
1. Malaria MUST be considered in all febrile patients currently in, or recently in, a malarious area.
2. It is not uncommon for malaria to present like pneumonia or gastroenteritis (with vomiting and diarrhea).
3. The use of chemoprophylaxis does not rule out malaria.
4. Consider bacterial meningitis in evaluating – treat for both disorders if meningitis is suspected.

SIGNS AND SYMPTOMS:
1. Prodrome of malaise, fatigue, and myalgia may precede febrile paroxysm by several days.
2. Paroxysm characterized by abrupt onset of fever, chills, rigors, profuse sweats, headache, backache, myalgia, abdominal pain, nausea, vomiting, and diarrhea (may be watery and profuse) in *P. falciparum*.
3. Intermittent fever to >40° C (105° F) OR fever may be near continuous in *P. falciparum* malaria; classic “periodicity” is usually absent. Profuse sweating between febrile paroxysms.
4. Tachycardia, orthostatic hypotension, tender hepatomegaly, and delirium (Cerebral malaria).

MANAGEMENT:
1. Malarone (atovaquone 250mg/proguanil 100mg) 4 tabs qd for 3 days with food PLUS primaquine 30mg qd for 14 days (MUST rule out G6PD deficiency before giving primaquine).
2. Acetaminophen (Tylenol) 1000mg PO q 6hr prn for fever.

DISPOSITION:
1. Urgent treatment and evacuation for complicated malaria (cerebral, pulmonary, unstable vital signs). These indicate a medical emergency.
2. Routine evacuation for uncomplicated cases (normal vital signs, normal mental status, tolerates PO, no cough/ shortness of breath).
MENINGITIS

SPECIAL CONSIDERATIONS:
1. May be bacterial, viral, or fungal. The bacterial type may cause death in hours, even in previously healthy young adults, if not treated aggressively with appropriate antibiotics.
2. Consider malaria as a differential diagnosis. Treat for both if malaria cannot be ruled out.

SIGNS AND SYMPTOMS:
1. Classic features include:
   A. Severe headache
   B. High fever
   C. Pain with any neck movement, particularly forward flexion
   D. Altered mental status
2. May also include:
   A. Photophobia
   B. Nausea and vomiting
   C. Malaise
   D. Seizures
3. Positive Brudzinski’s (pain with head and neck flexion) and Kernig’s (neck pain with hip flexion and knee extension) signs

MANAGEMENT:
1. If meningitis is suspected, treatment should be initiated immediately.
2. IV access.
3. Dexamethasone (Decadron) 10mg IV / IM q 6hr.
4. Ceftriaxone (Rocephin) 2gm IV q 12hr (IM route possible alternative but prefer IV route).
7. If seizures occur, treat per Seizure Protocol.
8. Moxifloxacin (Avelox) 400mg PO once OR Ceftriaxone (Rocephin) 250mg IM for prophylaxis of close contacts.

DISPOSITION:
1. Urgent evacuation.


NAUSEA AND VOMITING

**SPECIAL CONSIDERATIONS:**

1. Avoid rapid IV administration of promethazine (Phenergan)
2. **DO NOT** give subcutaneous promethazine (Phenergan)
3. Diphenhydramine (Benadryl) and promethazine (Phenergan) may cause drowsiness.

**SIGNS AND SYMPTOMS:**

Nausea and Vomiting

**MANAGEMENT:**

1. **Rx** Ondansetron (Zofran) 4–8mg IV / IM bid or 8mg PO q 8hr prn.
2. **OR** Promethazine (Phenergan) 25mg IV / IM / PO q 6hr prn.
3. **OR** Diphenhydramine (Benadryl) 25–50mg IV / IM / PO q 6hr prn (may be useful for vertigo or motion sickness).
4. Treat per Dehydration Protocol.

**DISPOSITION:**

Evacuate per Protocol for underlying condition.
PAIN MANAGEMENT

SPECIAL CONSIDERATIONS:
1. Any use of narcotic medications will be sedating and degrade the mission performance of patients
2. Avoid IM or SQ injections of narcotic medications due to the potential for delayed absorption.

SIGNS AND SYMPTOMS:
Pain

MANAGEMENT:
1. Start in sequential manner to maximize pain control with mission performance.
   A. Acetaminophen (Tylenol) 1000mg PO q 6hr prn.
   B. Non-steroidal anti-inflammatory drugs
      1) Meloxicam (Mobic) 15mg PO qd prn
      2) OR Ibuprofen (Motrin) 800mg PO q 8hr prn
      3) OR Ketorolac (Toradol) 30mg IM q 6hr prn.
         a. Consider 10mg PO q 8hr prn for prolonged use.
   C. Narcotic Medications
      1) Oral Transmucosal Fentanyl Citrate (Actiq Lozenge) 800mcg orally over 15 minutes (may repeat dose once)
         WARNING: Life-threatening hypoventilation/ respiratory arrest could occur at any dose of fentanyl, particularly in patients not taking chronic narcotics. Therefore, closely monitor for respiratory depression.
      2) Morphine sulfate 5mg IV initial dose then 5mg IV q 10 min for max dose of 30mg. Repeat as necessary q 30-60 minutes

2. Treat per Nausea and Vomiting Protocol.

DISPOSITION:
1. Consider underlying cause to determine evacuation priority.
2. Patients receiving IV/IM opiates should most likely be evacuated.
PNEUMOTHORAX - ACUTE (ATRAUMATIC)

SIGN AND SYMPTOMS:
1. Acute, unilateral chest pain
2. Dyspnea – typically mild
3. No wheezing
4. Decreased or absent breath sounds on affected side

MANAGEMENT:
1. Pulse oximetry monitoring
2. Oxygen (use oxygen for all suspected acute pneumothoraces)
3. Consider needle decompression for suspected tension pneumothorax.
4. If needle decompression shows immediate patient improvement, followed by worsening of condition, consider repeat needle decompression.
5. Consider tube thoracostomy:
   A. Recurrence of respiratory distress after 2 successful needle decompressions
   B. Evacuation time > 1hr with continued respiratory distress.
   C. Patient requires positive pressure ventilation
6. If at altitude, descend as far as tactically feasible.
7. If evacuation will occur in an unpressurized aircraft, consider decompression for high altitude evacuation and recommend lowest tactically feasible altitude

DISPOSITION:
1. Urgent evacuation for significant respiratory distress despite therapy.
2. Priority evacuation for patients whose respiratory status is stable.

SPECIAL CONSIDERATIONS:
1. Consider also: anaphylaxis, pulmonary embolism, high altitude pulmonary edema (HAPE), asthma, myocardial infarction and pneumonia.
2. More common in tall, thin individuals and smokers.
RHABDOMYOLYSIS PROTOCOL

SPECIAL CONSIDERATIONS:
1. Aggressive hydration is the cornerstone of treatment.
2. Causes: Limb ischemia, Carbon Monoxide Poisoning, Electrical or thermal burns, Blunt trauma or Crush injury, Snake Bite, Hyperthermia, Hypothermia, Physical Exertion

SIGNS AND SYMPTOMS:
1. Acute muscle pain (myalgias)
2. Muscle Weakness
3. Fever
4. Malaise
5. Nausea or Vomiting
6. Tea-colored urine
7. Oliguria/Anuria
8. Dipstick positive for blood, but no intact RBC on a spun specimen

MANAGEMENT:
1. Normal saline 1-2L bolus IV/IO followed by 500ml – 1L/hr.
   A. Avoid Ringer’s lactate due to the potassium content
   B. Titrate to achieve target urine output of >200ml/hr
   C. Monitor intake/output hourly. If possible, insert Foley catheter to facilitate measuring urine output
   D. Consider urinary alkalinization to achieve urine pH > 6.5
      1) Mix Sodium Bicarbonate 40mEq (1 ampule/bristoljet) in 500ml normal saline. Run at 100ml/hr.
2. Reassess vital signs and mental status frequently
3. Utilize Propaq or AED cardiac monitoring if available
4. Potential Problems / Complications
   A. Monitor for signs and symptoms of hyperkalemia (cardiac dysrhythmia) – administer 1gm calcium and 40mEq sodium bicarbonate (1 ampule) IV/IO
   B. Persistent oliguria despite adequate fluid resuscitation
   C. Hypocalcemia (provoked by sodium bicarbonate) – peri-oral tingling, muscle tetany, increased deep tendon reflexes, QT prolongation on cardiac monitor – stop sodium bicarbonate infusion
   D. Avoid loop diuretics such as furosemide (Lasix), which may increase myoglobin precipitation in kidneys and provoke acute renal failure
   E. Compartment syndrome – see Tactical Trauma Protocols

References:

DISPOSITION:
Urgent evacuation
SEIZURE

SPECIAL CONSIDERATIONS:
1. May be caused by injury, infection, high fever, alcohol withdrawal, drug use, toxins, and structural abnormalities of the central nervous system (CNS).
2. Possible history of previous seizures, recent head trauma, CNS infection, or headaches

SIGNS AND SYMPTOMS:
1. Involuntary repetitive muscle movements that are abrupt in onset
2. Associated unresponsiveness
3. Typically lasts 90-120 seconds.
4. Followed by period of confusion and somnolence (postictal state)
5. Evidence of recent seizure activity may include urinary incontinence and acute intraoral trauma (e.g.: tongue biting)

MANAGEMENT:
1. Avoid trauma to patient during the seizure, but do not restrain patient.

2. Diazepam (Valium) 5-10mg IV/IO q 5 min or 10mg IM q 15 min to a maximum dose of 20mg.
   A. OR Midazolam (Versed) 5mg IV/IO q 5 min or 5-10mg IM q 15 min (no maximum dose)

3. Fosphenytoin (Cerebyx) 18mg/kg IV/IO over 15 minutes or IM (if available) for seizures refractory to benzodiazepines.
   A. Do not administer fosphenytoin faster than 150 mg/min since this may result in hypotension.

4. Do not attempt to force an object into the mouth to open airway.

5. Support and maintain airway and ventilation as needed to include SPO2.

6. If seizures are accompanied by fever,
   A. Consider meningitis and treat per Meningitis Protocol.
   B. Consider malaria if in malaria endemic area and treat per Malaria Protocol

DISPOSITION: Urgent evacuation
SEPSIS / SEPTIC SHOCK

SPECIAL CONSIDERATIONS:
1. Sepsis is a severe, life-threatening bacterial blood infection.
2. Rapid onset - death may occur within 4-6 hours without antibiotic therapy.

SIGNS AND SYMPTOMS:
1. Hypotension
2. Fever
3. Tachycardia
4. Altered mental status
5. Dyspnea
6. May see skin rash (purport)

MANAGEMENT:
1. Obtain IV/IO access.

2. Ertapenem (Invanz) 1gm IV / IO qd OR Ceftriaxone (Rocephin) 2gm IV / IO.

3. If patient is hypotensive, give 1L normal saline or Ringer’s lactate fluid bolus. Consider additional fluids if still hypotensive, then an additional liter titrated to maintain systolic blood pressure >90mmHg or palpable radial pulse.
   A. Hextend 500mL IV boluses may be used (if crystalloids are unavailable) to maintain palpable radial pulse of systolic BP of 90mmHg.

4. Push dose IV epinephrine for persistent hypotension after fluid bolus.
   a. DO NOT GIVE UNDILUTED (1:1,000) EPINEPHRINE INTRAVENOUSLY.
   b. Take a 10ml syringe and draw up 1ml of 1:1,000 epinephrine.
   c. Then draw up 9ml of Normal Saline into this syringe.
   d. Waste 9ml of this mixture, then draw up 9ml more of normal saline into the same syringe.
   e. Final concentration is 10ml of 1:100,000 epinephrine, 10mcg/ml.
   f. Administer 0.5-2ml (5-20mcg) IV/IO to maintain radial pulse or SBP > 90mmHg.

5. Dexamethasone (Decadron) 10mg IV if persistent hypotension after fluid bolus and epinephrine.

6. Monitor for decreased mental status and be prepared to manage airway.

DISPOSITION:
Urgent evacuation
SMOKE INHALATION

SPECIAL CONSIDERATIONS:
1. Consider possible carbon monoxide (CO) poisoning and need for hyperbaric oxygen in all significant cases of smoke inhalation.
2. Normal oxygen saturation by pulse oximetry DOES NOT rule out the possibility of CO poisoning.
3. Burns to the upper airway may not be immediately obvious. Strong consideration should be given to early airway intervention if upper airway burns are suspected.

SIGNS AND SYMPTOMS:
1. History of smoke exposure
2. Burns
3. Coughing
4. Respiratory distress (may be delayed in onset)

MANAGEMENT:
1. Administer oxygen.
2. Consider the use of early intubation or cricothyroidotomy if airway burns/edema or singed nasal hair, facial burns are present/suspected.
3. Albuterol (Ventolin) by metered dose inhaler 2–4 puffs q4–6hr.
4. Dexamethasone (Decadron) 10mg IV / IM qd.
5. Limit patient exertion if possible.

DISPOSITION:
1. Urgent evacuation for respiratory distress, suspected inhalation burns.
2. Priority evacuation if not in distress but significant inhalation suspected.
SUBUNGUAL HEMATOMA

SPECIAL CONSIDERATIONS:
None

SIGNS AND SYMPTOMS:
1. Pain from the affected nail
2. Purplish-black discoloration under the nail

MANAGEMENT:
1. Decompress the nail with a large gauge needle by rotating needle through the nail directly over the discolored area until the underlying blood has been released and the pressure is relieved. Make sure that it is introduced into the affected nail with a gentle but sustained rotating motion.

2. Gentle pressure on the affected nail may help to evacuate more blood.


4. If a fracture is suspected, tape the injured finger or toe to an adjacent digit.

5. If fracture is suspected in a setting of a subungual hematoma, give Moxifloxacin (Avelox) 400mg PO qd for 7 days.

DISPOSITION:
Evacuation should not be required for this injury if the subungal hematoma is successfully treated.
TESTICULAR PAIN

SPECIAL CONSIDERATIONS:
1. The primary concern in testicular pain is differentiating testicular torsion from other causes of testicular pain.
2. Testicular torsion is a medical emergency requiring urgent correction to prevent loss of the affected testicle.
3. Other common causes of testicular pain include epididymitis and orchitis, infections commonly caused by STDs, as well as hernias and testicular masses.

SIGNS AND SYMPTOMS:
1. Testicular Torsion:
   A. Sudden onset testicular pain
   B. Usually associated with activity
   C. Associated testicular swelling
   D. Abnormal position of the affected testicle
   E. Symptoms may be increased by testicular elevation
   F. Usually associated with pain-induced nausea and vomiting
   G. Loss of cremasteric reflex is the best diagnostic indicator for testicular torsion.

2. Epididymitis:
   A. Gradual onset of worsening pain
   B. May have fever and/or dysuria
   C. Can also be traumatic
   D. Symptoms may be relieved with elevation
   E. Significant swelling may be present

MANAGEMENT:
1. If pain is sudden onset and the testicle is lying abnormally in the scrotum, an attempt to manual detorse the testicle is warranted.
   A. A single attempt to rotate the testicle outward (like opening the pages of a book) should be made.
      1) With torsion of the left testis, hold the testicle with the right thumb and forefinger and then rotate the testicle clockwise 180 degrees. This manipulation may need to be repeated 2-3 times, because testicular torsion may involve rotations of 180-720 degrees. These repeated attempts should be guided by resolution of pain and return to normal anatomy.
      2) For torsion of the right testicle, the procedure is similar except that the testicle is held using the left thumb and forefinger and the testicle is rotated in a counterclockwise direction.
   B. If pain increases, 1 attempt to rotate the opposite direction should be made.
   C. Successful detorsion will result in relief of pain.

2. Gradual onset of pain with a normal lying testicle should be treated per Urinary Tract Infection Protocol.


5. If torsion is not present, treat as presumed STD.
   A. Ceftraxone (Rocephin) 250mg IM OR ciprofloxacin (Cipro) 500mg PO
   B. PLUS doxycycline (Adoxa) 100mg PO bid for 10 days.

DISPOSITION:
1. Urgent evacuation for testicular torsion even if manually relieved with detorsion.
2. For other causes of testicular pain, treat cause and consider evacuation if symptoms persist more than 3 days, and if the patient is operationally compromised.
URINARY TRACT INFECTION

SPECIAL CONSIDERATIONS:
1. More common after instrumentation, in females, or in tactical settings with dehydration and/or kidney stones.
2. Symptoms may be confused with a sexually transmitted disease (STD).

SIGNS AND SYMPTOMS:
1. Dysuria
2. Urinary urgency and frequency
3. Cloudy, malodorous, or dark urine may be present
4. Suprapubic discomfort

MANAGEMENT:
1. Ceftriaxone (Rocephin) 1gm IV / IM OR Trimethoprim-Sulfamethoxazole (Septra DS) 1 PO bid for 3 days
2. AND Azithromycin 1gm PO once.
4. If fever, back pain, flank pain, and/or costovertebral angle tenderness develop, suspect kidney infection and treat per Flank Pain Protocol.
5. Encourage PO hydration.

