11TH EDITION

ADVANCED TACTICAL PARAMEDIC PROTOCOLS HANDBOOK®

U.S. SPECIAL OPERATIONS COMMAND's

Tactical Trauma Protocols

Tactical Medical Emergency Protocols

Recommended Drug List

Canine Tactical Combat Casualty Care

PLUS . . . Burn Quick Reference Guide and Nerve Charts

U.S. SPECIAL OPERATIONS COMMAND's

Tactical Trauma Protocols (TTPs)
Prolonged Casualty Care Guidelines (PCC)
Tactical Medical Emergency Protocols (TMEPs)
Recommended Drug List (RDL)
Canine/K9 Tactical Combat Casualty Care Guidelines (C-TCCC)
Burn Quick Reference Guide and Nerve Charts

For SPECIAL OPERATIONS ADVANCED TACTICAL PARAMEDICS (SO-ATPs)

USSOCOM OFFICE OF THE COMMAND SURGEON
DEPARTMENT OF EMERGENCY MEDICAL SERVICES AND PUBLIC HEALTH
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Previously know as: Journal of Special Operations Medicine's Training Supplement (2007–2012) and Journal of Special Operations Medicine Advanced Tactical Paramedic Protocols Handbook (2012–2021).

Disclaimer: The Advanced Tactical Paramedic – Protocols (ATP-P) Handbook is a resource for Special Operations Forces (SOF) medical personnel with advanced skills and knowledge, operating in tactical, remote or austere environments. The purpose of the handbook is to provide these medical professionals a resource that outlines the latest techniques and procedures used in the Special Operations community.

The USSOCOM Tactical Trauma Protocols (TTPs), Tactical Emergency Medical Protocols (TMEPs), and the TMEPs Drug List outlined in this handbook are peer-reviewed for accuracy, currency, and applicability by the authors and the publisher. Best efforts have been used in preparing these protocols by the USSOCOM and the Curriculum and Examination Board (CEB) authors. The publisher, Breakaway Media, LLC, makes no representations or warranties of any kind and assumes no liabilities of any kind with respect to the accuracy or completeness of the contents. The publisher shall not be held liable or responsible to any person or entity with respect to any loss or incidental or consequential damages caused, or alleged to have been caused, directly or indirectly, by the information contained herein. Loss or damage include, but are not limited to, loss of life, limb, eyesight, or mobility. This publication is intended to be used by qualified medical personnel in the treatment of injuries to persons and working dogs under their care. It is not intended to be used by unqualified persons or persons without proper medical training.

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SECTION 1
Tactical Trauma Protocols (TTPs)

USSOCOM Tactical Combat Casualty Care Tactical Trauma Protocols (TTPs)

Preface

The USSOCOM Tactical Trauma Protocols (TTPs) in many ways mirror the DoD Defense Health Board (DHB) Committee on Tactical Combat Casualty Care (CoTCCC) 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. The additional items are in green font.

Changes in 2012:

- Added the Junctional Emergency 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 to the anterior axillary line
- Modified the USSOCOM severe TBI management guidelines to establish consistency with the new TBI guidelines
- Authorized use of an incompletely blood collection bag as long as the total infusion time remains the same as that of a completely filled blood collection bag

Changes in 2014:

- Added e-mail address for suggested changes
- Added Abdominal Aortic & Junctional Tourniquet – AAJT™ and SAM® Junctional Tourniquet
- Added additional characteristic recommendation for supraglottic airways
- Revised the Administration of Blood and Blood Components Protocol to allow for routine transfusion of low titer type O whole blood as a functional "universal donor" and untitered type O fresh whole blood *in extremis*
- Removed recommendation for premedication with epinephrine and/or diphenhydramine from the Administration of Blood and Blood Components Protocol
- Minor changes to Crush Syndrome Protocol and added an example Crush Injury Kit

- Updated all canine treatment guidelines
- Added Open Globe Injury Protocol

Changes in 2016–2019:

- Updated USSOCOM Tactical Trauma protocols to reflect most CoTCCC TCCC Guidelines for Medical Personnel dated 1 August 2019
- Changed recommendation to replace air with saline in endotracheal tube cuffs to DO NOT replace air with saline in endotracheal tube cuffs
- Added "Only use air in the endotracheal tube cuffs. Use a cuff manometer to monitor cuff pressures during air evacuation and adjust volumes as needed"
- Added Prolonged Field Care (PFC) Considerations
- Added warning that "Once you begin transfusion type O blood, if the patients' blood type is not type O you may not switch to any other type" to the Administration of Blood and Blood Products Protocol
- Added field emergency donor panel questionnaire and triage tool to the Administration of Blood and Blood Products Protocol
- Added warnings for the administration of calcium gluconate
- Corrected calcium gluconate dosage for Administration of Blood and Blood Products Protocol
- Added Golden Minute Container to Administration of Blood and Blood Products protocol packing list
- Corrected calcium gluconate dosage for Crush Injury Protocol
- Added warnings for the administration of mannitol
- Changed number of vials of calcium gluconate in Crush Injury Kit
- Removed mannitol IV filters to the Crush Injury Kit for the safe administration of mannitol
- Updated Concussion Management in Deployed Settings charts to most current version and added new MACE2 exam chart
- Corrected contraindications for ketamine
- Removed Pneumatic Antishock Garment (PSAG)
- Standardized the wording for the administration of fosphenytoin (Cerebyx®) throughout.
- Revised prohibition against donating blood again for 56 days to no wait time if the blood is reinfused into the donor
- Removed recommendation to administer 500mL of Hextend® to blood donors and replaced with; If donor is expected to perform physical labor such as in a tactical situation. Have donor drink 500mL of oral rehydration salts (ORS) mixed in a ratio of 1 packet in 1000mL of potable water.
- Added provisions and guidance to infuse an incompletely filled blood collection bag
- Removed mannitol from the Crush Syndrome Protocol due to lack of practicality
- Modified analgesia guidelines to provide more options and to match the Pain Management Protocol (TMEPs)

Changes in 2019–2021

➤ Updated C-TCCC dated 1 October 2019 and USSOCOM Tactical Trauma protocols to reflect most current CoTCCC TCCC Guidelines for Medical Personnel dated 15 December 2021.

Summary of 2021 TCCC Changes:

3. Massive Hemorrhage
   b. "CoTCCC-Recommended" is removed from junctional tourniquets. No specific products are recommended by the CoTCCC. End users should select any FDA approved device that is indicated for junctional hemorrhage control.
4. Airway Management
   d. Removes Cric-Key technique as preferred option for surgical cricothyroidotomy and remove "least desirable option" from the standard open surgical technique. Units and end users should use the technique they are best trained to execute. Airway Notes: Removes iGel as the preferred extraglottic airway. Units may still use iGel if mission are at high elevation or evacuation is at high altitudes.
6. Analgesia – adjust Ketamine IV/IO dosing to 20–30mg (or 0.2–0.3mg/kg)
12. Inspect and dress known wounds
   b. Adds the preference of cleaning abdominal evisceration with clean and warm water if possible; clarifies guidance on conditions to attempt reduction of abdominal contents; that patient should remain NPO and NOT be administered oral medicals (Combat Wound Medication pack) and removes prolonged care considerations (now covered in separate PCC guidelines).

➤ The 11th Ed of our A*dvanced Tactical Paramedic Protocols Handbook* updates include:

Section 1 – *Tactical Trauma Protocols (TTPs)* – updated CoTCCC-TCCC Guidelines to reflect the committee's current version dated 15 December 2021; also in Section 1, the *Prolonged Casualty Care (PCC)* formally known as the Prolonged Field Care (PFC) section has been vastly updated to reflect their version dated 21 December 2021.

Section 4 has been significantly updated with the *Canine/K9 C-TCCC* updates dated 1 October 2019.

The acronym **MARCH/PAWS** is recommended to guide the priorities in the Care Under Fire (control of life-threatening hemorrhage only) and Tactical Field Care phases:

Massive hemorrhage – Control life-threatening bleeding.
Airway – Establish and maintain a patent airway.
Respiration – Decompress suspected tension pneumothorax, seal open chest wounds, and support ventilation/oxygenation as required.
Circulation – Establish IV/IO access and administer fluids as required to treat shock.
Head injury/**H**ypothermia – Prevent/treat hypotension and hypoxia to prevent worsening of traumatic brain injury and prevent/treat hypothermia.
Pain – Administer appropriate analgesia or sedation to manage pain.
Antibiotics – Administer battlefield antibiotics for early prevention of infection.
Wounds – Assess and dress additional wounds and check prior interventions.
Splinting – Splint all fractures or provide support to limb dressings.

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 appropriate.
3. Direct casualty to move to cover and apply self-aid if able or when tactically feasible, move or drag casualty to cover.
4. Try to keep the casualty from sustaining additional wounds.
5. Casualties should be extricated from burning vehicles or buildings and moved to places of relative safety. Do what is necessary to stop the burning process.
6. Stop life-threatening external hemorrhage if tactically feasible:
   a. Direct casualty to control hemorrhage by self-aid if able.
   b. Use a CoTCCC-recommended limb tourniquet for hemorrhage that is anatomically amenable to tourniquet use.
   c. Apply the limb tourniquet over the uniform clearly proximal to the bleeding site(s). If the site of the life-threatening bleeding is not readily apparent, place the tourniquet "high and tight" (as proximal as possible) on the injured limb and move the casualty to cover.
7. Airway management is generally best deferred until the Tactical Field Care phase.