DISPOSITION:
1. Usually responds to therapy and evacuation not required if it does.
2. Priority evacuation for pyelonephritis. See Flank Pain Protocol
3. Routine evacuation for worsening signs and symptoms
4. Upon return to base, all males should be evaluated for UTI, even if asymptomatic.
### 2012 Tactical Medical Emergency Protocol

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<th>Charles W. Beadling, MD, FAAA</th>
<th>MAJ Tanya Scherm, MD USAF</th>
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<tr>
<td>Director, Center for Disaster and Humanitarian Assistance Medicine, USUHS</td>
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<th>SGM F Young Bowling,18Z, ATP, NREMT-P</th>
<th>SFC Charles McAdams,</th>
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<th>LTC(P) Jason Wieman, MD, MPH</th>
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<tr>
<td>Regimental PA, 160th SOAR(A)</td>
<td>Commander, 421st Multifunctional Medical BN</td>
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<th>MSgt (Ret) Barry A. Frasier, NREMT-P</th>
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<td>Former IDMT, 24th STS</td>
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January 2013

USSOCOM OFFICE OF THE COMMAND SURGEON
DEPARTMENT OF EMERGENCY MEDICAL SERVICES AND PUBLIC HEALTH
7701 Tampa Point Boulevard
MacDill Air Force Base, FL 33621
(813) 826-5442
The following is a list of medications mentioned in the Tactical Medical Emergency Protocols. However, most of the TMEPs have a preferred medication recommendation and then an alternate one. All of these recommendations are listed here.

The CEB and RB recognize that a “one size fits all” approach to a strict formulary is unrealistic due to medication availability, mission requirements, etc. The list of medications is designed to guide the ATP in medication selection.

For specific order of the recommended medications and specific TMEP application of the medications, CHECK the specific TME Protocol.

Antibiotics: Always check potential drug allergies. If allergic to one class of medications, use alternate class of medications (Cephalosporins/Penicillins, Tetracyclines, Quinolones, Macrolides).

Unless specifically noted, the drug dosages listed are for an adult.

Changes – 2009:
- Calcium Chloride added
- Calcium Gluconate added
- Mannitol added
- Sodium Bicarbonate added
- Rifampin added
- Antiretroviral medication added (Kaletra, Attriplea, Truvada, Viread)
- All medications listed under their generic name except for the following HIV medications, which are the only drugs listed under their trade name (Atripla®, Combivir®, Truvada®, Kaletra®).
- Midazolam (Versed®) added.
- Pregnancy Categories added according to FDA classification listed below.

### Pregnancy Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Adequate and well-controlled studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters).</td>
</tr>
<tr>
<td>B</td>
<td>Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women OR Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester.</td>
</tr>
<tr>
<td>C</td>
<td>Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.</td>
</tr>
<tr>
<td>D</td>
<td>There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.</td>
</tr>
<tr>
<td>X</td>
<td>Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in use of the drug in pregnant women clearly outweigh potential benefits.</td>
</tr>
</tbody>
</table>

**WARNING** Medications with grounding requirements for personnel on flight status have been added. In some cases, the recommendation for grounding has been made based on the underlying medical condition and not specifically on the medication. Whenever possible consult a Flight Surgeon or an Aeromedical Physician Assistant.
to prescribing medications to personnel on flight status. Consult your unit medical officer for any unit specific protocols.

- **REMINDER:** After personnel on flight status have been grounded, they need clearance from a Flight Surgeon or an Aeromedical Physician Assistant to return to flying status.

- **Changes – 2010:**
  - Tadalafil (Cialis) added
  - Sildenafil (Viagra) added
  - K-9 doses added to: acetamolazide, ceftriaxone, dexamethasone, ertapenem

### Acetaminophen – PO (Tylenol®), IV (Ofrimev®)

- **Description:** Nonnarcotic analgesic and antipyretic. Blocks generation of pain impulses in the CNS by preventing sensitization of pain receptors.
- **Indications:** Mild pain or fever, febrile reactions from blood transfusions
- **Dose:**
  - 325–650mg PO q 4–6hr; or 1gm PO/IV every 6–8hr
- **Contraindications:**
  - Individuals with hypersensitivity to drug.
  - Cautious use in history of excess alcohol use
  - Chronic liver damage
- **Pregnancy Category B**
- **Side-effects:**
  - Rash
  - Urticaria,
- **Adverse reactions:**
  - Hemolytic anemia
  - Liver damage
- **TMEP use**
  - Bronchitis/Pneumonia Protocol
  - Malaria Protocol
  - Pain Management Protocol
  - Blood Products Transfusion Protocol

### Acetazolamide (Diamox®)

- **WARNING** GROUNDING medication for personnel on flight status
- **Description:** Non-diuretic antihypertensive (carbonic anhydrase inhibitor)
- **Indications:**
  - Prevention and/or amelioration of symptoms associated with acute mountain sickness in climbers attempting rapid ascent and/or in those who are very susceptible to acute mountain sickness despite gradual ascent. For maximum benefit begin regimen 7 days prior to ascent. Of minimal benefit in Rx of AMS, HACE, or HAPE.
  - Treatment of acute high altitude illness
- **Dose (Human):**
  - 125–250mg bid, 24 hours prior to ascent, continuing for 48 hours after ascent. Prevention and/or amelioration benefits are nominal once ascent has commenced.
  - If the 500mg sustained release tablet is used, dose is 500mg every 24 hours.

- **K-9 Dose:**
  - 250mg bid 24 hours prior to ascent, continuing for 48 hours after ascent.
  - If the 500mg sustained release tablet is used, dose is 500mg every 24 hours.
• **Contraindications:**
  - Sulfa allergy.
• Pregnancy category C
• **Side-effects:**
  - Paresthesia in extremities
  - Hearing dysfunction/tinnitus
  - Loss of appetite
  - Taste alterations
  - Nausea
  - Vomiting
  - Diarrhea
  - Polyuria
  - Drowsiness
  - Confusion

• **Warning**
  - **NOTE:** Use of Diamox results in a significant alteration in taste. Carbonated beverages will have seriously altered taste, and may be undrinkable.
  - Increased fluid intake is required with use of Diamox: Although Diamox is not in the general drug class of “diuretics”; it has diuretic effects and can result in serious dehydration unless great care is taken to maintain proper hydration.

• **Adverse reactions:**
  - Transient myopia (usually resolves w/ DC of drug)
  - Urticaria
  - Melena
  - Hematuria
  - Flaccid paralysis
  - Photosensitivity
  - Convulsions

• **TMEP use**
  - **Altitude Illness Protocol**
  - **K-9 High Altitude Sickness and Pulmonary Edema Protocol**

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**Aciphex®** – See Rabeprazole

**Actiq Lozenge®** – See Fentanyl, Oral

**Adrenalin** – See Epinephrine

**Afrin Nasal Spray®** – See Oxymetazline HCl

**Albuterol Inhaler (Ventolin®, Proventil®)**

• **WARNING**
  - Aviation personnel are grounded until medical condition no longer interferes with safely preforming aviation duties and the patient is free of side-effects.
  - Description: Inhaled beta-adrenergic agonist; relaxes bronchial smooth muscle
  - Indications:
    - Relief of bronchospasm
    - Prevention/ treatment of exercise-induced bronchospasm
  - Adult dose:
    - 2 inhalations q 4–6hr
    - Spray 4 times into the air if using for the first time or after >4 weeks of storage

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Pediatric dose:
- If >4yrs old, 1 inhalation q 4–6hr may be sufficient

Contraindications:
- Known hypersensitivity to Albuterol
- Pregnancy

Pregnancy Category C

Side-effects:
- Similar in nature to reaction to other sympathomimetic agents
  - Tremor
  - Nausea
  - Nervousness
  - Palpitations

Adverse reactions:
- Hypertension
- Angina
- Vertigo
- CNS stimulation
- Sleeplessness

TMEP use
- Asthma (Reactive Airway Disease) Protocol
- Bronchitis/Pneumonia Protocol
- Cough Protocol
- Smoke Inhalation Protocol

Amoxicillin/Clavulanate (Augmentin®)

**WARNING**
Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

Description: Oral antibacterial combination consisting of the semisynthetic antibiotic amoxicillin and the β-lactamase inhibitor, clavulanate potassium (the potassium salt of clavulanic acid).

Indications:
- Lower respiratory tract infections
- Otitis media
- Sinusitis
- Skin and skin structure infections
- Urinary tract infections

Adult dose: The usual adult dose is one 875mg tablet q 12hr.

Pediatric dose:
- 30mg/kg/day in divided doses (q 8–12hr) produces less nausea and diarrhea and is effective for most infections
- Pediatric patients weighing 40kg or more should be dosed according to the adult recommendations.

Contraindications:
- SERIOUS AND OCCASIONALLY FATAL HYPERSENSITIVITY (ANAPHYLACTIC) REACTIONS CAN OCCUR IN INDIVIDUALS WITH A HISTORY OF PENICILLIN HYPERSENSITIVITY
- Do not use in patients with a history of liver failure

Pregnancy Category B

Side-effects: The majority of side-effects observed in clinical trials were of a mild and transient nature but can include:
• Adverse reactions:
  o Hypersensitivity reactions
  o Hepatic dysfunction
  o Blood and lymphatic dysfunction (likely hypersensitivity-related)

• TMEP use
  o Cellulitis/Cutaneous Abscess Protocol
  o Dental Pain Protocol
  o Flank Pain Protocol
  o Head and Neck Infection Protocol
  o Ingrown Toenail Protocol

ASA – See Aspirin

Aspirin (ASA)

• Description: Analgesic, antipyretic, anti-inflammatory, anti-platelet effect
• Indications:
  o For the temporary relief of:
    • Mild to moderate pain
    • Fever.
  o MI Prophylaxis: Reduces the risk of death and/or nonfatal myocardial infarction in patients with a previous infarction or unstable angina pectoris.
  o MI/UA treatment
    o Transient Ischemic Attacks: Reducing the risk of recurrent transient ischemic attacks (TIAs) or stroke in patients who have transient ischemia of the brain due to fibrin emboli.
• Adult dose:
  o 325mg. One or two tablets/caplets with water. May be repeated every 4 hours as necessary up to 12 tablets/caplets a day or as directed by a doctor.
• Pediatric dose:
  o >12 years and over: One or two tablets/caplets with water. May be repeated every 4 hours as necessary up to 12 tablets/caplets a day or as directed by a doctor.
  o <12 years old: Do not give to children under 12 unless directed by a doctor.
• Contraindications:
  o Hypersensitivity to aspirin
  o Hypersensitivity to nonsteroidal anti-inflammatory agents (NSAID)
  o History of gastrointestinal bleeding
  o Patients with bleeding disorders (e.g., hemophilia).
  o Patient age < 16 years old
• Pregnancy Category D
• Side-effects:
  o Gastrointestinal symptoms
  o Gastrointestinal bleeding
  o Stomach pain
  o Heartburn
  o Nausea
  o Vomiting
• Adverse reactions:
  o Interacts with NSAIDs, Coumadin, Heparin
- TMEP use
  - Chest Pain Protocol
  - Deep Venous Thrombosis Protocol

### Atovaquone 250mg/ Proguanil 100mg (Malarone®)

**WARNING**

- GROUNDING medication for personnel on flight status
- Description: Antimalarial
- Indications:
  - Prophylaxis and treatment of *Plasmodium falciparum* malaria
- Adult dose:
  - There are pediatric tablets as well as adult tablets
  - Prophylaxis
    - Start treatment 1 or 2 days prior to entering malaria endemic area and continue daily during the stay and for 7 days after return
    - 1 tablet (adult strength) daily
  - Treatment
    - 4 tablets (adult strength; total daily dose atovaquone 1gm / 400mg proguanil) as a single daily dose for 3 consecutive days
- Pediatric dose:
  - There are pediatric tablets as well as adult tablets
  - Tablets may be crushed and mixed with condensed milk just prior to administration for those having difficulty in swallowing tablets
  - Prophylaxis dosing based on body weight
    - Safety and efficacy for prophylaxis have been established for children >11kg
  - Treatment dosing based on body weight
    - Safety and efficacy for treatment have been established for children > 5kg

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Total daily dose</th>
<th>Dosage regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 to 20</td>
<td>62.5mg / 25mg</td>
<td>1 pediatric tablet daily</td>
</tr>
<tr>
<td>21 to 30</td>
<td>125mg / 50mg</td>
<td>2 pediatric tablets as a single daily dose</td>
</tr>
<tr>
<td>31 to 40</td>
<td>187.5mg / 75mg</td>
<td>3 pediatric tablets as a single daily dose</td>
</tr>
<tr>
<td>&gt;40</td>
<td>250mg / 100mg</td>
<td>1 tablet (adult strength) as a single daily dose</td>
</tr>
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<tr>
<th>Weight (kg)</th>
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<th>Dosage regimen</th>
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<tbody>
<tr>
<td>5 to 8</td>
<td>125mg / 50mg</td>
<td>2 tablets (pediatric strength) daily for 3 consecutive days</td>
</tr>
<tr>
<td>9 to 10</td>
<td>187.5mg / 75mg</td>
<td>3 tablets (pediatric strength) daily for 3 consecutive days</td>
</tr>
<tr>
<td>11 to 20</td>
<td>250mg / 100mg</td>
<td>1 tablet (adult strength) daily for 3 consecutive days</td>
</tr>
<tr>
<td>21 to 30</td>
<td>500mg / 200mg</td>
<td>2 tablets (adult strength) as single daily dose for 3 consecutive days</td>
</tr>
<tr>
<td>31 to 40</td>
<td>750mg / 300mg</td>
<td>3 tablets (adult strength) as single daily dose for 3 consecutive days</td>
</tr>
<tr>
<td>&gt;40</td>
<td>1gm / 400mg</td>
<td>4 tablets (adult strength) as single daily dose for 3 consecutive days</td>
</tr>
</tbody>
</table>

- Contraindications:
Hypersensitivity to atovaquone, proguanil
Prophylaxis in patients with severe renal impairment (Cr CL < 30mL/min) unless potential benefits outweigh risks of non-treatment (progaunil accumulates in severe renal failure)

- Pregnancy Category C
- Side-effects:
  - Headache
  - Abdominal pain
  - Nausea/vomiting/diarrhea
  - Dizziness
  - Cough (pediatrics)
- Adverse reactions:
  - Liver transaminase elevations
  - Possible association with seizures and psychotic events (e.g., hallucinations)
  - Cutaneous reactions, including photosensitivity, erythema multiforme and Stevens-Johnson Syndrome
- Other notes:
  - Take daily dose at the same time every day with food or milk
  - If vomiting occurs within 1 hour of dosing, repeat the dose
  - Treatment has not been evaluated for treatment of cerebral malaria or other severe manifestations of complicated malaria
  - Absorption may be reduced in patients with diarrhea or vomiting. May need to add antiemetic to prevent vomiting.
  - Include protective clothing, insect repellants, bed nets as important components of malaria prophylaxis
  - If a dose is skipped, take it as soon as possible, and then return to normal schedule. Do not double the next dose.
- TMEP use
  - Malaria Protocol

Atripla® (efavirenz/emtricitabine/tenofovir)

- WARNING GROUNDING medication for personnel on flight status.
- Indications: Treatment of HIV
- Dose:
  - Take 1 tablet qd PO on an empty stomach. Dosing at bedtime may improve the tolerability of nervous system symptoms
- Contraindications:
  - Do not take the following medicines with Atripla
    - Cisapride (Propulsid®)
    - Midazolam (Versed®)
    - Tiazolam (Halcion®)
    - Voriconazole (Vfend®)
- Pregnancy Category D
- Side-effects:
  - Cardiac disorders: Palpitations
  - Ear and labyrinth disorders: Tinnitus
  - Endocrine disorders: Gynecomastia
  - Eye disorders: Abnormal vision
  - Gastrointestinal disorders:
    - Constipation
    - Malabsorption
    - Abdominal pain
    - Increased amylase,
    - Pancreatitis
  - Hepatobiliary disorders:
- Hepatic enzyme increase,
- Hepatic failure
- Hepatitis

- Immune system disorders:
  - Allergic reaction
- Metabolism and nutrition disorders:
  - Hypercholesterolemia
  - Hypertriglyceridemia
  - Hypophosphatemia
  - Lactic acidosis
- Musculoskeletal and connective tissue disorders:
  - Arthralgia
  - Myalgia
  - Myopathy
- Nervous system disorders:
  - Abnormal coordination
  - Ataxia
  - Cerebellar coordination and balance disturbances
  - Convulsions
  - Hypoesthesia
  - Paresthesia
  - Neuropathy
  - Tremor
- Psychiatric disorders:
  - Aggressive reactions
  - Agitation
  - Delusions
  - Emotional lability
  - Mania
  - Neurosis
  - Paranoia
  - Psychosis
  - Suicide
- Respiratory, thoracic, and mediastinal disorders:
  - Dyspnea
- Renal and urinary disorders:
  - Renal insufficiency
  - Renal failure
- Skin and subcutaneous tissue disorders:
  - Flushing
  - Photoallergic dermatitis
  - Skin discoloration
  - Stevens-Johnson Syndrome

- Other notes:
  - Store at 25° C (77° F); excursions permitted to 15-30° C (59-86° F)
- TMEP use:
  - HIV Post Exposure Prophylaxis Protocol

**Augmentin®** – See Amoxicillin/Clavulanate

**Avelox®** – See Moxifloxacin

**Azithromycin (Zithromax®, Z-Pak®)**
• **WARNING**  Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

• **Description:** Macrolide antibiotic

• **Indications:**
  - Acute bacterial sinusitis
  - Mild community-acquired pneumonia
  - Chancroid (Genital ulcer disease)
  - Pharyngitis/tonsillitis as alternative drug choice to first line therapy
  - Uncomplicated skin infections
  - Urethritis

• **Adult dose:**
  - For most bacterial infections: 500mg as single dose on day 1, then 250mg daily on days 2 through 5.
  - For gonorrhea: 2gm PO as a single dose

• **Pediatric dose:** (6 months of age or older)
  - Z-pac is not indicated for children. The oral suspension is the only dose approved for use in children, and is dosed on a mg/kg basis
    - 10mg/kg up to 500mg the first day; then 5mg/kg up to 250mg for the next 4 days

• **Contraindications:**
  - Known allergy to Azithromycin
  - Pregnancy
  - Z-pac in children
  - Patients receiving
    - Astemizole (Hismanal – antihistamine taken off of the U.S. market)
    - Cisapride (Propulsid – GI medication)

• **Pregnancy Category B**

• **Side-effects:**
  - Generally mild and reversible upon discontinuation of therapy
  - Nausea, vomiting, diarrhea, abdominal pain

• **Adverse reactions**
  - Rare:
    - Angioedema (swelling of the larynx)
    - Cholestatic jaundice
  - Hypersensitivity

• **Other notes**
  - Can be taken with or without food
  - Continue regimen for duration of prescription

• **TMEP use:**
  - Bronchitis/Pneumonia Protocol
  - Ear Infection Protocol
  - Gastroenteritis Protocol
  - Urinary Tract Infection Protocol

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**AZT (Zidovudine, Retrovir®)**

- **WARNING**  GROUNDING medication for personnel on flight status

- **Indications:**
  - Treatment of HIV infection

- **Dose:**
  - 300mg bid

- **Contraindications:** Known allergy to medication

- **Pregnancy Category C**
• Side-effects:
  o Body as a whole:
    o Back pain
    o Chest pain
    o Flu-like syndrome
    o Generalized pain
  • Cardiovascular:
    o Cardiomyopathy
    o Syncope
  • Endocrine:
    o Gynecomastia.
  • Eye:
    o Macular edema
  • Gastrointestinal:
    o Dysphagia
    o Flatulence
    o Oral mucosa pigmentation
    o Mouth ulcer
    o Nausea
    o Vomiting
    o Diarrhea
  • General:
    o Anaphylaxis
    o Angioedema
    o Vasculitis
  • Heme and lymphatic:
    o Aplastic anemia
    o Hemolytic anemia
    o Leukopenia
    o Lymphadenopathy
    o Pancytopenia with marrow hypoplasia
    o Pure red cell aplasia
  • Hepatobiliary tract and pancreas:
    o Hepatitis
    o Hepatomegaly with steatosis
    o Jaundice
    o Lactic acidosis
    o Pancreatitis
  • Musculoskeletal:
    o Muscle spasm
    o Myopathy
    o Myositis
    o Rhabdomyolysis
    o Tremor
  • Nervous:
    o Anxiety
    o Confusion
    o Depression
    o Dizziness
    o Loss of mental acuity
    o Mania
    o Paresthesia
    o Seizures
    o Somnolence
    o Vertigo
  • Respiratory:
    o Dyspnea
    o Rhinitis
- Sinusitis
- Cough
- Abnormal breathing and wheezing

- Skin:
  - Changes in skin and nail pigmentation
  - Pruritus
  - Stevens-Johnson Syndrome
  - Toxic epidermal necrolysis

- Special senses:
  - Amblyopia
  - Hearing loss
  - Photophobia

- Urogenital:
  - Urinary frequency
  - Urinary hesitancy

- TMEP use:
  - *HIV Post Exposure Prophylaxis Protocol*

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**Bactrim® – See Trimethoprim-Sulfamethoxazole**

**Bactroban® – See Mupirocin Ointment 2%**

**Benadryl® – See Diphenhydramine HCl**

**Bisacodyl (Dulcolax®)**

- Description: Stimulant laxative
- Indications: Used to treat constipation or to clean out the intestinal tract before bowel examinations or bowel surgery.
  - Adult dose: Swallow the tablets whole with a full glass of water or juice. Do not crush or chew the tablets. The tablets should work within 6–10hrs.
    o 5–15mg.
  - Pediatric dose:
    o 6 to 12 years: 5mg, taken at bedtime or in the morning before breakfast to produce evacuation approximately 8 hours later.

**Contraindications:**
- Ileus
- Intestinal obstruction
- Acute surgical abdominal conditions like acute appendicitis, acute inflammatory bowel diseases.
- Severe dehydration.
- Known hypersensitivity to substances of the triarylmethane group.

- Adverse reactions: Rarely, abdominal discomfort and diarrhea have been reported.
- Other notes:
  o Tablets have a special coating and therefore should not be taken together with milk or antacids. Tablets should be swallowed whole with adequate fluid.

- TMEP use:
  o *Constipation/Fecal Impaction Protocol*
**Calcium Chloride** (10% solution)

- **WARNING**
  - GROUNDING medication for personnel on flight status.
- **Description:** Calcium salt (electrolyte)
- **Action**
  - Increased calcium levels
  - Has a role in the release of neurotransmitters and hormones
  - Increased cardiac contractile state
  - May increase ventricular automaticity
- **Indications:**
  - Acute hypocalcemia
  - Acute hyperkalemia
  - Calcium channel blocker overdose
  - Hypermagnesemia
  - Cardiac arrest due to hyperkalemia, hypocalcemia
- **Adult dose:**
  - 0.5–1gm (5–10ml of a 10% solution) slow IVP over 3 to 5 minutes
- **Pediatric dose:**
  - 20mg/kg (0.15–3.0ml/kg of a 10% solution) slow IV push.
  - Maximum dose = 1gm or 10ml
- **Contraindications:**
  - Hypercalcemia
  - Digitalis toxicity
  - Renal or cardiac disease
- **Pregnancy Category:** Generally considered to be safe
- **Side-effects/precautions**
  - Extravasation may cause tissue damage and necrosis
  - Rapid injection may cause vasodilation, hypotension, bradycardia, cardiac dysrhythmia, syncope, and cardiac arrest
- **Other notes:**
  - Will precipitate if mixed with sodium bicarbonate
- **TMEP use:**
  - Crush Injury Protocol

---

**Calcium Gluconate (Kalcinate®)**

- **WARNING**
  - GROUNDING medication for personnel on flight status.
- **Description:** Calcium salt
- **Action:**
  - Increased calcium levels
  - Has a role in the release of neurotransmitters and hormones
  - Increased cardiac contractile state
  - May increase ventricular automaticity
- **Indications:**
  - Acute hypocalcemia
  - Acute hyperkalemia
Calcium channel-blocker overdose

- **Dose:**
  - 1gm (10ml of a 10% solution)
  - 2.25–14mEq intravenously repeated in 1 to 2 minutes

- **Contraindications:**
  - Hypercalcemia
  - Digitalis toxicity.
  - Renal or cardiac disease

- **Pregnancy class:** Generally considered to be safe

- **Side-effects/precautions**
  - Extravasation may cause tissue damage and necrosis
  - Rapid injection may cause vasodilation, hypotension, bradycardia, cardiac dysrhythmia, syncope, and cardiac arrest

- **Other notes:**
  - Will precipitate if mixed with sodium bicarbonate

- **TMEP use:**
  - *Crush Injury Protocol*

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**Ceftriaxone Sodium (Rocephin®)**

- **Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.**
- **Description:** 3rd generation cephalosporin
- **Indications:** Serious infections of the lower respiratory tract (i.e., pneumonia); urinary tract; skin infections; intra-abdominal infections (especially penetrating abdominal trauma); penetrating trauma to the extremities; & CNS infections

  - **Adult dose:**
    - 1–2gm IM / IV daily or in divided doses bid; max dose 4gm/day

  - **Pediatric dose:**
    - 50–75mg/kg given in divided doses q12 hours; max dose 2gm/day.

- **K-9 Dose**
  - 1gm IV / IM daily

- **Contraindications:**
  - Use caution in patients with a history of
    - Penicillin allergy
    - Hepatic dysfunction
    - Liver dysfunction

- **Pregnancy Category B**

- **Side-effects:**
  - Headaches
  - Dizziness
  - Nausea
  - Vomiting
  - Diarrhea
  - Abdominal cramps
Urticaria
- Temperature

- Adverse reactions:
  - Eosinophilia
  - Thrombocytosis
  - Leukopenia
  - Injection Site
    - Pain
    - Induration
    - Sterile abscess
    - Tissue sloughing
    - Phlebitis
  - Thrombophlebitis with IV use

- Preparation procedure:
  - Withdraw 10cc NaCl from a 100cc bag. Inject 10cc NaCl into 1gm Rocephin vial. Mix.
  - Withdraw entire contents of vial and inject into original 100cc NaCl IV bag. Mix.
  - Piggyback with running IV.

  - If giving IM, reconstitute with 1% lidocaine WITHOUT epinephrine.

- TMEP use:
  - Abdominal Pain Protocol
  - Bronchitis/Pneumonia Protocol
  - Dental Pain Protocol
  - Flank Pain (Renal Colic, Pyelonephritis, Kidney Stones) Protocol
  - Head and Neck Infection Protocol
  - Joint Infection Protocol
  - K-9 Trauma Management Protocol
  - Meningitis Protocol
  - Sepsis/Septic Shock Protocol
  - Tactical Trauma Protocol
  - Urinary Tract Infection Protocol

### Cephalosporins – General Antimicrobial Spectrum

- **WARNING** Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

- **1st generation:** Gram positive (including Staph aureus); basic gram negative coverage.
  - *Examples: cefazolin, cephalaxin, cefadroxil*

- **2nd generation:** Diminished Staph aureus, improved gram negative coverage compared to 1st generation; some with anaerobic coverage.
  - *Examples: cefotetan, cefoxitin, cefuroxime*

- **3rd generation:** Further diminished Staph aureus; further improved gram negative coverage compared to 1st and 2nd generation; some with pseudomonas coverage and diminished gram positive coverage.
  - *Examples: ceftriaxone (see Rocephin), cefotaxime, cefpodoxime, cefixime, cefoperazone.*

- **4th generation:** Same as 3rd generation plus coverage against Pseudomonas.
  - *Example: cefepime*

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Cerebyx® - See Fosphenytoin
**Chloroquine Phosphate**

- **Indications:**
  - Malaria due to *P. vivax*, *P. malariae*, *P. ovale*, and susceptible strains of *P. falciparum*.

- **Dose**
  - The dosage of chloroquine phosphate is often expressed in terms of equivalent chloroquine base. Each 500mg tablet of chloroquine phosphate contains the equivalent of 300mg chloroquine base.

- **Adult dose:**
  - **Prophylaxis:** 500mg (= 300mg base) on the same day of each week. Initiate therapy 1 to 2 weeks prior to departure to endemic area.
  - **Dose must be administered on same day of week**
  - **Continue prophylaxis for 4 additional weeks upon return from endemic area**
  - **Treatment:** 1gm PO x1 then 500mg PO daily x 3 days starting 6 hours after first dose.

- **Pediatric dose:** *The weekly suppressive dosage is 5mg calculated as base, per kg of body weight, but should not exceed the adult dose regardless of weight.*

- **Precautions:** Liver disease, blood disorders, psoriasis, a certain metabolic disease (glucose-6-phosphate dehydrogenase-G6PD deficiency), hearing problems, seizures.

- **Contraindications:** Known allergy to medication

- **Pregnancy Category C** – Generally accepted as safe.

- **Side-effects**
  - Nausea
  - Vomiting
  - Stomach upset
  - Cramps
  - Loss of appetite
  - Diarrhea
  - Blurred vision
  - Trouble seeing at night or problems focusing clearly
  - Easy bleeding or bruising.

- **Warnings:**
  - It has been found that certain strains of *P. falciparum* have become resistant to chloroquine and hydroxychloroquine. Chloroquine resistance is widespread and, at present, is particularly prominent in various parts of the world including sub-Saharan Africa, Southeast Asia, the Indian subcontinent, and over large portions of South America, including the Amazon basin.
  - Before using chloroquine for prophylaxis, it should be ascertained whether chloroquine is appropriate for use in the region to be visited by the traveler. Chloroquine should not be used for treatment of *P. falciparum* infections acquired in areas of Chloroquine resistance or malaria occurring in patients where Chloroquine prophylaxis has failed. Patients infected with a resistant strain of plasmodia, as shown by the fact that normally adequate doses have failed to prevent or cure clinical malaria or parasitemia, should be treated with another form of antimalarial therapy.

- **Drug interactions**
  - Ampicillin
  - Antacids
  - Cimetidine
  - Cyclosporine
  - Kaolin
  - Magnesium trisilicate.

- **TMEP use**
  - *Malaria Protocol*
COMBIVIR® (Lamivudine and Zidovudine (AZT, ZDV))

**WARNING**
- GROUNDING medication for personnel on flight status
- Indications: HIV infection
- Dose:
  - One Combivir tablet given twice daily
- **Contraindications:** Known allergy to medication.
- Pregnancy Category C
- Side-effects:
  - Cardiovascular:
    - Cardiomyopathy.
  - Endocrine and metabolic:
    - Gynecomastia
    - Hyperglycemia
  - Gastrointestinal:
    - Oral mucosal pigmentation
    - Stomatitis.
    - Nausea
    - Vomiting
    - Diarrhea
    - Decreased appetite
  - General:
    - Vasculitis
    - Weakness
    - Malaise and fatigue
    - Fever or chills
  - Heme and lymphatic:
    - Anemia, (including pure red cell aplasia and severe anemias)
    - Lymphadenopathy
    - Splenomegaly.
  - Hepatic and pancreatic:
    - Lactic acidosis
    - Hepatic steatosis
    - Pancreatitis
    - Posttreatment exacerbation of hepatitis B
  - Hypersensitivity:
    - Sensitization reactions (including anaphylaxis)
    - Urticaria
  - Musculoskeletal:
    - Muscle weakness
    - Myalgia
    - Arthralgia
    - Rhabdomyolysis.
  - Nervous:
    - Paresthesia
    - Peripheral neuropathy
    - Seizures
    - Dizziness
  - Respiratory:
    - Abnormal breath sounds
    - Wheezing
Skin:
  - Alopecia
  - Erythema multiforme
  - Stevens-Johnson Syndrome.

TMEP use:
  - HIV Post Exposure Prophylaxis Protocol

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**Decadron®** – See Dexamethasone

**Dexamethasone (Decadron®)**

**WARNING**
GROUNDING medication for personnel on flight status

Description: Parenteral steroid (glucocorticoid)

Indications:
  - Emergency treatment of AMS, HACE, HAPE, when tactical conditions preclude descent or acclimatization.
  - Use of Decadron ↓symptoms of AMS, but does not speed acclimatization.
  - Use of Decadron does not preclude the need for an emergency descent. (Administer Decadron every 6 hours until descent is accomplished)
  - Inflammatory conditions
  - Allergic conditions

Dose (Human): 4mg IV / IM / PO q 6hr

K-9 Dose:
  - 4mg IV / IM / PO q 6hr

Contraindications:
  - Use caution in patients with a history of:
    - Diabetes
    - Hypertension
    - Ulcers
  - Pregnancy Category C

Side-effects:
  - Delayed wound healing
  - Acne
  - Various skin eruptions
  - Edema

Adverse effects usually dose related.
  - Psychotic behavior
  - Congestive heart failure
  - Hypertension
  - Cataracts
  - Glaucoma
  - Hypokalemia
  - Hyperglycemia
  - Carbohydrate intolerance

TMEP use:
  - Altitude Illness Protocol
  - Anaphylactic Reaction Protocol
  - Asthma (Reactive Airway Disease) Protocol
  - Contact Dermatitis Protocol
  - Head and Neck Infection, Including Epiglottitis, Protocol
Diazepam (Valium®)

- **WARNING** GROUNDING medication for personnel on flight status
- **Description:** General CNS depressant (anticonvulsant/sedative). Benzodiazepine Class.
- **Indications:**
  - Acute anxiety
  - Seizures
  - Status epilepticus
  - Relaxation of skeletal muscle
  - Drug of choice for treatment of convulsions associated with chemical agents or organophosphates. NOTE: Successful treatment of convulsions from organophosphate or chemical exposure may require mass quantities and repeated administration of Diazepam (Valium).
  - Has NO analgesic or anesthetic properties.
  - Overdose may be reversed w/ Romazicon (Flumazenil)
- **Dose:**
  - Status Epilepticus: 5-10mg IV slow push
  - Acute anxiety: 5-15mg IV slow push
  - Relaxation of skeletal muscle: 5-15mg IV slow push
  - Chemical warfare: 10-15mg IV slow push
    - Auto injection Diazepam should be used for seizures induced by chemicals
- **Contraindications:**
  - ↓ BP
  - Acute narrow angle glaucoma
  - Has additive effect with other respiratory depressants (morphine, phenergan and alcohol). Be prepared to perform BLS.
- **Pregnancy Category D**
- **Side-effects:**
  - ↓ BP
  - ↓ Respirations
  - Drowsiness
  - Venous irritation
  - Pain at injection site
  - N & V
- **Adverse reactions:**
  - Bradycardia
  - CV collapse
  - Amnesia
  - Abdominal discomfort
- **TMEP use:**
  - Back Pain Protocol
  - Behavioral Changes Protocol
  - Hyperthermia Protocol
Seizure Protocol

- TTP use:
  - Head injury induced seizures

Diflucan® - See Fluconazole

Diphenhydramine HCl (Benadryl®)

- **WARNING**
  - GROUNDING medication for personnel on flight status
- Description: Antihistamine. Prevents (but does not reverse) histamine-mediated responses. H1 blocker.
- Indications:
  - Mild to moderate allergic symptoms and/or allergic reactions
  - Dystonic reaction
- Adult dose:
  - 25-50mg IM / IV / PO q 6 hrs; max dose 400mg/day.
- **Pediatric dose:**
  - (Children < 12 years): 5mg/kg/day in divided doses qid PO / IM / IV.
- **Contraindications:**
  - Asthma
  - Pregnant or lactating females
- Pregnancy Category C
- Side-effects:
  - Sedation
  - Blurred vision
  - Nausea
  - Vomiting
  - Diarrhea
  - Headache
- Adverse reactions:
  - Insomnia
  - Vertigo
  - Palpitations
  - Dry mouth
  - Constipation
  - Dysuria
  - Urine retention
- **TMEP Use:**
  - Allergic Rhinitis/Hay Fever/Cold Like Symptoms Protocol
  - Anaphylactic Reaction Protocol
  - Contact Dermatitis Protocol
  - Envenomation Protocol
  - Nausea and Vomiting Protocol

Dulcolax® – See Bisacodyl

Efavirenz and Emtricitabine and Tenofovir – See Atripla®

Emtricitabine and Efavirenz and Tenofovir – See Atripla®

Emtricitabine and Tenofovir – See Truvada®
**Epinephrine (Adrenaline)**

**WARNING**

**GROUNDING medication for personnel on flight status**

**Description:** Alpha and beta adrenergic sympathomimetic.
- First-line drug for anaphylaxis (See ACLS drugs for cardiac therapy)
- Causes bronchodilatation, vasoconstriction, increases blood pressure.
- Decreases edema/swelling due to allergic reactions.