Basic Management Plan for Tactical Field Care

1. **Establish a security perimeter in accordance with unit tactical standard operating procedures and/or battle drills. Maintain tactical situational awareness.**
2. **Triage casualties as required. Casualties with an altered mental status should have weapons and communications equipment taken away immediately.**

3. Massive Hemorrhage

a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended limb tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet use or for any traumatic amputation. Apply directly to the skin 2–3 inches above the bleeding site. If bleeding is not controlled with the first tourniquet, apply a second tourniquet side-by-side with the first.

b. For compressible (external) hemorrhage not amenable to limb tourniquet use or as an adjunct to tourniquet removal, use Combat Gauze™ as the CoTCCC hemostatic dressing of choice.

Alternative hemostatic adjuncts:

i. Celox Gauze™ or
ii. ChitoGauze® or
iii. XStat™ (best for deep, narrow-tract junctional wounds)
iv. iTClamp (may be used alone or in conjunction with hemostatic dressing or XStat™)

c. Hemostatic dressings should be applied with at least 3 minutes of direct pressure (optional for XStat™). Each dressing works differently, so if one fails to control bleeding, it may be removed and a fresh dressing of the same type or a different type applied. Note: XStat™ is not to be removed in the field, but additional XStat™, other hemostatic, or trauma dressings may be applied.

d. If the bleeding site is amenable to use of a junctional tourniquet, immediately apply a CoTCCC-recommended junctional tourniquet. Do not delay in the application of the junctional tourniquet once it is ready for use. Apply hemostatic dressings with direct pressure if a junctional tourniquet is not available or while the junctional tourniquet is being readied for use.

e. For external hemorrhage of the head and neck where the wound edges can be easily reapproximated, the iTClamp may be used as a primary option for hemorrhage control. Wounds should be packed with a hemostatic dressing or XStat™, if appropriate, prior to iTClamp application.

i. The iTClamp does not require additional direct pressure, either when used alone or in combination with other hemostatic adjuncts.
ii. If the iTClamp is applied to the neck, perform frequent airway monitoring and evaluate for an expanding hematoma that may compromise the airway. Consider placing a definitive airway if there is evidence of an expanding hematoma.
iii. DO NOT APPLY on or near the eye or eyelid (within 1cm of the orbit).

f. Perform initial assessment for hemorrhagic shock (altered mental status in the absence of brain injury and/or weak or absent radial pulse) and consider immediate initiation of shock resuscitation efforts.

4. Airway Management

a. Conscious casualty with no airway problem identified:

i. No airway intervention required

b. Unconscious casualty without airway obstruction:
   i. Place casualty in the recovery position
   ii. Chin lift or jaw thrust maneuver OR
   iii. Nasopharyngeal airway OR
   iv. Extraglotic airway
c. Casualty with airway obstruction or impending airway obstruction:
   i. Allow a conscious casualty to assume any position that best protects the airway, to include sitting up and/or leaning forward.
   ii. Use a chin lift or jaw thrust maneuver
   iii. Use suction if available and appropriate
   iv. Nasopharyngeal airway OR
   v. Extraglottic airway (if the casualty is unconscious).
   vi. Place an unconscious casualty in the recovery position.
   vii. If the previous measures are unsuccessful, perform a surgical cricothyroidotomy using one of the following:
      (a) Bougie-aided open surgical technique using a flanged and cuffed airway cannula of less than 10mm outer diameter, 6–7mm internal diameter, and 5–8cm of intratracheal length.
      (b) Standard open surgical technique using a flanged and cuffed airway cannula of less than 10mm outer diameter, 6–7mm internal diameter, and 5–8cm of intra-tracheal length.
      (c) Use lidocaine if the casualty is conscious.
d. Cervical spine stabilization is not necessary for casualties who have sustained only penetrating trauma.
e. Monitor the hemoglobin oxygen saturation in casualties to help assess airway patency.
f. Always remember that the casualty's airway status may change over time and requires frequent reassessment.

Airway Notes:

a. If an extraglottic airway with an air-filled cuff is used, the cuff pressure must be monitored to avoid overpressurization, especially during TACEVAC on an aircraft with the accompanying pressure changes.
b. Extraglottic airways will not be tolerated by a casualty who is not deeply unconscious. If an unconscious casualty without direct airway trauma needs an airway intervention, but does not tolerate an extraglottic airway, consider the use of a nasopharyngeal airway.
c. For casualties with trauma to the face and mouth, or facial burns with suspected inhalation injury, nasopharyngeal airways and extraglottic airways may not suffice and a surgical cricothyroidotomy may be required.

d. Surgical cricothyroidotomies should not be performed on unconscious casualties who have no direct airway trauma unless use of a nasopharyngeal airway and/or an extraglottic airway have been unsuccessful in opening the airway.

5. Respiration / Breathing

a. Assess for tension pneumothorax and treat, as necessary.

i. Suspect a tension pneumothorax and treat when a casualty has significant torso trauma or primary blast injury and one or more of the following:

(a) Severe or progressive respiratory distress
(b) Severe or progressive tachypnea
(c) Absent or markedly decreased breath sounds on one side of the chest
(d) Hemoglobin oxygen saturation <90% on pulse oximetry
(e) Shock
(f) Traumatic cardiac arrest without obviously fatal wounds
- If not treated promptly, tension pneumothorax may progress from respiratory distress to shock and traumatic cardiac arrest.

ii. Initial treatment of suspected tension pneumothorax:

(a) If the casualty has a chest seal in place, burp or remove the chest seal.
(b) Establish pulse oximetry monitoring.
(c) Place the casualty in the supine or recovery position unless he or she is conscious and needs to sit up to help keep the airway clear as a result of maxillofacial trauma.
(d) Decompress the chest on the side of the injury with a 14-gauge or a 10-gauge, 3.25-inch needle/catheter unit.
- Either the 5th intercostal space (ICS) in the anterior axillary line (AAL) or the 2nd ICS in the mid-clavicular line (MCL) may be used for needle decompression (NDC.) If the anterior (MCL) site is used, do not insert the needle medial to the nipple line.
- The needle/catheter unit should be inserted at an angle perpendicular to the chest wall and just over the top of the lower rib at the insertion site. Insert the needle/catheter unit all the way to the hub and hold it in place for 5–10 seconds to allow decompression to occur.
- After the NDC has been performed, remove the needle and leave the catheter in place.
- If a casualty has significant torso trauma or primary blast injury and is in traumatic cardiac arrest (no pulse, no respirations, no response to painful stimuli, no other signs of life), decompress both sides of the chest before discontinuing treatment.

iii. The NDC should be considered successful if:

(a) Respiratory distress improves, or

(b) There is an obvious hissing sound as air escapes from the chest when NDC is performed (this may be difficult to appreciate in high-noise environments), or
(c) Hemoglobin oxygen saturation increases to 90% or greater (note that this may take several minutes and may not happen at altitude), or
(d) A casualty with no vital signs has return of consciousness and/or radial pulse.

iv. If the initial NDC fails to improve the casualty's signs/symptoms from the suspected tension pneumothorax:
(a) Perform a second NDC on the same side of the chest at whichever of the two recommended sites was not previously used. Use a new needle/catheter unit for the second attempt.
(b) Consider, based on the mechanism of injury and physical findings whether decompression of the opposite side of the chest may be needed.
(c) Continue to re-assess!

v. If the initial NDC was successful, but symptoms later recur:
(a) Perform another NDC at the same site that was used previously. Use a new needle/catheter unit for the repeat NDC
(b) Continue to re-assess!

vi. If the second NDC is also not successful: continue on to the Circulation section of the TCCC Guidelines.

b. All open and/or sucking chest wounds should be treated by immediately applying a vented chest seal to cover the defect. If a vented chest seal is not available, use a nonvented chest seal. Monitor the casualty for the potential development of a subsequent tension pneumothorax. If the casualty develops increasing hypoxia, respiratory distress, or hypotension and a tension pneumothorax is suspected, treat by burping or removing the dressing or by needle decompression.

c. Initiate pulse oximetry. All individuals with moderate/severe TBI should be monitored with pulse oximetry. Readings may be misleading in the settings of shock or marked hypothermia.

d. Casualties with moderate/severe TBI should be given supplemental oxygen when available to maintain an oxygen saturation >90%.

6. Circulation

a. Bleeding

i. A pelvic binder should be applied for suspected pelvic fracture

ii. Severe blunt force or blast injury with one or more of the following indications:
(a) Pelvic pain
(b) Any major lower limb amputation or near amputation
(c) Physical exam findings suggestive of a pelvic fracture
(d) Unconsciousness
(e) Shock

iii. Reassess prior tourniquet application. Expose the wound and determine if a tourniquet is needed. If there is a vascular injury and the tourniquet is needed, replace any limb tourniquet placed over the uniform with one applied directly to the skin 2–3 inches above the bleeding site. Ensure that bleeding is stopped. If there is not a traumatic amputation, a distal pulse should be checked. If bleeding persists or a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet side-by-side with the first to eliminate both bleeding and the distal pulse. If the reassessment determines that the prior tourniquet was not needed, then remove the tourniquet and note time of removal on the TCCC Casualty Card.

iv. Limb tourniquets and junctional tourniquets should be converted to hemostatic or pressure dressings as soon as possible if three criteria are met: the casualty is not in shock; it is possible to monitor the wound closely for bleeding; and the tourniquet is not being used to control bleeding from an amputated extremity. Every effort should be made to convert tourniquets in less than 2 hours if bleeding can be controlled with other means. Do not remove a tourniquet that has been in place more than 6 hours unless close monitoring and lab capability are available.

v. Expose and clearly mark all tourniquets with the time of tourniquet application. Note tourniquets applied and time of application; time of re-application; time of conversion; and time of removal on the TCCC Casualty Card. Use a permanent marker to mark on the tourniquet and the casualty card.

b. Assess for hemorrhagic shock (altered mental status in the absence of brain injury and/or weak or absent radial pulse).

c. IV/IO Access

i. Intravenous (IV) or intraosseous (IO) access is indicated if the casualty is in hemorrhagic shock or at significant risk of shock (and may therefore need fluid resuscitation), or if the casualty needs medications, but cannot take them by mouth.

(a) An 18-gauge IV or saline lock is preferred.

(b) If vascular access is needed but not quickly obtainable via the IV route, use the IO route.

d. Tranexamic Acid (TXA)

i. If a casualty is anticipated to need significant blood transfusion (for example: presents with hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding)

OR

ii. If the casualty has signs or symptoms of significant TBI or has altered metal status associated with blast injury or blunt trauma:

(a) Administer 2g of tranexamic acid via slow IV or IO push as soon as possible but NOT later than 3 hours after injury

e. Fluid Resuscitation
   i. Assess for hemorrhagic shock (altered mental status in the absence of brain injury and/or weak or absent radial pulse).
   ii. The resuscitation fluids of choice for casualties in hemorrhagic shock, listed from most to least preferred, are:
      (a) Cold stored low titer O whole blood
      (b) Pre-screened low titer O fresh whole blood
      (c) Plasma, red blood cells (RBCs) and platelets in a 1:1:1 ratio
      (d) Plasma and RBCs in a 1:1 ratio
      (e) Plasma or RBCs alone

      NOTE: Hypothermia prevention measures should be initiated while fluid resuscitation is being accomplished.

      (a) If not in shock:
         • No IV fluids are immediately necessary.
         • Fluids by mouth are permissible if the casualty is conscious and can swallow.
      (b) If in shock and blood products are available under an approved command or theater Blood Product Administration Protocol:
         • Resuscitate with cold stored low titer O whole blood, or, if not available
         • Pre-screened low titer O fresh whole blood, or, if not available
         • Plasma, RBCs, and platelets in a 1:1:1 ratio, or, if not available
         • Plasma and RBCs in a 1:1 ratio, or, if not available
         • Reconstituted dried plasma, liquid plasma or thawed plasma alone or RBCs alone
         • Reassess the casualty after each unit. Continue resuscitation until a palpable radial pulse, improved mental status or systolic BP of 100mmHg is present.
         • Discontinue fluid administration when one or more of the above end points has been achieved.
         • If blood products are transfused, administer 1g of calcium (30mL of 10% calcium gluconate or 10mL of 10% calcium chloride) IV/IO after the first transfused product.
      (c) Given increased risk for a potentially lethal hemolytic reaction, transfusion of unscreened group O fresh whole blood or type specific fresh whole blood should only be performed under appropriate medical direction by trained personnel.
      (d) Transfusion should occur as soon as possible after life-threatening hemorrhage in order to keep the patient alive. If Rh negative blood products are not immediately available, Rh positive blood products should be used in hemorrhagic shock.

(e) If a casualty with an altered mental status due to suspected TBI has a weak or absent radial pulse, resuscitate as necessary to restore and maintain a normal radial pulse. If BP monitoring is available, maintain a target systolic BP between 100–110mmHg.

(f) Reassess the casualty frequently to check for recurrence of shock. If shock recurs, re-check all external hemorrhage control measures to ensure that they are still effective and repeat the fluid resuscitation as outlined above.

(g) Refractory Shock

- If a casualty in shock is not responding to fluid resuscitation, consider untreated tension pneumothorax as a possible cause of refractory shock. Thoracic trauma, persistent respiratory distress, absent breath sounds, and hemoglobin oxygen saturation <90% support this diagnosis. Treat as indicated with repeated NDC or finger thoracostomy/chest tube insertion at the 5th ICS in the AAL, according to the skills, experience, and authorizations of the treating medical provider. Note that if finger thoracostomy is used, it may not remain patent and finger decompression through the incision may have to be repeated. Consider decompressing the opposite side of the chest if indicated based on the mechanism of injury and physical findings.

(h) Given increased risk for a potentially lethal hemolytic reaction, transfusion of unscreened group O fresh whole blood or type specific fresh whole blood should only be performed under appropriate medical direction by trained personnel.

7. Hypothermia Prevention

a. Take early and aggressive steps to prevent further body heat loss and add external heat when possible for both trauma and severely burned casualties.

b. Minimize casualty's exposure to cold ground, wind and air temperatures. Place insulation material between the casualty and any cold surface as soon as possible. Keep protective gear on or with the casualty if feasible.

c. Replace wet clothing with dry clothing, if possible, and protect from further heat loss.

d. Place an active heating blanket on the casualty's anterior torso and under the arms in the axillae (to prevent burns, do not place any active heating source directly on the skin or wrap around the torso).

e. Enclose the casualty with the exterior impermeable enclosure bag.

f. As soon as possible, upgrade hypothermia enclosure system to a well-insulated enclosure system using a hooded sleeping bag or other readily available insulation inside the enclosure bag/external vapor barrier shell.

g. Pre-stage an insulated hypothermia enclosure system with external active heating for transition from the non-insulated hypothermia enclosure systems; seek to improve upon existing enclosure system when possible.
h. Use a battery-powered warming device to deliver IV/IO resuscitation fluids, in accordance with current CoTCCC guidelines, at flow rate up to 150 ml/min with a 38°C output temperature.
i. Protect the casualty from exposure to wind and precipitation on any evacuation platform.

8. Penetrating Eye Trauma

a. If a penetrating eye injury is noted or suspected:
   i. Perform a rapid field test of visual acuity and document findings.
   ii. Cover the eye with a rigid eye shield (NOT a pressure patch.)
   iii. Ensure that the 400mg moxifloxacin tablet in the Combat Wound Medication Pack (CWMP) is taken if possible and that IV/IM antibiotics are given as outlined below if oral moxifloxacin cannot be taken.

9. Monitoring

a. Initiate advanced electronic monitoring if indicated and if monitoring equipment is available.

10. Analgesia

a. *TCCC non-medical first responders* should provide analgesia on the battlefield achieved by using:
   i. Mild to Moderate Pain
   ii. Casualty is still able to fight
      (a) TCCC Combat Wound Medication Pack (CWMP)
         • Acetaminophen – 500mg tablet, 2 PO q8hr
         • Meloxicam – 15mg PO once a day

b. *TCCC Medical Personnel:*

Option 1

   i. Mild to Moderate Pain
   ii. Casualty is still able to fight
      (a) TCCC Combat Wound Medication Pack (CWMP)
         • Acetaminophen – 500mg tablet, 2 PO q8hr
         • Meloxicam – 15mg PO once a day

Option 2

   i. Mild to Moderate Pain
   ii. Casualty IS NOT in shock or respiratory distress AND Casualty IS NOT at significant risk of developing either condition.
      (a) Oral transmucosal fentanyl citrate (OTFC) 800µg
         • May repeat once more after 15 minutes if pain uncontrolled by first

c. *TCCC Combat Paramedics or Providers:*
   i. Fentanyl 50µg IV/IO 0.5–1µg/kg
      (a) May repeat q30min
   ii. Fentanyl 100µg IN
      (a) May repeat q30min

Option 3
   i. Moderate to Severe Pain
   ii. Casualty IS in hemorrhagic shock or respiratory distress OR
   iii. Casualty IS at significant risk of developing either condition:
      (a) Ketamine 20–30mg (or 0.2–0.3mg/kg) slow IV or IO push
         • Repeat doses q20min prn for IV or IO
         • End points: Control of pain or development of nystagmus (rhythmic back-and-forth movement of the eyes).
      (b) Ketamine 50–100mg (or 0.5–1mg/kg) IM or IN
         • Repeat doses q20–30min prn for IM or IN

Option 4
a. *TCCC Combat Paramedics or Providers:*
   i. Sedation required: significant severe injuries requiring dissociation for patient safety or mission success or when a casualty requires an invasive procedure; must be prepared to secure the airway:
      (a) Ketamine 1–2mg/kg slow IV/IO push initial dose
         • Endpoints: procedural (dissociative) anesthesia
      (b) Ketamine 300mg IM (or 2–3mg/kg IM) initial dose
         • Endpoints: procedural (dissociative) anesthesia
         • If an emergence phenomenon occurs, consider giving 0.5–2mg IV/IO midazolam.
         • If continued dissociation is required, move to the Prolonged Casualty Care (PCC) analgesia and sedation guidelines.
   ii. If longer duration analgesia is required:
      (a) Ketamine slow IV/IO infusion 0.3mg/kg in 100mL 0.9% sodium chloride over 5–15 minutes.
         • Repeat doses q45min prn for IV or IO
         • End points: Control of pain or development of nystagmus (rhythmic back-and-forth movement of the eyes).