**NOTE:**
- 1:1,000 dilution epinephrine (1mg in 1cc) is standard pararescue issue.
- 1:10,000 dilution (1mg in 10cc) is the standard ‘Cardiac’ dosage form for IV use.
- 1:1,000 epinephrine can be diluted to the 1:10,000 form by putting 1cc of 1:1,000 epinephrine (1mg epinephrine) in 9cc of normal saline (total volume of 10cc).

**Indications:** Anaphylaxis
- Allergic reactions (mild/moderate/severe)
- Asthma

**Adult dose (Epinephrine):**
- Anaphylaxis: 0.3-0.5mg (3-5cc of 1:10,000 dilution) IV or 0.3-0.5mg (0.3-0.5cc of 1:1,000 dilution) IM
- Allergic reaction: 0.3-0.5mg (0.3-0.5cc of 1:1,000 dilution) SQ / IM
- Asthma: 0.3-0.5mg (0.3-0.5cc of 1:1,000 dilution) SQ / IM

**Pediatric dose:** 0.01mg/kg SQ / IM. Not to exceed 0.5mg

**Contraindications:**
- 1:1,000 Epinephrine is NOT given IV.
- Use caution in patients with a history of heart disease or over the age of 40.
- Do not inject Epinephrine (or solutions containing Epi) into/near the fingers, toes, nose, ears or penis. Intense vasoconstriction may cause necrosis.

**Pregnancy Category C**

**Side-effects:**
- Cardiac arrhythmias
- Ventricular tachycardia
- Ventricular fibrillation
- Angina
- Hypertension
- ↑BP
- Nausea
- Vomiting
- Vasoconstriction

**Adverse reactions**
- Uncontrolled effects on myocardium & arterial system

**TMEP use:**
- Anaphylactic Reaction Protocol
- Asthma (Reactive Airway Disease) Protocol
- Sepsis/Septic Shock Protocol
**Ertapenem IV (Invanz®)**

- **WARNING**
  - Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.
- **Description:** Carbapenem antibiotic
- **Indications**
  - Complicated intra-abdominal infections
  - Complicated skin infections
  - Pneumonia
  - Complicated UTI, including pyelonephritis
  - Acute pelvic infections
  - **Drug of choice for penetrating battlefield trauma**
- **Adult dose**
  - 1gm daily
  - May be administered IV up to 14 days or IM injection for up to 7 days
  - For IV administration, infuse over 30 minutes
- **Pediatric dose**
  - **Not approved in patients < 18 yrs**

- **K-9 Dose**
  - 250mg IV / IM three times a day

- **Contraindications:**
  - Hypersensitivity to ertapenem
  - Penicillin allergy with documented severe reaction to PCN
  - Hypersensitivity to other carbapenem antibiotics
  - Anaphylactic reactions to other beta-lactam antibiotics
  - IM: hypersensitivity to lidocaine or other anesthetics of amide-type
- **Pregnancy Category B**
- **Side-effects:**
  - Diarrhea
  - Infused vein phlebitis/thrombophlebitis
  - Nausea/ vomiting
  - Headache
  - Vaginitis
- **Adverse reactions:**
  - Seizures
- **Other notes:**
  - Visually inspect any solution of ertapenem for particulate matter and discoloration prior to use when possible. Solutions range in color from colorless to pale yellow. Variations in color do not affect potency of the drug.
  - IV administration – must be reconstituted prior to administration
    - Do not mix or co-infuse with other medications
    - Do not use diluents containing dextrose
    - Reconstitute the contents of a 1gm vial of ertapenem with 10ml of 0.9% NaCl, or bacteriostatic water for injection
    - Shake well to dissolve, and immediately transfer contents to 50ml of 0.9% NaCl
    - Complete infusion within 6 hrs of reconstitution
  - IM administration - must be reconstituted prior to administration
    - Reconstitute the contents of a 1gm vial of ertapenem with 3.2ml of 1% lidocaine HCl injection (without epinephrine). Shake vial thoroughly to form solution
    - Immediately withdraw the contents of the vial, and administer by deep IM injection into a large muscle mass (such as the gluteal muscles or lateral part of the thigh)
- Use the reconstituted IM solution within 1 hour after preparation. **DO NOT ADMINISTER THE RECONSTITUTED IM SOLUTION IV.**

- **TMEP use:**
  - Abdominal Pain Protocol
  - Bronchitis/Pneumonia Protocol
  - Cellulitis/Cutaneous Abscess Protocol
  - Crush Injury Protocol
  - Flank Pain (Renal Colic, Pyelonephritis, Kidney Stone) Protocol
  - Joint Infection Protocol
  - K-9 Trauma Management Protocol
  - Meningitis Protocol
  - Sepsis/Septic Shock Protocol

**Fentanyl** – See Oral Fentanyl

**Flagyl®** – See Metronidazole

**Fluroquinolones** – See Quinolones, Moxafloxacin, Gatifloxacin, Levofloxacin

**Fluconazole (Diflucan®)**

**WARNING**

- Aviation personnel are grounded for the initial 24 hours of antifungal therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

- **Description:** Synthetic triazole antifungal agent

- **Indications:**
  - Vaginal candidiasis (vaginal yeast infections due to *Candida*).
  - Oropharyngeal and esophageal candidiasis.
  - Fungal skin infections

- **Dose:**
  - Skin infection: 150mg, 1 pill per week x 4 weeks
  - Single dose: Vaginal candidiasis: The recommended dosage of fluconazole for vaginal candidiasis is 150mg as a single oral dose.
  - Oropharyngeal candidiasis: The recommended dosage of fluconazole for oropharyngeal candidiasis is 200mg on the first day, followed by 100mg once daily. Clinical evidence of oropharyngeal candidiasis generally resolves within several days, but treatment should be continued for at least 2 weeks to decrease the likelihood of relapse.

- **Contraindications:**
  - Hypersensitivity to fluconazole.
  - Pregnancy Category C

- **Side-effects/adverse reactions:**
  - **Dermatologic:**
    - Exfoliative skin disorders including Stevens-Johnson Syndrome and toxic epidermal necrosis.

- **TMEP use:**
  - Fungal Skin Infection Protocol

**Fosphenytoin (Cerebyx®)**

**WARNING**

- GROUNDING medication for personnel on flight status
Description: Parenteral phenytoin

Indications:
- Prevention and treatment of seizures

Dose: 18mg/kg IV/IO over 15 minutes (if available) for seizures refractory to benzodiazepines.

- Do not administer faster than 150mg/min since this may result in hypotension.

Contraindications:
- Hypersensitivity to phenytoin
- Sinus bradycardia
- AV block

Pregnancy Category D

Adverse Effects
- Hypotension with rapid IV administration

Other Notes
- Store under refrigeration at 2° C to 8° C (36° F to 46° F). The product should not be stored at room temperature for more than 48 hours.
- Vials that develop particulate matter or are discolored should not be used.
- Because the full antiepileptic effect of phenytoin, whether given as Cerebyx or parenteral phenytoin, is not immediate, other measures, including concomitant administration of an IV benzodiazepine, will usually be necessary for the control of status epilepticus

TMEP Use:
- Seizure Protocol
- Tactical Trauma Protocol

Gatifloxacin 0.3% Ophthalmic Liquid (Zymar®)

- Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.
- Description: Ocular fluoroquinolone
- Indications: Eye infections

Adult dose
- Days 1 and 2: instill 1 drop in affected eye(s) every 2 hours while awake, up to 8 times/day
- Days 3 to 7: Instill 1 drop in affected eye(s) up to 4 times/day while awake

Pediatric dose
- Safety and efficacy in infants < 1 year not established
- Pediatric dosing like adult dosing

Contraindications
- Hypersensitivity to any component of product

Pregnancy Category C

Side-effects
- Upon instillation, may cause temporary blurring of vision or stinging
- If stinging, burning, or itching becomes pronounced, or redness, irritation, swelling, decreasing vision, or pain persists or worsens, discontinue and consider alternative therapy
- Lid margin crusting, white crystalline precipitates and foreign body sensation in the eye have been reported
- Bad/bitter taste in mouth
- Nausea

Adverse reactions
- Discontinue at first sign of skin rash or other allergic reaction
- Corneal staining
- Tearing and photophobia

- Other notes:
  - To instill in eye, tilt head back, place medication in conjunctival sac and close eye(s).
  - Apply light finger pressure on lacrimal sac for 1 minute following instillation
  - To avoid bottle contamination, do not touch tip of container to any surface. Replace cap after use.
  - In general, contact lenses should not be worn during therapy

- TMEP use:
  - Corneal Abrasion, Corneal Ulcer, Conjunctivitis Protocol
  - Ear Infection Protocol

**Glucose**

**Glutose** – See Glucose

**Glucose (Glutose®)**

- Description: Carbohydrate
- Route: Oral
- Indications: Altered mental status caused by hypoglycemia defined as;
  - **Adults:**
    - Diabetics = fingerstick blood glucose analysis less than 110mg/dL
    - Non-diabetics = fingerstick blood glucose analysis less than 80mg/dL
  - **Children:**
    - Diabetics = fingerstick blood glucose analysis less than 90mg/dL
    - Non-diabetics = fingerstick blood glucose analysis less than 60mg/dL

- **Adult dose**
  - Full tube given in small doses (25-50gm) – standing order

- **Pediatric dose:**
  - 0.5gm/kg in small doses – standing order

- Drug action: Increases blood glucose level
- Onset: 1 minute
- Duration: Depends on the degree of hypoglycemia
- Precautions: Assure gag reflex is present
- Side-effects:
  - Aspiration

- **Contraindications:**
  - Absent gag reflex
  - Patients who are unable to protect their own airway
  - Patients who are unable to swallow
- Pregnancy Category C
- TMEP use:
  - Behavioral Changes Protocol
  - Hyperthermia Protocol
  - Loss of Consciousness (without seizures) Protocol
  - Seizure Protocol

**Hespan® (Hetastarch in NaCl) Plasma Volume Expander (Artificial Colloid)**

**Hextend® (Hetastarch in Lactated Electrolyte Solution)**

- Description: Plasma volume expander (artificial colloid)
- Both Hespan and the newer product Hextend are artificial colloids and are used to expand the plasma volume. The major advantage over crystalloids is that these products give more volume expansion for a longer period of time for the same infused volume. These products are not blood or plasma replacements, they have no oxygen carrying capacity, and they have no coagulation properties. **These products should not be the primary fluid used to treat dehydrated patients, but can be used if no other fluids are available.**
- Indications: Treatment of shock secondary to hemorrhage.
• **Dose:**
  - Patient in shock, bleeding not controlled: hold fluid and control bleeding.
  - Patient in shock, bleeding controlled: start 500cc of Hespan/Hextend IV, check for improvement in BP.
    - Titrate to SBP of 85 **OR** improvement in mental status **AND** presence of radial pulse. Hold further fluid when either improvement point is met.
  - Patient still in shock after first 500cc of Hespan/Hextend; start second 500cc bag and titrate to improvement.

• **Contraindications:**
  - Known bleeding disorders or uncontrolled hemorrhage
  - CHF
  - Renal impairment
  - Not for use in children under 12 years
  - Use with caution in pregnancy.

• **Pregnancy Category C**

• **Side-effects:**
  - Nausea/vomiting
  - Peripheral and facial edema
  - Urticaria
  - Flushing chills

• **Adverse reactions:**
  - Severe anaphylaxis (rare)

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**Ibuprofen (Motrin®)**

• **Description:** NSAID, analgesic, antipyretic. Cox-1 inhibitor.

• **Indications:**
  - Mild to moderate pain
  - Arthritis

• **Dose:**
  - 200-800mg PO tid or qid. Not to exceed 2400mg/day (800mg tid)

• **Contraindications:**
  - **NOTE:** Should not be given to pts with a history of aspirin sensitivity or severe asthma
  - Penetrating trauma
  - Suspected internal bleeding
  - Suspected intracranial bleeding
  - Pregnancy
  - Nursing mothers

• **Pregnancy Category B**

• **Side-effects:**
  - Nausea
  - Vomiting
  - Headache
  - Dizziness
  - Drowsiness

• **Adverse reactions:**
  - Prolonged bleeding time
  - Tinnitus
  - Edema
  - Peptic ulcer

• **TMEP use:**
  - Chest Pain Protocol (Other Etiologies)
  - Pain Management Protocol

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**Imodium®**—See Loperamide HCl
**Kaletra® (Lopinavir and Ritonavir)**

- WARNING: GROUNDING medication for personnel on flight status.
- Class: Protease inhibitors.
- Action: This medication prevents human immunodeficiency virus (HIV) cells from multiplying in your body.
- Dose: 4 pills daily, taken together and with Truvada.
- **Contraindications:**
  - Do not take the following medicines with KALETRA because they can cause serious problems or death.
  - Triazolam (Halcion®)
  - Astemizole (Hismanal®)
  - Pimozide (Orap®)
  - Cisapride (Propulsid®)
  - Terfenadine (Seldane®)
  - Midazolam (Versed®)
  - Rifampin (Rimactane®, Rifadin®, Rifater®, or Rifamate®)
  - Cholesterol lowering medicines
    - Lovastatin (Mevacor®)
    - Simvastatin (Zocor®)
    - Atorvastatin (Lipitor®)
- Pregnancy Category C.
- **Side-effects/precautions:**
  - Body as a whole
    - Allergic reaction, back pain, chest pain, chest pain substernal, cyst, drug interaction, drug level increased, face edema, flu syndrome, hypertrophy, infection bacterial, malaise, neoplasm, and viral infection.
  - Cardiovascular system
    - Atrial fibrillation, cerebral infarct, deep vein thrombosis, migraine, myocardial infarct, palpitation, postural hypotension, thrombophlebitis, varicose vein, and vasculitis
  - Digestive system
    - Cholangitis, cholecystitis, constipation, dry mouth, enteritis, enterocolitis, eructation, esophagitis, fecal incontinence, gastritis, gastroenteritis, hemorrhagic colitis, hepatitis, hepatomegaly, increased appetite, jaundice, liver fatty deposit, liver tenderness, mouth ulceration, pancreatitis, periodontitis, sialadenitis, stomatitis, and ulcerative stomatitis.
  - Endocrine system
    - Cushing's Syndrome, diabetes mellitus, and hypothyroidism.
  - Heme and lymphatic system
    - Anemia, leukopenia, and lymphadenopathy.
  - Metabolic and nutritional disorders
    - Avitaminosis, dehydration, edema, glucose tolerance decreased, lactic acidosis, obesity, peripheral edema, and weight gain.
  - Musculoskeletal system
    - Arthralgia, arthrosis, bone necrosis, joint disorder, and myasthenia.
  - Nervous system
    - Abnormal dreams, agitation, amnesia, anxiety, apathy, ataxia, confusion, convulsion, dizziness, dyskinesia, emotional lability, encephalopathy,
extrapyramidal syndrome, facial paralysis, hypertonia, nervousness, neuropathy, peripheral neuritis, somnolence, thinking abnormal, tremor, and vertigo.

- **Respiratory system**
  - Asthma, cough, increased dyspnea, lung edema, pharyngitis, rhinitis, and sinusitis.

- **Skin and appendages**
  - Acne, alopecia, dry skin, eczema, exfoliative dermatitis, furunculosis, maculopapular rash, nail disorder, pruritis, seborrhea, skin benign neoplasm, skin discoloration, skin striae, skin ulcer, and sweating.

- **Special senses**
  - Abnormal vision, eye disorder, otitis media, taste loss, taste perversion, and tinnitus.

- **Urogenital system**
  - Abnormal ejaculation, amenorrhea, breast enlargement, gynecomastia, impotence, kidney calculus, nephritis, and urine abnormality.

- **Other notes:**
  - Store KALETRA soft gelatin capsules at 36° F - 46° F (2° C - 8° C) until dispensed. Avoid exposure to excessive heat. For patient use, refrigerated KALETRA capsules remain stable until the expiration date printed on the label. If stored at room temperature up to 77° F (25° C), capsules should be used within 2 months.