Analgesia and sedation notes:
a. Casualties need to be disarmed after being given OTFC, IV/IO fentanyl, ketamine, or midazolam.
b. The goal of analgesia is to reduce pain to a tolerable level while still protecting their airway and mentation.

c. The goal of sedation is to stop awareness of painful procedures.
d. Document a mental status exam using the AVPU method prior to administering opioids or ketamine.
e. For all casualties given opioids, ketamine or benzodiazepines – monitor airway, breathing, and circulation closely.
f. Directions for administering OTFC:
    i. Place lozenge between the cheek and the gum.
    ii. Do not chew the lozenge.
    iii. Recommend taping lozenge-on-a-stick to casualty's finger as an added safety measure OR utilizing a safety pin and rubber band to attach the lozenge (under tension) to the patient's uniform or plate carrier.
    iv. Reassess in 15 minutes.
    v. Add second lozenge, in other cheek, as necessary to control severe pain.
    vi. Monitor for respiratory depression.
g. Ketamine comes in different concentrations; the higher concentration option (100mg/mL) is recommended when using IN dosing route to minimize the volume administered intranasally.
h. Naloxone (0.4mg IV/IO/IM/IN) should be available when using opioid analgesics.
i. TBI and/or eye injury does not preclude the use of ketamine. However, use caution with OTFC, IV/IO fentanyl, ketamine, or midazolam in TBI patients as this may make it difficult to perform a neurologic exam or determine if the casualty is decompensating.
j. Ketamine may be a useful adjunct to reduce the amount of opioids required to provide effective pain relief. It is safe to give ketamine to a casualty who has previously received a narcotic. IV Ketamine should be given over 1 minute.
k. If respirations are reduced after using opioids or ketamine, reposition the casualty into a "sniffing position". If that fails, provide ventilatory support with a bag-valve-mask or mouth-to-mask ventilations.
l. Ondansetron, 4mg Orally Dissolving Tablet (ODT)/IV/IO/IM, every 8 hours as needed for nausea or vomiting. Each 8-hour dose can be repeated once after 15 minutes if nausea and vomiting are not improved. Do not give more than 8mg in any 8-hour interval. Oral ondansetron is NOT an acceptable alternative to the ODT formulation.
m. The use routine of benzodiazepines such as midazolam is NOT recommended for analgesia. When performing procedural sedation, benzodiazepines may also be considered to treat behavioral disturbances or unpleasant (emergence) reactions. Benzodiazepines should not be used prophylactically and are not commonly needed when the correct pain or sedation dose of ketamine is used.
n. Polypharmacy is not recommended; benzodiazepines should NOT be used in conjunction with opioid analgesia.

o. If a casualty appears to be partially dissociated, it is safer to administer more ketamine than to use a benzodiazepine.

11. Antibiotics:

a. Recommended for All Open Combat Wounds
b. If able to take PO meds:
   i. Moxifloxacin (from the CWMP), 400mg PO once a day
c. If unable to take PO (shock, unconsciousness):
   i. Ertapenem, 1g IV/IM once a day

12. Inspect and dress known wounds

a. Inspect and dress known wounds.
b. Abdominal evisceration – [Control bleeding]; rinse with clean (and warm if possible) fluid to reduce gross contamination. Hemorrhage control – apply combat gauze or CoTCCC recommended hemostatic dressing to uncontrolled bleeding. Cover exposed bowel with a moist, sterile dressing or sterile water-impermeable covering.
   i. Reduction: do not attempt if there is evidence of ruptured bowel (gastric/intestinal fluid or stool leakage) or active bleeding.
   ii. If no evidence of bowel leakage and hemorrhage is visibly controlled, a single brief attempt (<60 seconds) may be made to replace/reduce the eviscerated abdominal contents.
   iii. If unable to reduce; cover the eviscerated organs with water impermeable non-adhesive material (transparent preferred to allow ability to re-assess for ongoing bleeding); examples include a bowel bag, IV bag, clear food wrap, etc. and secure the impermeable dressing to the patient using adhesive dressing (examples: ioban, chest seal).
   iv. Do NOT FORCE contents back into abdomen or actively bleeding viscera.
   v. The patient should remain NPO.

13. Check for Additional Wounds

14. Burns

a. Assess and treat as a trauma casualty with burns and not burn casualty with injuries.
b. Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation.
c. Estimate total body surface area (TBSA) burned to the nearest 10% using the Rule of Nines.
d. Cover the burn area with dry, sterile dressings. For extensive burns (>20%), consider placing the casualty in the Heat-Reflective Shell or Blizzard Survival Blanket from the Hypothermia Prevention Kit in order to both cover the burned areas and prevent hypothermia.

e. Fluid resuscitation (USAISR Rule of Ten)
   i. If burns are greater than 20% of TBSA, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation should be initiated with lactated Ringer's, normal saline, or Hextend. If Hextend is used, no more the 1000mL should be given, followed by lactated Ringer's or normal saline as needed.
   ii. Initial IV/IO fluid rate is calculated as %TBSA × 10mL/hr for adults weighing 40–80 kg.
   iii. For every 10 kg ABOVE 80 kg, increase initial rate by 100mL/hr.
   iv. If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the USSOCOM TTPs in number 6.

e. Analgesia in accordance with the TCCC guidelines in number 10 may be administered to treat burn pain.

f. Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per the TCCC guidelines in number 11 if indicated to prevent infection in penetrating wounds.

g. All TCCC interventions can be performed on or through burned skin in a burn casualty.

h. Burn patients are particularly susceptible to hypothermia. Extra emphasis should be placed on barrier heat loss prevention methods,

15. Splint fractures and re-check pulses

16. Cardiopulmonary resuscitation (CPR)

a. Resuscitation on the battlefield for victims of blast or penetrating trauma who have no pulse, no ventilations, and no other signs of life will not be successful and should not be attempted.

b. However, 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 a tension pneumothorax prior to discontinuation of care. The procedure is the same as described in section (5a) above.

17. Communication

a. Communicate with the casualty if possible. Encourage, reassure, and explain care.

b. Communicate with tactical leadership as soon as possible and throughout casualty treatment as needed. Provide leadership with casualty status and evacuation requirements to assist with coordination of evacuation assets.

c. Communicate with the evacuation system (the Patient Evacuation Coordination Cell) to arrange for TACEVAC. Communicate with medical providers on the evacuation asset if possible and relay mechanism of injury, injuries sustained, signs/symptoms, and treatments rendered. Provide additional information as appropriate.

18. Documentation of Care

a. Document clinical assessments, treatments rendered, and changes in the casualty's status on a TCCC Casualty Card (DD Form 1380). Forward this information with the casualty to the next level of care.

19. Prepare for Evacuation

a. Complete and secure TCCC Card (DD 1380) to casualty.
b. Secure all loose ends of bandages and wraps.
c. Secure hypothermia prevention wraps/blankets/straps.
d. Secure litter straps as required. Consider additional padding for long evacuations.
e. Provide instructions to ambulatory patients as needed.
f. Stage casualties for evacuation in accordance with unit standard operating procedures.
g. Maintain security at the evacuation point in accordance with unit standard operating procedures.

Principles of Tactical Evacuation Care (TACEVAC)

The Tactical Evacuation Care Guidelines are now a separate document managed by the Committee on En Route Combat Casualty Care (CoERCCC).

TACEVAC Guidelines can be found in the En Route Care Collection on the Deployed Medicine website.

*The term "Tactical Evacuation" includes both Casualty Evacuation (CASEVAC) and Medical Evacuation (MEDEVAC) as defined in Joint Publication 4-02.

Basic Management Plan for Tactical Evacuation* Care

*The term "Tactical Evacuation" includes both Casualty Evacuation (CASEVAC) and Medical Evacuation (MEDEVAC) as defined in Joint Publication 4-02.

1. Transition of Care

a. Tactical force personnel should establish evacuation point security and stage casualties for evacuation.
b. Tactical force personnel or the medic should communicate patient information and status to TACEVAC personnel as clearly as possible. The minimum information communicated should include stable or unstable, injuries identified, and treatments rendered.
c. TACEVAC personnel should stage casualties on evacuation platforms as required.
d. Secure casualties in the evacuation platform in accordance with unit policies, platform configurations and safety requirements.
e. TACEVAC medical personnel should re-assess casualties and re-evaluate all injuries and previous interventions.

2. **Massive Hemorrhage** (same as Tactical Field Care – see page 6)
3. **Airway Management**
   Endotracheal intubation may be considered in lieu of cricothyroidotomy if trained.
4. **Respiration**
   Most combat casualties do not require supplemental oxygen, but administration of oxygen may be of benefit for the following types of casualties:
   a. Low oxygen saturation by pulse oximetry
   b. Injuries associated with impaired oxygenation
   c. Unconscious casualty
   d. Casualty with TBI (maintain oxygen saturation >90%
   e. Casualty in shock
   f. Casualty at altitude
   g., Known or suspected smoke inhalation
5. **Circulation** (same as Tactical Field Care – see page 9)
6. **Traumatic Brain Injury**
   a. Casualties with moderate/severe TBI should be monitored for:
      i. Decreases in level of consciousness
      ii. Pupillary dilation
      iii. SBP should be >90mmHg
      iv. O_2 sat >90
      v. Hypothermia
      vi. End-tidal CO_2 (If capnography is available, maintain between 35 and 40mmHg)
      vii. Penetrating head trauma (if present, administer antibiotics)
      viii. Assume a spinal (neck) injury until cleared.
   b. Unilateral pupillary dilation accompanied by a decreased level of consciousness may signify impending cerebral herniation; if these signs occur, take the following actions to decrease intracranial pressure:
      i. Administer 250mL of 3% or 5% hypertonic saline bolus.
      ii. Elevate the casualty's head 30°.
      iii. Hyperventilate the casualty.
         (a) Respiratory rate 20
         (b) Capnography should be used to maintain the end-tidal CO_2 between 30 and 35mmHg.
         (c) The highest oxygen concentration (FiO_2) possible should be used for hyperventilation.
         (d) Do not hyperventilate the casualty unless signs of impending herniation are present. Casualties may be hyperventilated with oxygen using the bag-valve-mask technique.

7. **Hypothermia Prevention** (same as Tactical Field Care – see page 12)
8. **Penetrating Eye Trauma** (same as Tactical Field Care – see page 13)
9. **Monitoring** (same as Tactical Field Care – see page 13)
10. **Analgesia** (same as Tactical Field Care – see page 13)
11. **Antibiotics** (same as Tactical Field Care – see page 16)
12. **Inspect and dress known wounds** (same as Tactical Field Care – see page 16)
13. **Check for additional wounds** (same as Tactical Field Care – see page 16)
14. **Burns** (same as Tactical Field Care – see page 16)
15. **Fractures and re-check pulses** (same as Tactical Field Care – see page 16)
16. **Cardiopulmonary resuscitation (CPR) in TACEVAC**
    a. Casualties with torso trauma or polytrauma who have no pulse or respirations during TACEVAC should have bilateral needle decompression performed to ensure they do not have a tension pneumothorax. The procedure is the same as described in Section (4a) above.
    b. CPR may be attempted during this phase of care if the casualty does not have obviously fatal wounds and will be arriving at a facility with a surgical capability within a short period of time. CPR should not be done at the expense of compromising the mission or denying lifesaving care to other casualties.
17. **Communication**
    a. Communicate with the casualty if possible. Encourage, reassure and explain care.
    b. Communicate with next level of care. Relay mechanism of injury, injury types, signs/symptoms, and treatments rendered. Provide additional information as possible.
18. **Documentation of Care** (same as Tactical Field Care – see page 18)
    a. Document clinical assessments, treatments rendered, and changes in the casualty's status on a TCCC Casualty Card (DD Form 1380). Forward this information with the casualty to the next level of care.

Prolonged Casualty Care Guidelines (CPG ID:91)*

The Prolonged Casualty Care (PCC) guidelines are a consolidated list of casualty-centric knowledge, skills, and best practices intended to serve as the DoD baseline clinical practice guidance to guide casualty management over a prolonged amount of time in austere, remote, or expeditionary settings, and/or during long-distance movements.

***Guideline Only/Not a Substitute for Clinical Judgment**

PROLONGED CASUALTY CARE BACKGROUND

Prolonged Casualty Care (PCC)*: The need to provide patient care for extended periods of time when evacuation or mission requirements surpass available capabilities and/or capacity to provide that care.*

The PCC guidelines are a consolidated list of casualty-centric knowledge, skills, abilities, and best practices intended to serve as the DoD baseline clinical practice guidance (CPG) to direct casualty management over a prolonged period of time in austere, remote, or expeditionary settings, and/or during long-distance movements. These PCC guidelines build upon the DoD standard of care for non-medical and medical first responders as established by the Committee on Tactical Combat Casualty Care (CoTCCC), outlined in the Tactical Combat Casualty Care (TCCC) guidelines,[1] and in accordance with (IAW) DoDI 1322.24.

The guidelines were developed by the PCC Work Group (PCC WG). The PCC WG is chartered under the Defense Committee on Trauma (DCoT) to provide subject matter expertise supporting the Joint Trauma System (JTS) mission to improve trauma readiness and outcomes through evidence-driven performance improvement. The PCC WG is responsible for reviewing, assessing, and providing solutions for PCC-related shortfalls and requirements as outlined in DoD Instruction (DoDI) 1322.24, *Medical Readiness Training, 16 Mar 2018*, under the authority of the JTS as the DoD Center of Excellence pursuant to DoDI 6040.47, *JTS*, 05 Aug 2018.

Operational and medical planning should seek to avoid categorizing PCC as a primary medical support capability or control factor during deliberate risk assessment; however, an effective medical plan always includes PCC as a contingency. Ideally, forward surgical and critical care should be provided as close to casualties as possible to optimize survivability.[2] DoD units must be prepared for medical capacity to be overwhelmed, or for medical evacuation to be delayed or compromised. When contingencies arise, commanders' casualty response plans during PCC situations are likely to be complex and challenging. Therefore, PCC planning, training, equipping, and sustainment strategies must be completed prior to a PCC event. The following evidence-driven PCC guidelines are designed to establish a systematic framework to synchronize critical medical decisions points into an executable PCC strategy, regardless of the nature of injury or illness, to effectively manage a complex patient and to advise commanders of associated risks.

The guidelines build upon the accepted TCCC categories framed in the novel MARC2H3-PAWS-L treatment algorithm, (Massive Hemorrhage/MASCAL, Airway, Respirations, Circulation, Communications, Hypo/Hyperthermia and Head Injuries, Pain Control, Antibiotics, Wounds (including Nursing and Burns), Splinting, Logistics).

The PCC guidelines prepare the Servicemember for "what to consider next" after all TCCC interventions have been effectively performed and should only be trained after having mastering the principles and techniques of TCCC.

The guidelines are a consolidated list of casualty-centric knowledge, skills, abilities, and best practices are the proposed standard of care for developing and sustaining DoD programs required to enhance confidence, interoperability, and common trust among all PCC-adept personnel across the Joint force.

MARC^{2}H^3-PAWS-L
Massive Hemorrhage/MASCAL
Airway
Respirations
Circulation
Communication
Hypothermia/Hyperthermia
Head Injury
Pain Control
Antibiotics
Wounds (+ Nursing/Burns)
Sprinting
Logistics

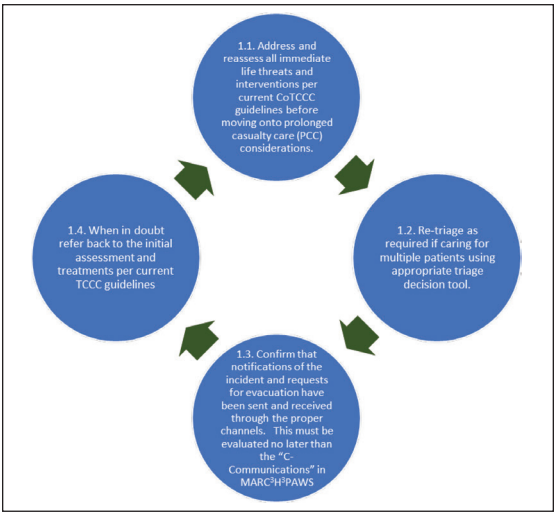
The JTS CPGs are foundational to the PCC guidelines and will be referenced throughout this document in an effort to keep these guidelines concise. General information on the Joint Trauma System is available on the JTS website (https://jts.amedd.army.mil) and links to all of the CPGs are also available by using the following link: https://jts.amedd.army.mil/index.cfm/PI_CPGs/cpgs.

The TCCC guidelines are included in these guidelines because they are foundational AND a prerequisite to effective PCC. Remember, the primary goal in PCC is to get out of PCC!!!

PCC Principles

The principles and strategies of providing effective prolonged casualty care are meant to help organize the overwhelming amount of critical information into a clear clinical picture and proactive plan regardless of the nature of injury or illness. The following steps can be implemented in any austere environment from dispersed small team operations in permissive environments to large scale combat operations to make the care of a critically ill patient more efficient for the medic and their team. These mimic the systems and processes in typical intensive care units without relying on technology while leaving the ability to add technological adjuncts as they become available. The following checklist is meant to emphasize some of the most important principles in efficient care of the critically ill patient.

Figure 1 *Steps of PCC Principles*



1. **Perform initial lifesaving care using TCCC guidelines and continue resuscitation.** The foundation of good PCC is mastery of TCCC and a strong foundation in clinical medicine.
2. **Delineate roles and responsibilities, including naming a team leader.** A leader should be appointed who will manage the larger clinical picture while assistants focus on attention intensive tasks.
3. **Perform comprehensive physical exam and detailed history with problem list and care plan.** After initial care and stabilization of a trauma or medical patient, a detailed physical exam and history should be performed for the purpose of completing a comprehensive problem list and corresponding care plan.
4. **Record and trend vital signs.** Vital signs trending should be done with the earliest set of vital signs taken and continued at regular intervals so that the baseline values can be compared to present reality on a dedicated trending chart.
5. **Perform a teleconsultation.** As soon as is feasible, the medic should prepare a teleconsultation by either filling out a preformatted script or by writing down their concerns along with the latest patient information.
6. **Create a nursing care plan.** Nursing care and environmental considerations should be addressed early to limit any provider-induced iatrogenic injury.

7. **Implement team wake, rest, chow plan.**
   The medic and each of their first responders should make all efforts to take care of each other by insisting on short breaks for rest, food, and mental decompression.
8. **Anticipate resupply and electrical issues**
9. **Perform periodic mini rounds assessments.**
   Stepping back from the immediate care of the patient periodically and re-engaging with a mini patient round and review of systems can allow the medic to recognize changes in the condition of the patient and reprioritize interventions.
   a. Is the patient stable or unstable?
   b. Is the patient sick or not sick?
   c. Is the patient getting better or getting worse?
   d. How is this assessment different from the last assessment?
10. **Obtain and interpret lab studies.**
    When available, labs may be used to augment these trends and physical exam findings to confirm or rule out probable diagnoses.
11. **Perform necessary surgical procedures.**
    The decision to perform invasive and surgical interventions should consider both risks and benefit to the patient's overall outcome and not merely the immediate goal.
12. **Prepare for transportation or evacuation care.**
    If the medic is caring for the patient over a long tactical move or strategic evacuation, they should be prepared with ample drugs, fluids, supplies and be ready for all contingencies in flight.
13. **Prepare documentation for patient handover.**
    The preparation for transportation and evacuation care should begin immediately upon assuming care for the patient and should include hasty and detailed evacuation requests up both the medical and operational channels with the goal of getting the patient to the proper role of care as soon as possible.