- **TMEP use:**
  - HIV Post Exposure Prophylaxis Protocol

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**Ketalar® - See Ketamine**

### **Ketamine (Ketalar®)**

- **WARNING**
  - GROUNDING medication for personnel on flight status

- **Description:** Rapid acting general sedative and analgesic

- **Indications:**
  - Anesthetic agent for procedures

- **Adult Dose:** 20mg IV/IO over 1 minute, followed by 20mg increments every 30-60 seconds until nystagmus occurs or a maximum total dose of 100mg.

- **Do not administer faster as this may result in respiratory depression.**

- **Contraindications:**
  - Hypersensitivity to ketamine
  - Eye globe injury
  - Head injury

- **Pregnancy Category B**

- **Adverse Effects**
  - Hypertension
  - Respiratory Depression
  - Emergence Reactions (delirium, hallucinations, confusion)
  - Increased Intra-cranial pressure
  - Increased intra-ocular pressure
  - Hypersalivation

- **Other Notes**
  - Do not mix ketamine hydrochloride and diazepam in syringe or infusion bottle
  - Ketamine should not be injected intravenously without proper dilution. It is recommended the drug be diluted with an equal volume of either Sterile Water for Injection, USP, normal saline, or 5% dextrose in water.
  - Protect from light
- Effects of ketamine are increased when combined with other analgesics or muscle relaxants
- Vials that develop particulate matter or are discolored should not be used.

- **TMEP Use:**
  - *Procedural Analgesia Protocol*

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### Ketorolac (Toradol®)

- **Description:** Analgesic, non-steroidal anti-inflammatory (NSAID). Inhibits platelet function.
- **Indications:**
  - For the temporary relief of:
    - Mild to moderate pain
    - Fever (if ASA or Acetaminophen is not available).
- **Adult dose:**
  - 30mg IV / IM. May be repeated q 6hr. **Do not use more than 5 consecutive days.**
- **Pediatric dose**
  - Adolescents 13–16 years and children 2–12 years: 1mg/kg IM to a maximum of 30mg or 0.5mg/kg IV to a maximum of 15mg
- **Contraindications:**
  - Hypersensitivity to nonsteroidal anti-inflammatory agents (NSAID)
  - History of gastrointestinal bleeding
  - Patients with bleeding disorders (e.g., hemophilia).
  - Suspected or confirmed
    - Cerebrovascular bleeding
    - Hemorrhagic diathesis
    - Incomplete hemostasis
    - High risk of bleeding
  - Prior to major surgery
  - Exercise extreme caution in patients with a history of
    - Hypertension or hypertension and congestive heart failure.
    - Cardiovascular disease
    - Peripheral vascular disease
    - Cerebrovascular disease (e.g., stroke, transient ischemic attack)
  - Advanced renal impairment
  - Patients at risk for renal failure due to volume depletion
- **Pregnancy Category B**
- **Side-effects:**
  - Gastrointestinal symptoms
  - Gastrointestinal bleeding
  - Stomach pain
  - Heartburn
- **TMEP use:**
  - *Pain Management Protocol*

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**Lamivudine and Zidovudine (AZT, ZDV) - See Combivir®**

**Lariam® – See Mefloquine**

**Lidocaine HCL – See Xylocaine®**
• **WARNING** Aviation personnel are grounded for 12 hours after the use of local anesthesia and until symptoms have resolved enough to allow safe performance of duties.
• **Description:** Local anesthetic; see ACLS drugs for cardiac therapy.

• **WARNING** CAUTION: Some lidocaine solutions contain 1:10,000 epinephrine. This causes intense vasoconstriction and prolongs the duration of the anesthesia. These solutions are identified by a red label or red lettering on the label. **DO NOT use solutions containing epinephrine on or near the fingers, toes, nose, ears, or penis.**

• **Indications:**
  - Local anesthetic: Suturing, debridement, nerve blocks, thoracostomy, or other similar procedures. Duration of anesthesia is 30 to 60 minutes.
  - Cardiac Use: Use ACLS Protocols

• **Dose (Local anesthesia):** To desired effect. Maximum single adult dose is 4.5mg/kg or 300mg (15cc of the 2% solution contains 300mg lidocaine).
  - **NOTE 1:** This is a different max dose than with IV lidocaine for ACLS use.
  - **NOTE 2:** 2% lidocaine contains 20mg of lidocaine per cc. Diluting 2% lidocaine 1:1 with normal saline gives a 1% solution (10mg per cc) that is just as effective as the 2% solution.

• **Contraindications:**
  - 2nd degree, 3rd degree AV block
  - Hypotension
  - Stokes-Adams Syndrome

• **Pregnancy Category B**
• **Side-effects:**
  - Slurred speech
  - Altered mental status
  - Tinnitus
  - Edema

• **Adverse Reactions:**
  - Dermatologic reactions
  - Status asthmaticus
  - Anaphylaxis
  - Seizures

• **TMEP use:**
  - Back Pain Protocol
  - Cellulitis/Cutaneous Abscess Protocol
  - Ingrown Toenail Protocol

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**Loperamide HCl (Imodium®)**

• **WARNING** Aviation personnel are grounded until medical condition is not a factor and free of side-effects for 24 hours.
• **Description:** Antidiarrheal (opiod)
• **Indications:** Treatment of acute diarrhea. For use in acute, non-invasive diarrhea only.
  - Refer to medical emergencies if blood and/or mucus are present in stool, or diarrhea is associated with fever (infectious diarrhea).
• **Dose:** 2 capsules (4mg) first dose, then 1 capsule (2mg) after every unformed stool, not to exceed 16 mg (8 capsules) in 24 hours. Use only if control of diarrhea is critical for continued operations.
• **Contraindications:**
  o Acute dysentery.
  o Not for use in children < 12 years old
• Pregnancy Category B
• **Side-effects:**
  o Abdominal pain/distention
  o Nausea
  o Vomiting
  o Severe constipation
  o Drowsiness
  o Dizziness.
• Adverse reactions: Hypersensitivity
• TMEP use:
  o *Gastroenteritis Protocol*

**Lopinavir and Ritonavir** – See Kaletra®

**Macrolide Class of Antibiotics** – See Azithromycin (Z-Pak®)

**Malarone®** - See Atovaquone 250mg/ proguanil 100mg

**Mannitol (Osmotrol®)**

  • **WARNING** GROUNDING medication for personnel on flight status.
  • Description: Osmotic diuretic
  • Action:
    o Increases osmolarity of the glomerular filtrate, which increases the reabsorption of water, increasing sodium and chloride.
  • Indications;
    o Crush injury
  • Dose:
    o 1-2gm/kg at the rate of 5gm/hr
• **Contraindications:**
  o Anuria
  o Pulmonary edema
  o Dehydration
  o Congestive heart failure
  o Hypovolemia
  o Hypotension
  o Hypersensitivity
• Pregnancy Category C
• **Side-effects/precautions**
  o Sodium depletion
  o Transient volume overload
  o Pulmonary edema
  o Hypotension (excessive diuresis)
  o Angina like chest pain
  o Dizziness
  o Headache
  o Nausea and vomiting
  o Chills
    o Drug may crystallize at temperatures of 45° F or lower
• Other notes:
WARNING Use an in line filter
- TMEP use:
  - Crush Injury Protocol

**Mefloquine (Lariam®)**

- **GROUNDING** medication for personnel on flight status
- **Description:** Antimalarial agent
- **Indications:**
  - Prevention of mild to moderate malaria caused by *Plasmodium falciparum* (including chloroquine-resistant strains) and *P. vivax*
  - Treatment of mild to moderate malaria caused by Mefloquine-susceptible strains of *P. falciparum* (both chloroquine-susceptible and resistant strains) and *P. vivax*
- **Adult dose:**
  - Prophylaxis: 250mg once weekly
    - Initiate therapy 1 to 2 weeks prior to departure to endemic area
    - Dose must be administered on same day of week
    - Continue prophylaxis for 4 additional weeks upon return from endemic area
  - Treatment: 5 tablets (1250mg) given as a split dose taken 6-8 hours apart.
  - Do not take on empty stomach
  - Take with at least 240ml (8oz) glass water
- **Pediatric dose**
  - Prophylaxis:
    - Children > 45kg: one 250mg tablet should be taken in children
    - Children <45kg: weekly dose decreases in proportion to body weight (3 to 5mg/kg once weekly):
      - 30–45kg: ¾ tablet
      - >20–30kg: ½ tablet
      - Up to 20kg: ¼ tablet
      - Experience with Mefloquine in infants < 3 months or weighing < 5kg is limited
    - Initiate therapy 1 week prior to departure to endemic area
    - Dose must be administered on same day of week
    - Continue prophylaxis for 4 additional weeks upon return from endemic area
  - Treatment: 20–25mg/kg for nonimmune patients
    - Splitting the dose into 2 doses taken 6-8 hours apart may reduce adverse effects
    - Treatment in children has been associated with early vomiting; if patient vomits within 30 minutes of dose and a significant loss of drug is suspected by inspection of emesis, re-dose patient with full dose; if vomiting occurs within 30 to 60 minutes, administer ½ the full dose.
    - Do not administer on an empty stomach and give with ample water
    - For very young patients, dose may be crushed, mixed with water or sugar water and may be administered via oral syringe
    - Experience in infants < 3 months or < 5kg is limited
- **Contraindications:**
  - Hypersensitivity to related compounds (e.g., quinine, quinidine)
  - Patients with:
    - Active depression
    - Recent history of depression
    - Generalized anxiety disorder
    - Psychosis
    - Schizophrenia or other major psych disorders
- History of convulsions
- Pregnancy Category C
- Side-effects:
  - Cardiac rhythm disturbances
  - Exercise caution when performing activities requiring alertness and fine motor coordination such as driving, piloting, operating heavy machinery as dizziness, loss of balance have occurred with Mefloquine during and following its use
- Adverse reactions:
  - Reactions (symptoms) attributable to Mefloquine cannot be distinguished from symptoms of malaria. Due to long half-life of the drug, symptoms could persist for several weeks following the last dose.
  - Prophylaxis
    - Vomiting (3%)
    - Dizziness
    - Syncope (fainting)
    - Extrasystoles (skipped heartbeats; <1%)
  - Treatment
    - Dizziness, headache
    - Myalgia (muscle aches)
    - Nausea, vomiting
    - Fever, chills
    - Diarrhea
    - Skin rash
    - Abdominal pain
    - Fatigue
    - Loss of appetite
    - Tinnitus (ringing in the ears)
- Other notes:
  - Patients given Mefloquine for *P. vivax* are at high risk for relapse and should subsequently receive Primaquine.
  - There is insufficient clinical data to document Mefloquine’s effect on malaria caused by *P. ovale* or *P. malariae*
  - Liver impairment can prolong the elimination of Mefloquine
  - When Mefloquine is taken concurrently with oral live typhoid vaccines, attenuation of immunization cannot be excluded. Therefore, complete attenuated oral live vaccinations at least 3 days before starting Mefloquine.
  - Anticonvulsant blood levels (e.g., phenytoin [Dilantin®], valproic acid [Depakote®], carbamazepine [Tegretol®], and phenobarbital) may be reduced by Mefloquine and therefore risk for convulsions may increase in patients with history of epilepsy. Mefloquine itself has also been associated with convulsions in the absence of anticonvulsant treatment.
- TMEP use:
  - *Malaria Protocol*

### Meloxicam (Mobic®)

- Description: NSAID
- Indications:
  - Relief of the signs and symptoms of osteoarthritis and rheumatoid arthritis.
  - Mild to moderate pain relief
- Dose:
  - 7.5mg or 15mg daily. The maximum recommended daily oral dose is 15mg.
- Contraindications:
  - Allergy to NSAID class of drugs, Aspirin.
  - Pregnancy Category B (1st and 2nd trimesters)
  - Pregnancy Category C (3rd trimester)
- Side-effects:
  - Allergic reaction
  - Anaphylactoid reactions including shock
- Face edema
- Fatigue
- Fever
- Hot flushes
- Malaise
- Syncope
- Weight decrease
- Weight increase
- Dyspepsia

- **TMEP use:**
  - *Pain Management Protocol*

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### Metronidazole (Flagyl®)

**WARNING**
Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

- **Description:** Nitroimidazole antibiotic
- **Indications:**
  - Gastroenteritis presumed due to Giardia
- **Adult dose:**
  - Amebic Dysentery – 750mg PO tid x 5–10 days
  - Trichomoniasis – 2gm PO x 1 dose; OR 250mg PO tid x 7 days
  - Giardia – 250mg PO tid x 5–7 days
  - Severe anaerobic infections – 1gm IV, the 500mg IV q 6 hr
- **Pediatric dose:**
  - Safety and efficacy have not been established, except for amebiasis. 35–50mg/kg tid for 10 days. Newborns exhibit a reduced capacity to eliminate the drug.
- **Contraindications:**
  - Hypersensitivity to any component of product, or other nitroimidazole derivatives
  - Pregnancy (first trimester in patients with Trichomoniasis)
  - Administer with caution to patients with CNS diseases
  - Use with caution in patients with history of blood dyscrasias
- **Pregnancy Category B**
- **Side-effects:**
  - Disulfiram-like reaction including flushing, palpitations, tachycardia, nausea, vomiting may occur with concomitant ethanol ingestion. Refrain from ethanol during therapy and ≥1 to 3 days afterward.
- **Adverse reactions:**
  - Seizures
  - Peripheral neuropathy (numbness or paresthesia of extremity)
  - Patients with undiagnosed candidiasis may present more prominent symptoms during therapy; treat with candididal agent
- **TMEP use:**
  - *Abdominal Pain Protocol*
  - *Gastroenteritis Protocol*

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### Midazolam (Versed®)

- **WARNING**
  - GROUNDING medication for personnel on flight status
- **Class:** Benzodiazepine
- **Indications:**
Sedation in combination with analgesia to perform brief, but painful procedures (i.e. fracture reduction)
- Treatment of active seizures
- Sedation of agitated patients

**Dose:**
- 0.07-0.08mg/kg IM (Average or typical adult dose is 5mg IM)
- 5-10mg IM / IV / IO for seizure control
- 1mg IV slowly q 2-3 minutes to maximum adult dose of 10mg for sedation purposes. Titrate to achieve necessary level. (The patient is somewhat somnolent, but still easily arousable.)

**Side-effects:**
- Respiratory: laryngospasm, bronchospasm, wheezing, shallow respirations,
- Cardiovascular: bradycardia, tachycardia
- Gastrointestinal: vomiting
- CNS/neuromuscular: retrograde amnesia, hallucination, confusion
- Special senses: blurred vision, diplopia, nystagmus, pinpoint pupils,
- Hypersensitivity: anaphylactoid reactions, hives, rash, pruritus.
- Miscellaneous: yawning, lethargy, chills, weakness

**Contraindications:**
- Known sensitivity to midazolam
- Acute narrow angle glaucoma
- Injectable midazolam should not be administered to adult or pediatric patients in shock or coma, or in acute alcohol intoxication with depression of vital signs

**Pregnancy Category D**

**Warnings:**
- Use with caution when other medications capable of producing central nervous system depression are used.
- Prior to the intravenous administration of midazolam be sure that the immediate availability of oxygen, resuscitative drugs, age and size-appropriate equipment for bag-valve-mask ventilation and intubation, and skilled personnel for the maintenance of a patent airway and support of ventilation are available.
- Monitor patients continuously for early signs of hypoventilation, airway obstruction, or apnea.
- Use with caution in patients with severe fluid or electrolyte disturbances.
- Oxygen is desirable, but not absolutely required.

**Overdose treatment:**
- Flumazenil may be used to reverse the effects of midazolam after accidental over-administration. Flumazenil should not be used to reverse midazolam after seizure treatment since this may result in intractable seizures. It should also not be used in the setting of an intentional or mixed drug overdose.
- Monitor vital signs during the recovery period.

**TMEP uses:**
- Acute Behavioral Changes Protocol
- Seizures Protocol

**Mobic®** – See Meloxicam

**Motrin®** – See Ibuprofen

**Morphine Sulfate (Opioid)**

**WARNING** GROUNDING medication for personnel on flight status
- **Description:** Narcotic analgesic – alters perception of pain and emotional response to pain.

- **Have Narcan available when using Morphine.**
  - Alters perception & emotional response to pain

- **Indications:**
  - Severe pain
  - Pain from cardiac ischemia

- **Contraindications:**
  - Respiratory depression
  - Hypotension
  - Head injury

- **Pregnancy Category B**
- **Adult dose:** 4-15mg IV / IM slow push. Titrate to response.
- **Pediatric dose:** 0.1-0.2mg/kg IM / IV. *Do not exceed 15mg.*

- **K-9 Dose:**
  - Acute Pain: 30mg IM
  - Sedation: 15-30mg IM

- **Side-effects:**
  - ↓ RR
  - Hypotension
  - Bradycardia
  - Nausea
  - Vomiting
  - Dizziness
  - Pruritus
  - Skin flushing

- **Adverse reactions:**
  - Seizures with large doses
  - Constipation
  - Ileus
  - Urinary retention

- **TMEP use:**
  - Chest Pain Protocol
  - Pain Management Protocol
  - K-9 Trauma Management Protocol

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**Moxifloxacin (Avelox®)**

- **WARNING**
  - Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

- **Description:** 4th generation quinolone

- **Broad spectrum antibiotic with broad anaerobic coverage for PO / IV administration).** Inhibits DNA preventing cellular replication and division

- **Indications:**
  - Community-acquired pneumonia (CAP), including CAP caused by multi-drug resistant *Streptococcus pneumoniae* *
  - Complicated skin and skin structure infections, including diabetic foot infections
  - Complicated intra-abdominal infections, including polymicrobial infections such as abscesses
• **Dose:** 400mg/day PO / IV
  - IV infusion should be over 60 minutes
  - Avoid use with antacids;
  - Decrease dose in renal impairment
  - Avoid using with antiarrhythmics – May cause prolonged QT interval

• **Contraindications:**
  - Hypersensitivity to fluoroquinolones
  - Patients < 18 years old
  - Pregnancy and lactation
  - Uncorrected hypokalemia

• **Pregnancy Category C**

• **Side-effects:**
  - Headache
  - Nausea
  - Diarrhea
  - Photosensitivity
  - Insomnia
  - Vertigo,

• **Adverse reactions:**
  - Tendon rupture
  - Use cautiously with NSAIDs due to increased CNS stimulation
  - Prolonged QT interval
  - Abnormal dreams
  - Pseudomembranous colitis

• **Other notes:**
  - Oral antacids decrease absorption of the Moxafloxacin when taken orally.
  - Visually inspect any solution of Moxafloxacin for particulate matter and discoloration prior to use. Solution must be clear.
  - IV administration- must be reconstituted prior to administration
    - Do not mix or co-infuse with other medications
    - At cool temperatures precipitation may occur, which will re-dissolve at room temperature.