Guideline User Notes

PCC operational context uses the following paradigm for phases of care for different periods of time one is in a PCC scenario:

Table 1 *Roles of Care*

Role	Definition	Time Period
1a	Carried/Point of Need/Ruck	<1 Hour
1b	Mission-specific transportation platform/Truck	1–4 Hours
1c	Mission support site/House	>4 Hours
1d	Evacuation platform/Plane (as planned or available)	No Timeframe

Where appropriate, a minimum-better-best format is included for situations in which the operational reality precludes optimal care for a given scenario:

Minimum: This is the minimum level of care which should be delivered for a specified level of capability

Better: When available or practical, this includes treatment strategies or adjuncts that improve outcomes while still not considered the standard of care.

Best: This is the optimal medical for a given scenario based on the level of medical expertise of the provider

Expectations of prehospital care, based on TCCC's role-based standard of care, are included within each section:

Tier 1: This is the basic medical knowledge for all service-members.

Tier 2: Those who have been through approved CLS training are expected to be able to meet the standards at this level of care.

Tier 3 (Combat Medics/Corpsmen [CMC]): Those who are trained medics/corpsmen are expected to meet the medical standards for this tier.

Tier 4 (Combat Paramedic/Provider [CPP]): This is the highest level of prehospital capability and will have a significantly expanded scope of practice.

Mascal/Triage

Background

The foundation of effective PCC is accurate triage for both treatment in the PCC setting and for transportation to a higher level of care, as well as effective resource management across the entire trauma system. Resource management includes the appropriate utilization of medical and non-medical personnel, equipment and supplies, communications, and evacuation platforms. Like most Mass Casualty incidents (MASCAL), the purpose of triage in a PCC setting is to swiftly identify casualty needs for optimal resource allocation in order to improve patient outcomes. However, PCC presents unique and dynamic triage challenges while managing casualties over a prolonged period with a low likelihood of receiving additional medical supplies or personnel with enhanced medical capabilities apart from pre-established networks. MASCAL in a PCC environment will necessitate more conservative resource allocation than traditional MASCAL in mature theaters or fixed medical facilities where damage control surgery, intensive care, and medical logistical support are more readily available, and resupply is more likely. PCC dictates the need for implementing various triage and resource management techniques to ensure the greatest good for all. The objectives and basic strategies are the same for all MASCAL; however, tactics will vary depending on the available resources and situations.

MASCAL Decision Points

1. Determine if a PCC MASCAL is occurring – do the requirements for care exceed capabilities?
   a. What is the threat? Has it been neutralized or contained? If not, security takes priority.
   b. What is the total casualty estimate?
   c. Are there resource limitations that will affect survival?
   d. Can medical personnel arrive at the casualty location, or can the casualty move to them?
   e. Is evacuation possible?
   f. Communicate the situation to all available personnel conducting or enabling PCC.
   g. Assess requirements for which class of triage you are facing (see Appendix C) and scale medical action to maximize lethality then survivability.
   h. Remain agile and be ready to move based on the mission.
2. Determine if conditions require significant changes in the commonly understood and accepted standards of care (Crisis Standards of Care)[3] or if personnel who are not ordinarily qualified for a particular medical skill will need to deliver care. MASCAL in PCC requires both medical and non-medical responders initially save lives and preserve survivable casualties. Both groups will need skills traditionally outside existing paradigms, such as non-medical personnel taking and record vital signs or Tier 3 TCCC medical personnel maintaining vent settings on a stable patient. The MASCAL standard of care will be driven by the volume of casualties, resources, and risk or mortality/morbidity due to degree of injury/illness; as such, remain agile throughout the MASCAL and trend in both directions based upon resources available.
3. MASCAL management is often intuitive and reactive (due to lack of full mission training opportunities) and should rely on familiar terminology and principles. Treatment and casualty movement should be rehearsed to create automatic responses.
4. The tactical and strategic operational context will underpin every facet of MASCAL in a PCC environment, operational commanders MUST be involved in every stage of MASCAL response (The mere fact that a medical professional or team of medical professionals is forced to hold a casualty longer than doctrinal planning timelines means there is a failure in the operational/logistical evacuation chain. Battle lines, ground-to-air threat, etc. levels may have shifted.)
5. Logistical resupply may need to include non-standard means and involve personnel and departments not typically associated with Class VIII in other situations (i.e., aerial resupply, speedballs, caches, local national market procurement).
6. The most experienced person should establish MASCAL roles and responsibilities, as appropriate.

Key Considerations in MASCAL

1. Usually, simpler is better.
2. Focus on those that will preserve scarce resources, such as blood.
3. Triage is a continuous process and should be repeated as often as is clinically and operationally practical.
4. Avoid high resource and low yield interventions.
5. Emergency airway interventions should prioritize REVERSIBLE pathology in salvageable patients.
6. Decisions will depend on available resources and skillsets (i.e., penetrating traumatic brain injury [TBI] triaged differently if no neurosurgery is available in a timely manner or at all in theater).
7. Conserve, ration, and redistribute additional scarce resources (i.e., blood, drug).

Massive Hemorrhage

Background

Early recognition and intervention for life-threatening hemorrhage are essential for survival. The immediate priorities are to control life-threatening hemorrhage and maintain vital organ perfusion with rapid blood transfusion.[4]

Pre-deployment, Mission Planning, and Training Considerations

1. Conduct unit level blood donor testing (for blood typing, transfusion transmitted diseases and Low Titer blood type O titers) and develop operational roster.
2. Define Cold Chain Stored Whole Blood (CSWB) distribution quantities in area of responsibility.
3. Manage and equip prehospital blood storage program if unit policies and procedures allow for prehospital blood storage.

Table 2 *PCC Role-Based Guidelines for Massive Hemorrhage Management*

PCC Role-based Guidelines for Massive Hemorrhage Management			
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP
			All Personnel - Complete Basic TCCC Management Plan for Massive Hemorrhage then: • Identify life-threatening bleeding that may have started or was not adequately controlled with initial interventions in TCCC Basic Management Plan for Massive Hemorrhage. • Check tourniquets to ensure that they have not shifted or loosened.
			• Re-assess and re-apply MARCH interventions. • Perform all recommended interventions from guidelines for above tier level.
			• Ensure all interventions noted above are completed by TCCC ASM and CLS personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include: **Role 1a** • Conduct Triage – Time Assessment. • Assess extremities distal to pressure dressings to ensure that they are not acting as a venous tourniquet which could result in compartment syndrome by checking pulses and the skin color distal to the dressing. • Communicate evacuation and re-supply requirements (i.e. , Blood resupply/Speedball). • Administer Calcium and Tranexamic Acid (TXA) per TCCC guideline.
			Role 1b • Re-assess and re-apply MARCH interventions. • Consider tourniquet conversion (>2 hours but before 6 hours). • Assess for refractory shock – see Circulation Section.
			Role 1c • Evaluate for compartment syndrome. • Consider teleconsultation. • Continue resuscitation until min palpable radial pulse or improved mental status better: SBP >90mmHg best: SBP between 100–110mmHg. Discontinue fluid administration when one of the above end points have been achieved. • Ensure interventions noted above are completed by TCCC ASM, CLS and Combat Medic/Corpsmen (CMC) personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include: **Role 1a** • Re-assess all prior MARCH interventions.
			Role 1b • Assess using ultrasound (if available) including Extended Focused Assessment with Sonography in Trauma, Central Venous Pressure. • Determine hypovolemia vs. refractory shock to drive decision on further resource utilization.
			Role 1c • Convert to type-specific blood replacement, if testing available. • Establish Foley catheter with goal Urine Output (UOP) of >1/2mL/kg/hr.

Damage Control Resuscitation (DCR) in Prolonged Field Care CPG, 01 Oct 2018[5]
https://jts.health.mil/assets/docs/cpgs/Damage_Control_Resuscitation_PFC_01_Oct_2018_ID73.pdf

Airway Management

Background

Airway compromise is the second leading cause of potentially survivable death on the battlefield after hemorrhage.[6] Complete airway occlusion can cause death from suffocation within minutes. Austere environments present significant challenges with airway management. Limited provider experience and skill, equipment, resources, and medications shape the best management techniques. Considerations include limited availability of supplemental oxygen; medications for induction/rapid sequence intubation, paralysis, and post-intubation management; and limitations in available equipment. Another reality is limitations in sustainment training options, especially for advanced airway techniques. Due to these challenges, some common recommendations that may be considered "rescue" techniques in standard hospital airway management may be recommended earlier or in a non-standard fashion to establish and control an airway in a PCC environment. Patients who require advanced airway placement tend to undergo more interventions, be more critically injured, and ultimately have a higher proportion of deaths. The ability to rapidly and consistently manage an airway when indicated or spend time on other resuscitative needs when airway management is not indicated, may contribute to improved outcomes.[7,8]

Table 3 *PCC Role-based Guidelines for Airway Management*

PCC Role-based Guidelines for Airway Management			
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP
			All Personnel - Complete Basic TCCC Management Plan for Airway then: Assess for airway problem; use patient positioning per TCCC guidelines to maintain open airway.
			• Re-assess airway interventions performed in TCCC. • Positive end-expiratory pressure (PEEP) valves should be used anytime you are using a bag valve mask. • Use nasal pharyngeal airway (NPA). • Ensure all interventions noted above are completed by TCCC ASM and CLS personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include: **Role 1a** • Airway adjuncts should be assessed for efficacy by checking the patient's work of breathing, end-tidal CO_2 ($EtCO_2$) and pulse oximetry levels. • Level of sedation should be continuously assessed every 5 minutes for patients sedated deep enough for endotracheal intubation.
			Role 1b • Re-asses airway before, after and during any patient movement. • Airway adjuncts with an inflatable cuff such as ET or cricothyrotomy tube or inflatable laryngeal mask airways (LMA) should be assessed for proper inflation levels to ensure that they are not under or over inflated. • Inflate the cuff with a 10mL syringe and then releasing your thumb from the plunger to let the plunger equalize.
			Role 1c • Airway adjuncts with an inflatable cuff such as ET or cricothyrotomy tube or inflatable LMA should be assessed for proper inflation levels to ensure that they are not under or over inflated. • Mechanical suction device and yankauer suction for suctioning out the oropharynx. • Airway adjuncts should be assessed for efficacy by checking the patient's work of breathing, $EtCO_2$ and pulse oximetry levels. • Mouth care should be performed per the attached nursing care checklist in appendix. • Ensure above interventions are completed by TCCC ASM, CLS and CMC personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include:
			Role 1a • Re-assess all prior MARCH interventions.
			Role 1b • Re-assess cuff pressures per above. • Continued assessment of patient's work of breathing, $EtCO_2$ and pulse oximetry levels.
			Role 1c • Inflate and periodically check cuff pressures with a cuff manometer to a goal of 20mmHg. • Use heat moisture exchanger to keep contaminants out and endogenous heat and moisture in the lungs. • Inline suction catheter for suctioning airway adjunct as indicated.

Airway Management in Prolonged Field Care, 01 May 2020[9]
https://jts.health.mil/assets/docs/cpgs/Airway_Management_in_Prolonged_Field_Care_01_May_2020_ID80.pdf

Respiration and Ventilation

Background

Respiration is the process of gas exchange at the cellular level. Oxygen is conducted into the lung and taken up by the blood via hemoglobin to be transported throughout the body. In the peripheral tissues, carbon dioxide is exchanged for oxygen, which is transported by the blood to the lungs, where it is exhaled. This process is essential to cellular and organism survival. Dysfunction of this process is a feature of multiple-injury patterns that can lead to increased morbidity and mortality.

Table 4 *PCC Role-based Guidelines for Respiration Management*

PCC Role-based Guidelines for Respiration Management				
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP	***All Personnel - Complete Basic TCCC Management Plan for Respiration then:*** • Identify Respiratory distress. • Some Level 1 providers may be trained in Basic Life Support (BLS), and if so, may offer the following interventions: » Open the airway using Head Tilt or Jaw Thrust maneuver. » Provide rescue breaths per BLS.
				• Perform all recommended interventions from guidelines for above Tier level • Additional interventions include: » Use Bag Valve Mask with PEEP Valve. » Use NPA.
				• Ensure all interventions noted above are completed by TCCC ASM and CLS personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include: » Target ventilation to pulse oximetry level of 92%; use supplemental oxygen if available. » Use end-tidal carbon dioxide monitor and maintain $EtCO_2$ between 35–45mmHg. » If definitive airway is required, consider cricothyrotomy tube as less sedation and pain management is required to facilitate a patent and secure method for respirations.
				• Ensure interventions noted above are completed by TCCC ASM, CLS, and CMC personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include: **Mechanical Ventilation (For trained providers)** • Use of mechanical ventilators in the PCC environment requires experience and training, best accomplished under board-certified medical personnel and sustained routinely. • Ensure appropriate amount of induction, sedation, and pain management to sustain the patient for up to 96 hours in a PCC environment.
				Role 1a • BVM, NPA, Pulse oximetry to maintain >92%. • Intubate if no gag reflex and casualty is salvageable (TBI).
				Role 1b • Add EtCO, monitoring, goal 35–45mmHg; initiate mechanical ventilation.
				Role 1c • Establish sedation, pain management maintenance plan for >96 hours; use non-invasive ventilation as able. • Monitor ABGs.

Additional Considerations

- When in a PCC environment, simple monitoring technologies are able to be used by most providers in each of the provider categories to ensure adequate gas exchange and oxygen delivery. Peripheral oxygen saturation can be measured using a pulse oximeter which provides a measurement of hemoglobin saturation and, by inference, the effectiveness of measures to oxygenate a patient. Ventilation can be monitored with end-tidal carbon dioxide. The use of these tools together in a PCC environment provides estimates of oxygen transport to the cells, tissue metabolism, and adequacy of ventilation.
- Providers in the PCC environment can adopt, implement, monitor, and sustain respiration using concepts of manipulating minute ventilation (respiratory rate multiplied by tidal volume). Put simply, it is the number of times a patient is breathing each minute multiplied by the amount of air breathed in with each breath.
- Support of adequate minute ventilation can be performed in an escalating algorithm with rescue breathing, bag valve mask assisted ventilation, and mechanical ventilation. Each of these methods may require escalation of airway management skills and respiratory skills. Manipulation of any of the variables of minute ventilation will alter gas exchange. Therefore, medical providers in the PCC environment at all levels will need to be competent with the monitoring devices appropriate to their level of training. At a minimum, all providers with specific medical training should be competent to use and interpret the previous paragraph's monitoring devices.
- The causes of respiratory failure can overlap and become confusing. When in doubt and whenever possible, initiate a Telemedicine Consultation for further guidance and input.

Circulation and Resuscitation

Background

PCC presents a unique challenge for implementing damage control resuscitation (DCR) as defined by the JTS guideline. PCC goes beyond DCR and should bridge the gap between the prevention of death, the preservation of life, and definitive care. The goals are a return to a normal level of consciousness (LOC), increase and stabilization of systolic blood pressure at 100–110mm Hg when appropriate, and stabilization of vital signs – Heart rate, respiratory rate, oxygen saturation, etc.

Table 5 *PCC Level for Circulation and Resuscitation*

PCC Level for Circulation and Resuscitation				
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP	***All Personnel - Complete Basic TCCC Management Plan for Massive Hemorrhage then:*** **Role 1a** • Re-assess all tourniquets and wound dressings. • Ensure that bleeding has stopped. • If bleeding persists, consider additional tightening of the tourniquet, the use of an additional tourniquet, or the use of hemostatic dresssings with wound packing to stem the hemorrhage. • Conduct the principles of wound care to avoid infection and possible follow-on sepsis. • Initiate hypothermia prevention measures.
				Role 1b/1c • Continue and/or initiate above circulation interventions. • Initiate hypothermia prevention measures, if not already completed.
				• Perform all recommended interventions from guidelines for above Tier level. • Additional interventions include: **Role 1a** • Re-assess all tourniquets and wound dressings. • Ensure that bleeding has stopped. • If bleeding persists, consider additional tightening of the tourniquet, the use of an additional tourniquet or the use of hemostatic dressings with wound packing to stem the hemorrhage. • Replace any limb tourniquet placed proximal over the uniform with one applied directly to the skin 2–3 inches above the wound. • Assess extremities distal to pressure dressings. • Check pulses and the skin color distal to the dressing. • Decreased pulses or skin mottling may indicate the dressing is acting as a venous tourniquet. • If present, dressing may need to be replaced or readjusted. • Ongoing venous tourniquet could result in limb damage or development of compartment syndrome. • Conduct the principles of wound care to avoid infection and possible follow-on sepsis. • Initiate hypothermia prevention measures.
				Roles 1b/1c • Continue and/or initiate above circulation interventions. • Initiate hypothermia prevention measures, if not already completed.
				• Re-assess and re-apply MARCH interventions. • Review transfusion transmitted disease (TTD)/titer of present unit members. • Ensure all interventions noted above are completed by TCCC ASM and CLS personnel • Conduct inventory of all shock treatment supplies including whole blood, testing equipment, IVs, and other resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include:

(continues)

Table 5 *Cont.*

PCC Level for Circulation and Resuscitation		
T C C C - C M C	T C C C - C P P	**Role 1a** • Re-assess tourniquets and wound dressings as noted in above tier recommendations. • Convert tourniquets per TCCC guidelines. » In less than 2 hours if bleeding can be controlled with other means. » DO NOT remove a tourniquet that has been in place more than 6 hours. • Initiate hypothermia prevention measures. • If present, assess pelvic compression device and verify placement and tightness. • IV or intraosseous (IO) access if not already initiated in MARCH interventions: » If the casualty remains in hemorrhagic shock or at significant risk of shock. » If the casualty needs medications but cannot take them by mouth. • Initiate resuscitation with fluid replacement: » For casualties in hemorrhagic shock. » Give blood products per DCoT and TCCC guidelines. » Give calcium per TCCC guidelines. » If not already done, give TXA per TCCC guidelines. » Re-assess the casualty after each unit of blood and note on PCC FC vitals tracker. • The goals of resuscitation: » Return to a normal LOC. » Return of palpable radial pulse » Continue resuscitation until: ■ **Minimum:** palpable radial pulse or improved mental status ■ **Better:** SBP >90mmHg ■ **Best:** SBP between 100–110mmHg. » Stabilization of vital signs – Heart rate, respiratory rate, oxygen saturation. • If the patient has signs of ongoing shock despite hemorrhage control: » Re-assess look for bleeding! » Consider alternate causes of shock – hypovolemic (burn, sepsis, diarrheal illness and other causes of non-hemorrhagic shock), obstructive (tension pneumothorax or cardiac tamponade), distributive (spinal cord injury, sepsis, anaphylaxis, etc.). » If shock is not hemorrhagic, then treat for alternate cause of shock: judicious crystalloid for sepsis and burns, chest tube for tension pneumothorax; crystalloid and vasopressors* for evidence of spinal cord injury with neurogenic shock. • If resuscitation goals can all be met, maintain crystalloid IV or discontinue IV/IO resuscitation and have the casualty orally rehydrate (avoid free water due to risk of hyponatremia) until 0.3–0.5mL/kg/hr. UOP is achieved. • Initiate hypothermia prevention measures. • Differentiate between transient responder, non-responder, and refractory shock. • Communicate evacuation and re-supply requirements (i.e., blood resupply/speedball).
		Roles 1b/1c • Continue and/or initiate above circulation and resuscitation interventions. • Manage IV or IO access for ongoing resuscitation. • Initiate hypothermia prevention measures. • Differentiate between transient responder, non-responder, and refractory shock. • Communicate evacuation and re-supply requirements (i.e. , blood resupply/speedball). • Initiate teleconsultation to medical control.