• **TMEP use:**
  - Barotrauma Protocol
  - Bronchitis/Pneumonia Protocol
  - Cellulitis/Cutaneous Abscess Protocol
  - Ear Infection Protocol
  - Epistaxis Protocol
  - Flank Pain (Renal Colic, Pyelonephritis, Kidney Stone) Protocol
  - Gastroenteritis Protocol
  - Ingrown Toenail Protocol
  - Meningitis Protocol (Prophylaxis)
  - Subungual Hematoma Protocol

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**Mupirocin Ointment 2% (Bactroban®)**

• **Description:** Topical antibacterial

• **Indications:**
  - Impetigo
  - Topical skin infection

• **Adult dose:**
  - Clean affected area
  - Apply small amount of antibiotic on the area 1 to 3 times/day
  - The affected area may be covered by gauze or a sterile bandage

• **Pediatric dose:**
  - Safety in children has been established in ages 2 to 16 yrs
- Pediatric dosing like adult dosing

- **Contraindications:**
  - Should not be used with open wounds

- Pregnancy Category B

- **Side-effects:**
  - Burning, stinging, pain, itching at application site
  - Adverse reactions
  - Nausea

- **Adverse reactions:**
  - Dry skin
  - Tenderness
  - Swelling
  - Contact dermatitis
  - Increased exudate (rare)
  - Systemic reactions (rare)

- **Other notes:**
  - For external use only
  - Avoid eyes and mucosal membranes
  - If no improvement in 3 to 5 days, consider alternative therapy

- **TMEP use:**
  - Epistaxis Protocol
  - Ingrown Toenail Protocol

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**Narcan® – See Naloxone HCl**

**Naloxone HCl (Narcan®)**

- **WARNING**
  - GROUNDING medication for personnel on flight status
  - Description: Narcotic antagonist.
  - Indications: Known or suspected narcotic induced respiratory depression.

  - Have available when using Morphine.

- Adult dose: 0.4-2mg IV. Repeat q 2-3 min/prn.
  - Duration is 20 to 40 minutes (< duration of action of Morphine). Repeat doses of may be necessary after 20 to 30 minutes.

- Pediatric dose: 0.01mg/kg dose IM / IV / SQ q 2-3 min.
  - If initial dose does not result in clinical response, increase dose up to 0.1mg/kg
  - If no response after 10mg has been administered, diagnosis of narcotic induced toxicity should be questioned.

- **Contraindications:** Known allergy to medication

- Pregnancy Category B

- **Side-effects:**
  - In narcotic dependent patient, withdrawal symptoms may be precipitated.

- **Adverse reactions:** With higher than recommended doses:
  - Nausea
  - Vomiting
  - Tachycardia
  - Hypertension
  - Tremors

- **TMEP use:**
  - Loss of Consciousness (without seizures) Protocol
**Nelfinavir (Viracept®)**

- **WARNING**
  - GROUNDING medication for personnel on flight status
  - Description: Anti-retroviral agent, protease inhibitor
  - Indications: HIV post exposure prophylaxis
  - Adult dose: 750mg tid or 1250mg bid if taken with food.
  - Pediatric dose: Children 2-13 years old: 45-55mg/kg bid, or 25-35mg/kg tid.
  - If tablets are unable to be taken may use powder form mixed with water, milk, formula, or dietary supplement. Do not use acidic juices. Once mixed, do not store for more than 6 hours.
  - Contraindications:
    - Hypersensitivity to Nelfinavir
    - Concurrent therapy with amiodarone, ergot derivatives, midazolam, pimozide, quinidine, triazolam
  - Pregnancy Category B
  - Adverse reactions:
    - Diarrhea (14-20% of adults, 39-47% of children)
    - Nausea
    - Flatulence
    - Rash
    - Decreased lymphocytes
    - Decreased neutrophils
    - Decreased hemoglobin
    - Increased creatine kinase
    - Increased transaminases
    - Abdominal pain
    - Weakness
    - Other reactions occur at a rate of less than 2%
  - Other notes:
    - Has high potential for interactions with other drugs.
    - Not recommended for use with rifampin, St. John’s Wort, lovastatin, simvastatin, or proton pump inhibitors. Serum levels will be significantly reduced.
    - Should be taken with meals to increase plasma concentration.
    - If mixed with acidic food or juice (e.g., orange juice, apple juice, applesauce) it may have a bitter taste.
  - TMEP use:
    - HIV Post Exposure Prophylaxis Protocol

**Nifedipine (Procardia®)**

- **WARNING**
  - GROUNDING medication for personnel on flight status
  - Description: An antianginal drug belonging to a class of pharmacological agents, the calcium channel blockers. It works by relaxing blood vessels so blood can flow more easily.
  - Indications:
    - HAPE prophylaxis/treatment.
    - Certain types of chest pain (angina). It may help to increase exercise tolerance and decrease the frequency of angina attacks. Use other medications (e.g., sublingual nitroglycerin) to relieve attacks of chest pain.
  - Contraindications: Known allergy to medication
  - Pregnancy Category C
  - Dose:
    - 10mg PO, then 20mg PO q 6hr.
• Side-effects: Primarily vasodilatory in nature (hypotension, peripheral edema)

• Warning:
  o Although, in most patients, the hypotensive effect of nifedipine is modest and well tolerated, occasional patients have had excessive and poorly tolerated hypotension.

• TMEP use:
  o Altitude Illness Protocol

Ofirmev® - see Acetaminophen

Ondansetron (Zofran®)

• GROUNDING medication for personnel on flight status
• Description: antiemetic
• Indications
  o Prevention of nausea and vomiting
• Adult dose:
  o Oral dose: 4-8mg PO tid up to 48 hrs
  o IV / IM dose: 4mg IV over 2-5 min or 4mg IM tid
• Pediatric dose:
  o Oral dose:
    ▪ Little information available on dosing in children <= 3 yrs
    ▪ 4-11 years of age: 4mg tid up to 48 hours
    ▪ >12 years of age: 4-8mg PO bid up to 48 hrs
  o IV dose:
    ▪ Little information available on dosing in children <= 2 yrs
    ▪ 2-12 years old and <40kg: single .1mg/kg IV dose over 2-5 min
    ▪ 2-12 Years and > 40kg: 4mg IV over 2-5 min
• Contraindications:
  o Hypersensitivity to any component of product
• Pregnancy Category B
• Side-effects:
  o Anxiety
  o Dizziness
  o Sedation/drowsiness
  o Headache
  o Malaise/fatigue
  o Chills/shivering
  o Constipation or diarrhea
  o Fever
  o Pruritis
  o Urinary retention
  o Musculoskeletal pain
  o Extrapyramidal symptoms
  o Arrhythmias
  o Hypotension
  o Chest pain
• Adverse reactions:
  o Elevated liver transaminases
  o Rare cases of hypersensitivity, sometimes severe (anaphylaxis) have been reported
  o Syncope (rare)
  o Grand mal seizures (rare)
  o Bronchospasm (rare)
  o Transient blurred vision (rare)
- Hypokalemia (rare)
- Rifampin may decrease ondansetron levels
- **TMEP use:**
  - *Nausea and Vomiting Protocol*

### Oral Fentanyl (Actiq Lozenge®)

#### WARNING
- **GROUNDING** medication for personnel on flight status
- **Description:** Opioid – Oral transmucosal fentanyl citrate.
- **Indications:** Severe battlefield related trauma pain
- **Dose:** 400-800mcg.
  - The blister package should be opened with scissors immediately prior to product use. The patient should place the ACTIQ unit in his or her mouth between the cheek and lower gum, occasionally moving the drug matrix from one side to the other using the handle. The ACTIQ unit should be sucked, not chewed. A unit dose of ACTIQ, if chewed and swallowed, might result in lower peak concentrations and lower bioavailability than when consumed as directed.
  - The ACTIQ unit should be consumed over a 15-minute period. Longer or shorter consumption times may produce less efficacy than reported in ACTIQ clinical trials. If signs of excessive opioid effects appear before the unit is consumed, the drug matrix should be removed from the patient’s mouth immediately and future doses should be decreased.
- **Contraindications:** Known allergy to medication
- **Pregnancy Category C**
- **Treatment of overdose:**
  - Ventilatory support
  - Intravenous access
  - Narcan (naloxone) or another opioid antagonist may be warranted in some instances, but it is associated with the risk of precipitating an acute withdrawal syndrome.
- **Side-effects:** The most serious adverse effects associated with all opioids are:
  - Respiratory depression (potentially leading to apnea or respiratory arrest)
  - Circulatory depression
  - Hypotension
  - Shock
  - All patients should be followed for symptoms of respiratory depression.
- **TMEP use:**
  - *Pain Management Protocol*

### Osmotrol® – See Mannitol

### Oxymetazoline HCl (Afrin® Nasal Spray)

- **Description:** Vasoconstrictor (decongestant)
- **Indications:** Use as an adjunct to valsala maneuver to clear ears and sinuses during compression and decompression.
- **Dose:** Spray into each nostril 2 times, twice daily. Not to exceed three consecutive days due to rebound congestion
  - **NOTE:** Do not tilt head backwards while spraying.
- **Contraindications:**
  - Severe damage to tympanic membrane/sinuses from barotrauma.
- **Pregnancy Category C**
- **Side-effects:**
  - Burning
  - Sneezing and stinging of nasal mucosa
- Adverse reactions:
  - Rhinitis
  - Rebound congestion

- TMEP use:
  - Epistaxis Protocol

**Phenergan®** - See Promethazine HCl

**Primaquine**

- Description: Antimalarial
- Indications: Used to prevent relapse of *P. vivax* and *P. ovale* malarias and to prevent attacks after departure from areas where *P. vivax* and *P. ovale* malarias are endemic.
- Dose: 30mg PO daily x 14 days beginning immediately after leaving the malarious area
  - Screen for G6PD deficiency prior to dispensing.
  - Give with food to prevent gastric irritation.
- **Contraindications:**
  - G6PD deficiency
  - Rheumatoid Arthritis
  - SLE
  - Pregnancy
- Pregnancy Category C
- Side-effects:
  - Darkening of urine
  - Fevers
  - Chills
  - Cyanosis
  - Nausea
  - Vomiting
  - Abdominal cramps
- Adverse reactions:
  - Visual disturbances
  - Hypertension
  - Anemia/leukopenia
  - Methemoglobinemia
- TMEP use:
  - Malaria Protocol

**Procardia®** - See Nifedipine

**Promethazine HCl (Phenergan®)**

- **WARNING** GROUNDING medication for personnel on flight status
- Description: Phenothiazine class. An H1 receptor blocking agent. Antihistamine, sedative, antimotion-sickness, antiemetic, and anticholinergic effects. The duration of action is generally from four to six hours. The major side-effect this drug is sedation.
- Indications:
  - Antihistamine for allergies
  - Anaphylactic reactions in addition to epinephrine.
  - Nausea
  - Vomiting
  - Motion sickness.
  - Antiemetic therapy
- Adult dose:
o Oral dose  
  ▪ Nausea / vomiting: The average adult dose is 25mg q 4 hr.  
  ▪ Motion sickness: The average adult dose is 25mg bid. The initial dose should be taken one-half to one hour before anticipated travel and be repeated 8-12 hours later if necessary. On succeeding days of travel, it is recommended that 25mg be given on arising and again before the evening meal.

o Parenteral: administered by deep IM injection  
  ▪ Nausea / vomiting: 12.5-25mg q 4-6 hr PRN. If taking narcotics or barbiturates, it may be necessary to reduce doses of those medications to prevent excess somnolence.  
  ▪ Motion sickness: 12.5-25mg; repeat PRN up to 4 times/day

• Pediatric dose:  
  o Oral dose:  
    ▪ Nausea / vomiting  
      • 2-12 years old: 1.1mg/kg of body weight. Do not exceed half of the suggested adult dose.  
      • Children < 2 years old: Contraindicated  
    ▪ Motion Sickness: Contraindicated in children
  o Parenteral: administered by deep IM injection  
    ▪ Nausea / vomiting:  
      • 2 to 12 years old: 12.5-25mg q 4-6hr PRN. If taking narcotics or barbiturates, reduce the dose to 1.1mg/kg.  
      ▪ Motion sickness: Contraindicated in children

• Contraindications:  
  o Children < 2 years old  
  o Comatose states  
  o Antiemetics should not be used in vomiting of unknown etiology in children.  
  o Asthma

• Pregnancy Category C

• Side-effects:
  o Drowsiness, sedation, sleepiness  
  o Anticholinergic effects – dry mouth, urinary retention, dry eyes, constipation  
  o Photosensitivity  
  o Bradycardia.  
  o Urticaria,  
  o Sedation  
  o Respiratory depression  
  o Hypotension  
  o Chest pain

• Adverse reactions:  
  o Lowers seizure threshold  
  o Extrapyramidal symptoms, dystonia  
  o May exacerbate glaucoma  
  o May exacerbate hypertension  
  o Cholestatic jaundice  
  o Arrhythmias

• Warning:  
  o Intra-arterial injection may result in gangrene of the affected extremity.  
  o Because of the potential for Phenergan to reverse epinephrine’s vasopressors effect, epinephrine should NOT be used to treat hypotension associated with Phenergan overdose.  
  o Subcutaneous injection or IV infiltration may result in tissue necrosis

• Other notes:  
  o Store at room temperature, between 15°-25° C (59°-77° F).  
  o Protect from light.
- Use carton to protect contents from light.
- Do not use if solution is discolored or contains a precipitate.
- IV administration may be hazardous and is NOT recommended

**TMEP use:**
- *Nausea and/or Vomiting Protocol*

**Proventil® – See Albuterol Inhaler**

**Pseudoephedrine (Sudafed®)**

- **Description:** Adrenergic class. Primary activity though α-effects on respiratory mucosal membranes reducing congestion, hyperemia, edema, and minimal bronchodilation secondary to β-effects.
- **Indications:**
  - Nasal decongestant
  - Adjunct in otitis media with antihistamines
- **Adult dose:**
  - 30-60mg q 4-6 hr PO
- **Pediatric dose:**
  - 6-12 years old: 30mg/dose PO q 4-6hr
  - 2-5 years old: 15mg/dose PO q 4-6hr
- **Contraindications:**
  - Hypersensitivity
  - Narrow angle glaucoma
- **Pregnancy Category C**
- **Precautions:**
  - Pregnancy
  - Cardiac disorders
  - Hyperthyroidism
  - Diabetes mellitus
  - Prostatic hypertrophy
  - Lactation
  - Hypertension
- **Side-effects:**
  - CNS: Tremors, anxiety, insomnia, headache, dizziness, hallucinations, seizures
  - CV: Palpitations, tachycardia, hypertension, chest pain, dysrrhythmias
  - EENT: Dry nose, irritation of nose and throat
  - GI: Nausea, vomiting, anorexia, dry mouth
  - GU: dysuria
- **Other notes:**
  - Do not use continuously, or more than recommended dose.
  - Rebound congestion may occur.
  - Avoid taking at bedtime, stimulation may occur.
- **TMEP use:**
  - Allergic Rhinitis/Hay Fever/ Cold Like Symptoms
  - Barotrauma Protocol

**Quinolones – General Antimicrobial Spectrum**

**WARNING**
Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

- 1st generation: Gram negative (excluding Pseudomonas), urinary tract only.
  - Example *nalidixic acid*
• 2nd generation: Gram negative (including Pseudomonas); *Staph aureus* but not *Pneumococcus*; some atypicals.
  - *Examples*: *ciprofloxacin*, *norfloxacin*, *ofloxacin*
• 3rd generation: Gram negative (including Pseudomonas); gram positive (including *Staph aureus* and *Pneumococcus*); expanded atypical coverage.
  - *Example*: *levofloxacin*
• 4th generation: Same as 3rd generation: plus broad anaerobic coverage.
  - *Examples*: *gatifloxacin*, *moxifloxacin*, *trovafloxacin*
• **Contraindications**: Known allergy to medication
• Pregnancy Category C

### Rabeprazole (Aciphex®)
- **Description**: GI agent – proton pump inhibitor (PPI)
- Gastric PPI that specifically suppresses gastric acid secretion by inhibiting the acid secretion in the cells of the stomach. Does not have H2 histamine receptor blocking properties.
- **Indications**: For healing and maintenance of erosive or ulcerative gastroesophageal reflux disease (GERD), duodenal ulcers and hypersecretory conditions.
- **Contraindications**:
  - PPI hypersensitivity
  - Pregnancy
- Pregnancy Category B
- **Adult dose**:
  - 20mg PO qd

**Pediatric dose**:
- *Contraindicated.*

- **Side-effects**:
  - Headaches
  - Nausea
  - Vomiting
  - Diarrhea
  - Abdominal cramps
  - ↑ temperature
- **Adverse reactions**:
  - Stevens-Johnson Syndrome
  - Toxic epidermal necrolysis (Fatalities have been reported.)
- **Other notes**:
  - This medication should be swallowed whole. It should not be crushed or chewed.
- **TMEP use**:
  - *Abdominal Pain Protocol*

### Ranitidine (Zantac®)
- **WARNING** Aviation personnel are grounded for 72 hours when taking an H2 blocker for the first time. There is no grounding period if aviation personnel have taken before without any no side-effects.
- **Description**: H2 blocker; ↓ secretion of stomach acid
- **WARNING** **NOTE**: Drug Interactions: ↓absorption of oral diazepam.
- **Indications**:
  - Gastric and/or peptic ulcers
  - Upper GI bleeds
  - Prevention of stress ulcers in burn victims or patients on steroid treatment.
  - Drug of choice for treatment of gastric or peptic ulcers.
Adjunct in treatment of urticaria and anaphylaxis.

- **Adult dose:**
  - 50mg IV / IM q 6-8hr for ulcers, burns, steroid use, upper GI bleeds, urticaria, or anaphylaxis.
  - Oral dose: 150mg bid for ulcer, urticaria.
- **Pediatric dose:** 1.5mg/kg IV x 1, then 0.75mg/kg IV q 12hr
- **Contraindications:**
  - Known/suspected liver disease
- **Pregnancy Category B**
- **Side-effects:**
  - Headache
  - Diarrhea
  - Constipation
  - Muscle aches
  - Vertigo
  - Malaise
  - Dry mouth
  - Nausea
  - Vomiting
- **Adverse reactions:**
  - Thrombocytopenia
  - Liver toxicity
- **TMEP use:**
  - Abdominal Pain Protocol
  - Anaphylactic Reaction Protocol
  - Chest Pain Protocol (Other Etiologies)

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**Retrovir®** - See AZT (Zidovudine)

**Rifadin®** – See Rifampin

**Rifampin (Rifadin®)**

**WARNING** Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

- **Description:** Inhibits DNA-dependent RNA polymerase
- **Class:** Bacteriacidal antibiotic
  - Indications:
    - Tuberculosis
    - Anthrax
    - Brucellosis
    - Asymptomatic carriers of *Neisseria meningitidis* to eliminate meningococci from the nasopharynx
  - MRSA soft tissue infections
- **Dose:**
  - 600mg PO bid
- **Contraindications:**
  - Liver dysfunction
- **Pregnancy Category C**
- **Side-effects/precautions:**
  - Hepatotoxic
    - Hepatitis
    - Jaundice
- Liver failure in severe cases
  - Respiratory
    - Shortness of breath
    - Wheezing
  - Cutaneous
    - Flushing
    - Pruritus
    - Rash
    - Redness and watering of eyes
  - Abdominal
    - Nausea
    - Vomiting
    - Abdominal cramps
    - Diarrhea
    - Jaundice
    - Flatulence

- Warnings:
  - Concomitant antacid administration may reduce the absorption of rifampin. Daily doses of rifampin should be given at least 1 hour before the ingestion of antacids.
  - Rifampin and its metabolites may impart a red-orange color to urine, feces, sputum, sweat and tears; soft contact lenses worn during rifampin therapy may become permanently stained

- TMEP use:
  - Cellulitis/ Cutaneous Abscess Protocol

Ritonavir and Lopinavir – See Kaletra®

Rocephin® (Ceftriaxone Sodium)

Salmeterol (Serevent®)

- Description: Long acting inhaled beta-2 adrenergic agonist; relaxes bronchial smooth muscle (bronchodilator)
- Indications:
  - Relief of asthma
  - Prevention/treatment of exercise-induced bronchospasm
  - Treatment for chronic obstructive pulmonary disease (COPD)
  - Nocturnal asthma
  - HAPE prophylaxis/treatment
- Adult dose:
  - 1 inhalation q 12hr (twice daily)
- Pediatric dose:
  - If more than 4 years of age, same as adult dose
- Contraindications:
  - Hypersensitivity to salmeterol or other beta-2 agonists
  - Pregnancy Category C
- Side-effects:
  - Dry mouth/throat (sugarless hard candy or ice chips will often relieve symptoms)
- Adverse reactions:
  - Cardiovascular: tachyarrhythmias
  - Neurologic: dizziness, headache, tremor
  - Respiratory: throat irritation, also exacerbation of asthma (severe)
• Caution:
  o This medication DOES NOT give immediate relief in the event of asthma attack or bronchospasm
  o This medication SHOULD NOT be used in combination with other long-acting inhaled beta-agonists (e.g., formoterol, salmeterol/fluticasone)
  o Milk allergy; milk protein in the inhalation powder formulation
• TMEP use:
  o Altitude Illness Protocol

**Sildenafil (Viagra®)**
- Class: PDE5 inhibitor.
- Action: Vasodilator with potential blood pressure lowering effects
- Dose: 50mg
- Contraindications:
  o Nitrates – Concomitant use of nitrates in any form. Tadalafil potentiates the hypotensive effects of nitrates
- Pregnancy Category B
- Side Effects:
  o Cardiovascular- angina pectoris, chest pain, hypotension, myocardial infarction, postural hypotension, tachycardia
  o Digestive - dry mouth, dysphagia, esophagitis, gastritis,
  o Ophthalmologic- blurred vision, conjunctivitis (including conjunctival hyperemia), eye pain
- Warnings:
  o Alpha Blockers: coadministration may potentiate the blood pressure lowering effects of alpha blockers.
  o Antihypertensive: coadministration may potentiate the blood pressure lowering effects of alpha blockers.
  o Antacids: simultaneous administration of antacids reduces the absorption of Cialis
  o Ritonavir and HIV Protease Inhibitors: Increased tadalafil absorption.
- TMEP Use:
  o Altitude Illness Protocol

**Sodium Bicarbonate**
- **WARNING** GROUNDING medication for personnel on flight status.
- Description: Alkalizing agent, electrolyte
- Action:
  o Sodium bicarbonate combines with hydrogen ions to form water and carbon dioxide
  o Buffers metabolic acidosis
  o Forces an intracellular shift of excess potassium in hyperkalemia
  o Increased pH
- Indications:
  o Severe metabolic acidosis in cardiac arrest refractory to ventilation
  o Tricyclic antidepressant overdose
  o Hyperkalemia
  o Alkalization agent for specific toxins (Salicylates, Phenobarbital)
- Dose:
- 1mEq/kg IV
- **Contraindications:**
  - Metabolic or respiratory alkalosis
  - Hypocalcemia
  - Hypokalemia
  - Hypernatremia
- Pregnancy Category C
- Side-effects/precautions:
  - Metabolic alkalosis may occur
  - Precipitates when mixed with calcium chloride or gluconate
  - May increase intracellular acidosis
  - May cause imbalance
  - May deactivate catecholamine
  - Large solute load may lead to fluid overload
- TMEP use:
  - *Crush Injury Protocol*

**Sudafed® - See Pseudoephedrine**

**Tadalafil (Cialis®)**

- **Class:** PDE5 inhibitor.
- **Action:** Vasodilator with potential blood pressure lowering effects
- **Dose:** 10mg
- **Contraindications:**
  - Nitrates – Concomitant use of nitrates in any form. Tadalafil potentiates the hypotensive effects of nitrates
- Pregnancy Category B
- **Side Effects:**
  - Cardiovascular - angina pectoris, chest pain, hypotension, myocardial infarction, postural hypotension, tachycardia
  - Digestive - dry mouth, dysphagia, esophagitis, gastritis,
  - Ophthalmologic- blurred vision, conjunctivitis (including conjunctival hyperemia), eye pain
- **Warnings:**
  - Alpha Blockers: coadministration may potentiate the blood pressure lowering effects of alpha blockers.
  - Antihypertensive: coadministration may potentiate the blood pressure lowering effects of alpha blockers.
  - Antacids: simultaneous administration of antacids reduces the absorption of Cialis
  - Ritonavir and HIV Protease Inhibitors: Increased tadalafil absorption.
  - Rifampin: reduced tadalafil absorption 46%. The reduced exposure of tadalafil with the coadministration of rifampin can be anticipated to decrease the efficacy of tadalafil for once daily use; the magnitude of decreased efficacy is unknown.
- **TMEP Use:**
  - *Altitude Illness Protocol*

**Tenofovir (Viread®)**

- **WARNING** GROUNDING medication for personnel on flight status.
- **Indications:** Treatment of HIV
- **Dose:**
  - 1 pill daily
- **Contraindications:** Known allergy to medication
- Pregnancy Category B
- **Side-effects:**
  - Immune system disorders
    - Allergic reaction
  - Metabolism and nutrition disorders
    - Lactic acidosis
    - Hypokalemia
    - Hypophosphatemia
  - Respiratory, thoracic, and mediastinal disorders
    - Dyspnea
  - Gastrointestinal disorders
    - Pancreatitis
    - Increased amylase
    - Abdominal pain
  - Hepatobiliary disorders
    - Hepatic steatosis
    - Hepatitis
    - Increased liver enzymes (most commonly AST, ALT gamma GT)
  - Skin and subcutaneous tissue disorders
    - Rash
  - Musculoskeletal and connective tissue disorders
    - Rhabdomyolysis,
    - Osteomalacia (manifested as bone pain and which may contribute to fractures)
    - Muscular weakness
    - Myopathy
  - Renal and urinary disorders
    - Acute renal failure
    - Nephrogenic diabetes insipidus
    - Renal insufficiency
    - Proteinuria
  - General disorders
    - Weakness
    - Fatigue
  - **TMEP use:**
    - HIV Post Exposure Prophylaxis Protocol

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**Tenofovir and Emtricitabine** – See Truvada®

**Tenofovir and Emtricitabine and Efavirenz** – See Atripla®

**Tequin®** – Gatifloxacin *(No longer used)*

**Tetracaine 0.5% Drops**

**WARNING** Aviation personnel are grounded for 12 hours after the use of local anesthetic and until symptoms have resolved enough to allow safe performance of duties.

- Description: Local anesthetic
- Indications: As a topical optic anesthetic (may aid in ocular exam to relieve blepharospasm); removal of foreign bodies
- **Dose:**
  - 1 or 2 drops – 2-3 minutes before procedure
- See appropriate TMEP

**Contraindications:**
- Not for prolonged use

**Pregnancy Category C**

**Side-effects:**
- Stinging
- Tearing
- Swelling
- Sensitivity to light

**Adverse reactions:**
- Conjunctival redness
- Transient eye pain
- Hypersensitivity reactions

**TMEP use:**
- Corneal Abrasion, Corneal Ulcer, Conjunctivitis Protocol

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**Toradol® – See Ketorolac**

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**Tranexamic Acid (Cyklokapron®)**

- **Class:** Antifibrinolytic agent.
- **Action:** Competitive inhibitor of plasminogen activation → stabilizes clots.
- **Indications:**
  - (Off label) Combat casualties at high risk for requiring massive blood transfusion (e.g.: presenting with hemorrhagic shock, penetrating torso trauma, multiple major amputation, or clinical evidence of severe blood loss).
- **Dose:** Adult 1 gm IV/IO for two doses
- **Contraindications:**
  - Subarachnoid hemorrhage.
  - Active intravascular clotting.
  - Known hypersensitivity
- **Pregnancy Category B**
- **Side Effects:**
  - Cardiovascular: angina pectoris, chest pain, hypotension, myocardial infarction, postural hypotension, tachycardia
  - Digestive: dose related nausea, vomiting, and diarrhea.
  - Ophthalmologic: blurred vision, conjunctivitis (including conjunctival hyperemia), eye pain
- **Warnings:**
  - Rapid administration may result in hypotension.
  - Do not coadminister with blood products or Hextend.
  - Do not administer more than 3 hours after injury.
- **TTP Use:**
  - Tactical Field Care and Tactical Evacuation Care protocols

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**Trimethoprim-Sulfamethoxazole (TMP-SMZ, Bactrim®, Septra®)**

**WARNING** Aviation personnel are grounded for the initial 24 hours of antibiotic therapy and until the medical condition no longer interferes with safely performing aviation duties and the patient is free of side-effects.

- **Description:** Antimicrobial – antibacterial, sulfonamide
- **Action:**
  - Fixed combination of TMP and SMZ, synthetic folate antagonists and enzyme inhibitors that prevent bacterial synthesis of essential nucleic acids and proteins; effective against
**Pneumocystis carinii** pneumonia, Shigellosis enteritis, most strains of enterobacteriaceae, *Nocardia, Legionella micdadei, and Legionella pneumophila, and Haemophilus ducreyi*

- **Indications:**
  - Cellulitis
  - Enteritis
  - Urinary tract infections
- **Adult dose:** 160mg TMP/800mg SMZ (DS) PO bid
- **Contraindications:**
  - TMP, SMZ, sulfonamide, or bisulfite hypersensitivity
  - Group A beta-hemolytic streptococcal Pharyngitis
  - Use caution with severe allergy or bronchial asthma
  - G6PD deficiency
  - Pregnancy
- **Pregnancy Category C**
- **Adverse effects:**
  - Rash
  - Toxic epidermal necrolysis
  - Nausea and vomiting
  - Diarrhea
  - Pseudomembranous enterocolitis
  - Abdominal pain
- **TMEP use:**
  - Cellulitis/Cutaneous Abscess Protocol
  - Urinary Tract Infection Protocol

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**Truvada® (Emtricitabine and Tenofovir)**

- **WARNING**
  - GROUNDING medication for personnel on flight status.
- **Indications:** Treatment of HIV
- **Dose:**
  - Adult Dose: 1 tablet daily
- **Contraindications:** Known allergy to medication
- **Pregnancy Category B**
- **Side-effects:**
  - General
    - Fatigue
  - Infections
    - Sinusitis
    - Upper respiratory infections
    - Nasopharyngitis
  - CNS
    - Headache
    - Dizziness
  - Psychiatric
    - Depression
    - Insomnia
  - Immune system disorders
    - Allergic reaction
  - Metabolism and nutrition disorders
    - Lactic acidosis
    - Hypokalemia
    - Hypophosphatemia
  - Respiratory, thoracic, and mediastinal disorders
    - Dyspnea
  - Gastrointestinal disorders
- Pancreatitis
- Increased amylase
- Abdominal pain
- Nausea
- Vomiting
- Diarrhea

  - Hepatobiliary disorders
    - Hepatic steatosis
    - Hepatitis
    - Increased liver enzymes (most commonly AST, ALT gamma GT)
    - Jaundice
  - Skin and subcutaneous tissue disorders
    - Rash
  - Musculoskeletal and connective tissue disorders
    - Rhabdomyolysis
    - Osteomalacia (manifested as bone pain and which may contribute to fractures), muscular weakness, myopathy
  - Renal and urinary disorders
    - Acute renal failure
    - Nephrogenic diabetes insipidus
    - Renal insufficiency
    - Proteinuria
    - Polyuria

- General disorders and administration site conditions
  - Fatigue

- Other notes:
  - Store at 25° C (77° F), excursions permitted to 15–30° C (59–86° F).
- TMEP use:
  - HIV Post Exposure Prophylaxis Protocol

**Tylenol®** – See Acetaminophen

**Valium®** - See Diazepam

**Ventolin®** – See Albuterol Inhaler

**Versed®** – See Midazolam

**Viagra®** - see Sildenafil

**Viread®** - See Tenofovir

**Viracept®** – See Nelfinavir

**Xylocaine®** – See Lidocaine HCL

**Z- Pak®** - See Azithromycin

**Zantac®** – See Ranitidine

**Zidovudine** - See AZT
Zithromax® – See Azithromycin

Zofran® – See Ondansetron

Zidovudine (AZT, ZDV) and Lamivudine - See Combivir®

Zymar® – See Gatifloxacin 0.3% Ophthalmic Liquid
# 2012 Joint Formulary Authors

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1. General

A. Trauma care guidelines have been implemented for human combatants in the U.S. military, but appropriate parallel guidelines have not been established for multipurpose canines (MPCs) used by the U.S. Special Operations Command. Canine Tactical Combat Casualty Care (C-TCCC) guidelines were developed to align recommendations for canines with published TCCC guidelines familiar to military personnel. These C-TCCC guidelines should assist in standardization of care to these unique patients, while evolving to apply updated knowledge or new technologies to tactical care of these unique force assets.

B. Multipurpose canines (MPCs) are increasingly used by the U.S. Special Operations Command as a force multiplier, serving as team members due to their exceptional skills in personnel, explosive, and contraband detection. Tactical Combat Casualty Care (TCCC) guidelines have been developed and successfully implemented for human combatants, with documented reduction in lives lost. Training in TCCC has led to questions by special operations medics and other USSOCOM personnel regarding the applicability of TCCC guidelines to their canine counterparts.

C. Historical and epidemiological data regarding disease and injury in working dogs is very important in determining conditions associated with high mortality. However, a formalized system of data collection for tracking battlefield medical injuries in MPCs has not been established due to the relatively new use of these assets by USSOCOM. Compared to humans, the different size, stature, locomotion, and proportional conformation of torso-to-limbs for dogs suggest that the anatomic location or nature of battlefield injury will also differ between humans and canines. Differences in physiology and pharmacokinetics between humans and canines also dictate review of guidelines before assuming general applicability.

D. To improve field management of MPC medical issues and develop applicable guidelines, an initial meeting was held in Tampa, FL, at the 2009 Special Operations Medical Association (SOMA) conference to form a committee that would address this need and develop Canine-TCCC (C-TCCC) guidelines.

E. For continuity and uniformity, these guidelines have been developed using the TCCC guidelines as a template. Phases of Care have been used consistent with the most current guidelines and includes Care Under Fire, Tactical Field Care, and Tactical Evacuation Care (combining MEDEVAC and CASEVAC Care). Major differences between canine and human care guidelines are emphasized.

F. The C-TCCC Guidelines are found in Appendix H.

2. Hemostatic Agents. The benefits of hemostatic agents have been demonstrated in animal models, although not published specifically in a canine model. It is assumed that these benefits, as well as potential side-effects, would be similar for canine as for human combatants.

3. Pharyngeal and Surgical Airways

A. Airway management in working canines must be balanced between the need for adequate patient ventilation and safety of individuals working on/near the canine patient. Human safety usually necessitates muzzling of the canine patient, but muzzling restricts airflow to the patient, interferes with cooling mechanisms (i.e. panting), and increases the risk of aspiration if the canine vomits. Muzzling may not be required if the patient is unconscious or sedated.

B. Laryngeal mask airways are not designed to be used with the canine anatomy and are typically unable to establish the necessary seal for safe and effective use. Proper head and neck placement can facilitate airflow. As with human patients, pulling the MPC’s tongue forward can help open airways. Intubation should be attempted in the unconscious MPC before performing a surgical tracheotomy. Be prepared to remove the endotracheal tube if the MPC regains consciousness.
C. Trauma to the head, pharynx, and/or larynx may compromise airflow and be life-threatening. Surgical tracheotomy may be indicated although placement of a large bore needle into the tracheal lumen may provide a sufficient supplemental air portal.

4. **Tension Pneumothorax.** Thoracic trauma is common in working canines on the battlefield. Tension pneumothorax may be more rapidly fatal in the canine, compared to humans, due to the fenestrated mediastinum found in most dogs, resulting in bilateral lung collapse. Patients in distress from pneumothorax, regardless of cause, are best managed by evacuating free pleural air and therefore, reestablishing normal thoracic pressure gradients. Wounds or thoracic wall defects should be sealed and covered. The canine hair coat makes obtaining a proper chest seal difficult. Reinforcement with additional dressings may be required to ensure a proper seal. Free pleural air can be evacuated with a syringe attached to a stopcock and connector tubing (if available) and small-bore (14 gauge or less) catheter or needle. Care must be taken not to produce additional lung trauma during thoracocentesis. The use of chest tubes in the C-TCCC model is not recommended. This care should occur further up the echelons of care.

5. **Intravenous (IV) Access and Intraosseous (IO) Infusion**
   a. Hemorrhagic shock is a recognized need for fluid resuscitation. Special Operations medics may have training in emergency placement of IV fluids in canine patients, but IV placement may be difficult in shock due to vasoconstriction. Catheters or needles that are larger than 18-gauge are typically too large for placement in peripheral (leg) veins in canine casualties. Historically, fluid therapy at point of injury has not been instrumental in survival rates of MPCs due to rapid evacuation times. New mission profiles may make this capability necessary in the future.
   b. Intraosseous devices using a manubrium route, while proven successful in combat on human casualties, have had little evaluation or use in canine patients. Military veterinarians can advise and train SOF medics on canine anatomic landmarks to aid in the successful use of IO devices in the tibial tuberosity, humeral head, or iliac crest. It is recommended that SOF medics do not place IO devices unless previously trained by a military veterinarian.

6. **Fluid Resuscitation.** Physiologic principles of fluid resuscitation are applicable to canine casualties. Colloid administration has been demonstrated to be effective in dogs and is used in civilian veterinary critical care. The effect of hetastarch products on platelet aggregation times has been documented in dogs, as in people, but its clinical impact is considered minimal and not a deterrent to judicious use.

7. **Battlefield Antibiotics.** The use of prophylactic antibiotics for canine patients with trauma and open wounds is routine, as it is with human patients. Antibiotic spectrum is generally similar as selected for human patients due to similarity in potential wound pathogens. Pharmacokinetics, e.g. absorption and excretion, of antibiotics in dogs often differs from humans. General extrapolations such as “Always use a human pediatric dose (e.g. for 35-40kg) for a working dog” or “Always use an adult human dose for an adult working dog” are invalid. The committee has sought to make recommendations in accordance with TCCC guidelines, making adjustments to ensure adequate systemic antibiotic concentrations in a typical MPC patient.

8. **Battlefield Analgesics.** Analgesia and pain management are advocated for the humane medical care of canine patients, but drug options are somewhat limited. Products beneficial in humans may be impractical for canine patients, e.g., oral transmucosal fentanyl citrate (OTFC) lozenges, or potentially toxic, e.g., acetaminophen. Among analgesics available to combatants through routine medical supply channels, morphine was considered by the committee to be the most practical analgesic for battlefield use in canine patients. Due to marked differences in metabolism and effect of opiates between species, significantly higher doses of morphine are required for dogs than people (on a mg/kg basis). Morphine is considered a respiratory depressant in dogs, although there may be initial respiratory stimulation. Dogs
are sensitive to the emetic effects of morphine, and handlers should be prepared to immediately remove
the muzzle after morphine administration to reduce the risk of aspiration.

9. Oxygen Administration and Patient Monitoring. The committee recognized that oxygen support
may not be available on or near the battlefield, and most canine casualties will not require oxygen in the
phases of care addressed in these guidelines. The potential for thoracic trauma however necessitates
prudent patient monitoring of oxygenation. Pulse oximetry, using instrumentation for human casualties, is
considered an effective indirect measurement of oxygen saturation in critical canine patients. Oximeter
readings, however, are impaired by the configuration of the sensor, hair, or poor peripheral vascular flow.
Measurements should be taken on the tongue (most reliable), ear, prepuce, or vulva. If the patient is
intubated, a handheld capnography device can be utilized on the end of the endotracheal or tracheotomy
tube to monitor end tidal CO₂ and respirations.

10. Blood Products. Canine blood (erythrocyte) antigens compose more than a dozen blood group
systems, which differ from human blood types. Limited product availability and projected need makes the
use of prepared canine blood products impractical. Although dog-to-dog transfusion may be considered
by a military veterinarian at higher levels of care, evaluation of major and minor incompatibility should
nevertheless be performed by the veterinarian. Non-military or native dogs should not be used as blood
donors due to the risk of transmission of blood-borne parasites and disease transmission, e.g., rabies.

11. Hypothermia on the Battlefield. Hypothermia is a documented independent predictor of mortality in
combat, and management of hypothermia has been added to recent TCCC guidelines. In the face of
hypothermia, non-human mammals are generally more adept at maintaining core body temperature than
humans. However, sedation, loss of consciousness, and trauma in MPCs can blunt these protective
mechanisms. The smaller body size of canine patients facilitates the use of issued or improvised
warming or protective blankets to keep the patient warm and dry.

12. Burns. Burn injury is infrequent in military dogs due to the lack of flammable clothing or outer
garments and the protective nature of the dog’s natural haircoat. As such, the committee has elected to
omit this topic as a part of guidelines for standard battlefield care. Burns on canine patients may be
covered with dry, sterile dressings. Additional care includes preventing hypothermia, airway
management, and providing aggressive fluid management and analgesia to the canine burn patient.

13. Tourniquets

   a. Tourniquet use is a recognized life-saving method in the TCCC guidelines, preventing
      exsanguination following vascular injury to the extremities. Canine extremities are a smaller proportion of
      body composition than in people, and while preliminary data shows that extremity injuries are the most
      common canine battlefield injury, they are less likely to be life threatening than a similar injury in a person.
      Tactical experience has shown that nearly all canine extremity bleeding can be controlled through the use
      of pressure dressings and hemostatic agents. Historically, tourniquets have rarely, if ever, been needed
to control extremity bleeding in the MPC.

   b. Life-threatening exsanguinating injuries to canines are more likely to occur in non-compressible
      areas such as the thorax or abdomen. Furthermore, proper tourniquet application can be hindered by the
      tapered shape of the canine leg and the width of many commercially available tourniquets potentially
      carried by combatants, resulting in venous but not arterial occlusion.

   c. Commercially available tourniquets, e.g., combat application tourniquet or Special Operations
      force tactical tourniquet, can be effective in canine limb injury if properly placed and secured above a
      bony protuberance, e.g., olecranon or greater trochanter. Improvised tourniquets can also be applied
      successfully. Tourniquets should not remain in place for more than 2 hours, and ideally less than one
      hour to minimize risk of peripheral neuropathy.
d. As noted in TCCC guidelines, appropriate training in tourniquet use on the battlefield is essential to their successful use. Canine handlers and medics should therefore understand the limitations and potential benefit of tourniquet use.

14. Input and Future Directions

A. These guidelines represent an important, but only an initial step, in support of MPCs. Feedback from handlers and first-responders is critical to properly adjust guidelines to current battlefield experiences and evidence-based medicine. USSOCOM veterinary personnel will be responsible for incorporation of the C-TCCC guidelines into appropriate training and training materials for the command.

B. Other DoD working dogs are ably supported by U.S. Army veterinary personnel, including clinical specialists at the DoD Military Working Dog Veterinary Services, Lackland AFB, TX, the Army Medical Department Center & School, Ft. Sam Houston, TX, U.S. Public Health Command, and the DoD Veterinary Services Activity. Representatives of these organizations serve on the C-TCCC committee to assist in harmonization of medical recommendations for all working dogs supporting U.S. armed forces.

C. This group will also help identify canine medical issues appropriate to military or civilian R&D efforts and resourcing.

15. MPC Resuscitative Care By Non-Veterinary Providers

A. MPC handlers will be trained to provide immediate lifesaving care for their dogs as outlined in the current Military Working Dog (MWD) Handler’s Handbook as published by the DOD MWD Veterinary Services at Lackland AFB, TX.

B. SOF medics will provide immediate lifesaving care, emergency, and nonemergency care to the MPC within the scope of veterinary practice for which they have been trained.

C. Advanced human healthcare providers (physicians, physician assistants, nurse practitioners, etc.) will only provide initial resuscitation of sick or combat-injured dogs in theater as outlined in the Clinical Management of Military Working Dogs Clinical Practice Guidelines (CPG) without veterinary supervision or oversight.

D. Human healthcare providers may provide other emergency and non-emergency care to MPCs only when supervised by, or at the direction of, a veterinarian.

E. Once the sick or injured MPC is stabilized, all efforts will be made to evacuate the MPC to the appropriate level of veterinary care.


G. Copies of the Military Working Dog Handler’s Handbook are available through the DOD MWD Veterinary Services located at Lackland AFB, TX, the local U.S. Army Veterinary Treatment Facility, or the Medical Detachment, Veterinary Services for deployed MPCs.
APPENDIX H

C-TCCC GUIDELINES

Care Under Fire: Actions taken while still engaged by the enemy.

1. Return fire/take cover
2. Expect Multi-Purpose Canine (MPC) casualty to remain engaged as a combatant, if appropriate
3. Move MPC casualty to cover
4. Muzzle the MPC casualty if airway is not compromised
5. Try to keep the MPC casualty from sustaining additional wounds
6. Remove from burning buildings or vehicles to relative safety if it does not endanger the force. Do what is necessary to stop the burning process.
7. Airway management is generally best deferred until the Tactical Field Care phase
8. Stop life-threatening external hemorrhage if tactically feasible, using pressure bandages and hemostatic agents.

Tactical Field Care: Actions taken when no longer engaged by the enemy.

1. If not already done, muzzle the MPC casualty if airway is not compromised
2. Airway management:
   A. Make sure the neck is reasonably straight; try to bring the head in-line with the neck.
   B. If MPC is unconscious, pull tongue forward to help open airway. If that is unsuccessful, attempt to intubate the MPC before performing a surgical tracheotomy.
   C. If previous measures are unsuccessful, perform needle or surgical tracheotomy (with lidocaine if conscious)
3. Respiration:
   A. Consider tension pneumothorax and decompress with needle thoracocentesis if casualty has torso trauma and respiratory distress
   B. Sucking chest wounds should be treated by applying a chest seal during expiration and monitoring for development of a tension pneumothorax.
4. Circulation:
   Assess for unrecognized hemorrhage and control all sources of bleeding using pressure bandages or hemostatic agents if available.
5. Peripheral intravenous (IV) access:
   A. Start an 18-gauge IV or saline lock, if indicated, or if evacuation times are extended.
   B. If resuscitation is required and IV access is not obtainable, use the intraosseous (IO) route
6. Fluid resuscitation:
   A. If not in shock: no IV fluids necessary
   B. If in shock: colloids (250ml IV bolus), repeat once after 30 minutes if still in shock, no more than 500ml colloids
   C. Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties
   D. Reassess for fluid resuscitation for extended CASEVAC times
7. Prevention of hypothermia:
   A. Minimize casualty’s exposure to the elements.
   B. Apply/wrap in a rescue or heat blanket, as needed
C. If mentioned gear is not available, use dry blankets, poncho liners, sleeping bags, body bags, or anything that will retain heat and keep the casualty dry.

8. Monitoring:
   A. Pulse oximetry should be available as an adjunct to clinical monitoring.
   B. Place on tongue, ear, flank, or other nonpigmented, highly vascular (hairless) area.
   C. Readings may be misleading in the settings of shock or marked hypothermia.
   D. If dog is intubated, use a handheld capnography device to monitor end tidal CO₂ and respirations.

9. Inspect and dress known wounds.

10. Check for additional wounds.

11. Analgesia, sedation & patient control as necessary
   A. Morphine sulfate, 30-50mg IM, (primary analgesia), monitor for respiratory depression;

   CAUTION: Morphine can cause vomiting. Be prepared to remove muzzle.

12. Splint fractures and recheck pulse of the affected limb.

13. Antibiotics: recommended for all open combat wounds
   A. If able to take PO: Moxifloxacin (400mg orally qd)
   B. If unable to take PO (shock, unconsciousness): Cefotetan, 1g IV (slow push over 3-5 minutes) or IM every 8 hours, or Ertapenam, 0.5g IV or IM every 12 hours.

14. Cardiopulmonary resuscitation should not be attempted as it is rarely effective due to:
   a. Massive noncompressible thoracic hemorrhage.
   b. Massive noncompressible abdominal hemorrhage.
   c. Severe head injury leading to respiratory and cardiac arrest.
   d. Massive pulmonary contusions leading to respiratory and cardiac arrest.
   e. Tension pneumothorax, which should be treated by needle decompression.

15. Document clinical assessments, treatments rendered, and changes in casualty’s status. Forward this information with the MPC casualty to the next level of care.

Tactical Evacuation (TACEVAC) Care: Actions taken when the injured patient is being evacuated from the point of injury.

1. Airway management:
   A. Make sure the neck is reasonably straight; try to bring the head in-line with the neck. If the MPC is unconscious, pull tongue forward to help open airway. If that is unsuccessful, attempt to intubate the MPC before performing a surgical tracheotomy.
   B. If measures above are unsuccessful, perform a surgical tracheotomy (with lidocaine if conscious).

2. Respiration:
   A. Consider tension pneumothorax and decompress with needle thoracocentesis if casualty has torso trauma and respiratory distress.
   B. Most MPC casualties do not require oxygen, but administration of oxygen may be of benefit.

3. Circulation:
   A. Assess for unrecognized hemorrhage and control all sources of bleeding using pressure bandages or hemostatic agents as needed.
4. Peripheral IV access:
   A. Reassess need for peripheral IV access—if indicated, start an 18-gauge IV or saline lock; if resuscitation is required and IV access is not obtainable, use IO route

5. Fluid resuscitation:
   A. Reassess for hemorrhagic shock; altered mental status (in the absence of brain injury), and change in pulse character
   B. If not in shock: no IV fluids necessary
   C. If in shock: colloids (250ml IV bolus), repeat once after 30 minutes if still in shock, no more than 500ml colloids

6. Prevention of hypothermia:
   A. Minimize casualty's exposure to the elements.
   B. Continue heat or rescue blanket(s), but limit warming of TBI casualties
   C. Utilize portable fluid warmers on all IV sites if possible
   D. Protect the casualty from wind if doors must be kept open

7. Monitoring:
   Institute electronic monitoring of pulse oximetry and vital signs if indicated

8. Inspect and dress known wounds if not already done

9. Check for additional wounds

10. Analgesia, sedation & patient control as necessary
    A. Morphine sulfate, 30-50mg IM, (primary analgesia) monitor for respiratory depression

   CAUTION: Morphine can cause vomiting. Be prepared to remove muzzle.

11. Reassess fractures and recheck pulses of the affected limb(s).

12. Antibiotics: recommended for all open combat wounds
    A. If able to take PO: moxifloxacin (400mg orally qd)
    B. If unable to take PO (shock, unconsciousness): Cefotetan, 1g IV (slow push over 3-5 minutes) or IM q 8 hours, or ertapenem, 0.5g IV or IM q 12 hours

13. Document clinical assessments, treatments rendered, and changes in casualty’s status. Forward this information with the MPC casualty to the next level of care