(continues)

Table 5 *Cont.*

PCC Level for Circulation and Resuscitation		
TCCC-CMC	TCCC-CPP	• Re-assess and re-apply MARCH interventions. • Review TTD/titer of present unit members. • Ensure all interventions noted above are comapleted by TCCC ASM, CLS and CMC personnel • Conduct inventory of all shock treatment supplies including whole blood, testing equipment, IVs, and other resources etc. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include: **Role 1a** • Interventions for both Tier 3 and Tier 4 level providers at this phase are the same.
		Role 1b • Ultrasound may be used to further refine the cause of ongoing hemorrhage or other causes of shock if available and medical provider is trained in its use. • If ultrasound is available, teleconsultation can also be used to guide the provider in its implementation. • Continually observe for changes in patient status, signs of clinical deterioration, alternate causes of shock, and need for change in resuscitation strategies. • Continue resuscitation until: » **Minimum:** palpable radial pulse or improved mental status » **Better:** SBP >90 mmHg » **Best:** SBP between 100–110mmHg.
		Role 1c • Convert to type-specific blood replacement. • Ultrasound may be used to further refine the cause of ongoing hemorrhage or other causes of shock if available and medical provider is trained in its use. • If ultrasound is available, teleconsultation can also be used to guide the provider in its implementation. • Continually observe for changes in patient status, signs of clinical deterioration, alternate causes of shock and need for change in resuscitation strategies. • Continue resuscitation until: » **Minimum:** palpable radial pulse or improved mental status » **Better:** SBP >90mmHg » **Best:** SBP between 100–110mmHg. • If SBP remains less than 100–110mmHg despite appropriate resuscitation and hemorrhage control, a vasopressor agent should be started if available*.

**All use of pressors should be administered by role-based approved protocols or teleconsultation approval:*

- *norepinephrine continuous infusion 0.1–0.4 mcg/kg/min*
- *vasopressin continuous infusion 0.01–0.04 units*

Communication and Documentation

Background

Communication and documentation in PCC are linked priorities as they are activities that are synergistic. For instance, the standard documentation forms (see below) that are used to track the important medical interventions and trends are the recommended scripts that are used in a teleconsultation. Effective documentation leads to effective communication, both in the immediate PCC environment and as a long-term medical management tool for the casualty.

Communication

a. Communicate with the casualty if possible. Encourage, reassure, and explain care.
b. Communicate with tactical leadership as soon as possible and throughout casualty treatment as needed. Provide leadership with casualty status and evacuation requirements to assist with coordination of evacuation assets.
c. Verify evacuation request has been transmitted and establish communication with the evacuation platform as soon as tactically feasible relaying: mechanism of injury, injuries sustained, signs/symptoms, treatments rendered, and other information as appropriate. Have a rehearsed script to relay vital information to the next echelon of care prioritize interventions that cannot be seen by the next provider, such as medications.
d. Ensure appropriate notification up the chain of command that PCC is being conducted; requesting support based on the MASCAL decision points.
e. Call for teleconsultation as early and as often as needed (e.g., higher medical capability in the Chain of Command, the Advanced Virtual Support for Operational Forces system line, etc.).
f. Remember, communication of the situation and medical interventions that have been done and are ongoing includes both teleconsultation and the "handoff report."

Documentation of Care

a. There are 3 levels of documentation, categorized in a minimum, better, best format:
   i. **Minimum:** Documentation of care on the TCCC card (DD1380).
   ii. **Better:** Utilization of a standard PCC flowsheet (if available), example attached.
   iii. **Best:** Completion of a formal After Action Report (AAR) after patient handoff.
b. Transfer documented clinical assessments and treatments rendered. If the availably to scan and/or transmit this information to all parties involved teleconsultation (using all approved and available means), do so for them to have as much of the information as possible.
c. Perform a detailed head-to-toe assessment and record all findings as a problem list so that a comprehensive care plan can then be constructed using the attached flow sheet.

Table 6 *PCC Role-based Guidelines for Communications and Documentation*

PCC Role-based Guidelines for Communication and Documentation				
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP	***Complete Basic TCCC Communication and Documentation Principles then:*** • Identify requirements for communicating care to the casualty, leadership, and medical personnel in accordance with TCCC Guidelines. • Document casualty information on the DD Form 1380 TCCC Card and ensure proper placement of that card on the casualty, in accordance with DHA-PI 6040.01. • Initiate scripted teleconsultation.
	TCCC-CLS	TCCC-CMC	TCCC-CPP	• Monitor the documentation for each casualty and ensure that it is completed by those service members assisting with care. • Initiate scripted teleconsultation.
		TCCC-CMC	TCCC-CPP	**Ensure documentation and communication is completed for each casualty in accordance with PCC standards:** • Ensure that communication is established with evacuation assets and/or receiving facilities. • Prepare evacuation request and set up priorities for evacuation for each casualty. • Ensure DD1380 TCCC Cards are completed for every casualty. • Initiate scripted teleconsultation. • Complete AAR.
			TCCC-CPP	**Ensure documentation and communication is completed for each casualty in accordance with PCC standards:** • Ensure communication is established with evacuation assets and/or receiving facilities. • Initiate scripted teleconsultation, if needed. • Prepare evacuation request and set up priorities for evacuation for each casualty. • Ensure DD1380 TCCC Cards are completed for every casualty. • Complete After Action Report with an emphasis on the scenario's impact on future unit-level medical training and logistics requirements.

*Documentation in Prolonged Field Care, 13 Nov 2018 CPG[10]
https://jts.health.mil/assets/docs/cpgs/Documentation_Prolonged_Field_Care_13_Nov_2018_ID72.pdf

*Documentation Requirements for Combat Casualty Care, 18 Sep 2020 CPG[11]
https://jts.health.mil/assets/docs/cpgs/Documentation_Requirements_for_Combat_Casualty_Care_18_Sep_2020_ID11.pdf

Hypothermia

Background

Prevention of hypothermia must be emphasized in combat operations and casualty management at all levels of care. Hypothermia occurs regardless of the ambient temperature; hypothermia can, and does, occur in both hot and cold climates. Because of the difficulty, time, and energy required to actively re-warm casualties, significant attention must be paid to preventing hypothermia from occurring in the first place. Prevention of hypothermia is much easier than treatment of hypothermia; therefore, prevention of heat loss should start as soon as possible after the injury. This is optimally accomplished in a layered fashion with rugged, lightweight, durable products that are located as close as possible to the point of injury, and then utilized at all subsequent levels of care, including ground and air evacuation, through all levels of care.[12]

Table 7 *PCC Role-based Guidance for Hypothermia Management*

PCC Role-based Guidance for Hypothermia Management			
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP
Complete Basic TCCC Management Plan for Hypothermia then:			
Role 1a • Take early and aggressive steps to prevent further body heat loss and add external heat when possible for both trauma and severely burned casualties. • Minimize casualty's exposure to cold ground, wind, and air temperatures. Place insulation material between the casualty and any cold surface as soon as possible. • Keep protective gear on or with the casualty, if feasible. • Replace wet clothing with dry clothing, if possible, and protect from further heat loss. If unable to replace the dry clothing, wrap an impermeable layer around the casualty. • Place an active heating blanket on the casualty's anterior torso and under the arms in the axillae. » **Caution:** DO NOT place any active external heating directly on the skin or in areas of skin which are under pressure or have poor blood flow as this increases risk of injury and/or skin burns. • Enclose the casualty with the exterior impermeable enclosure bag, if available. • Protect the casualty from exposure to wind and precipitation on any evacuation platform.			
Role 1b • Continue and/or initiate above hypothermia interventions. • Pre-stage an insulated hypothermia enclosure system with external active heating for transition from the non-insulated hypothermia enclosure systems; seek to improve upon existing enclosure system when possible. • Upgrade hypothermia enclosure system to a well-insulated enclosure system using a hooded sleeping bag or other readily available insulation inside the enclosure bag/external vapor barrier shell. » **Best:** Improvised hypothermia wrap with high-quality insulation with cold-rated sleeping bag combined with heat source, internal vapor barrier, outer impermeable enclosure. • When using the Hypothermia Prevention and Management Kit (HPMK) ready-heat-blanket, perform frequent skin checks to monitor for contact burns. • Protect the casualty from exposure to wind and precipitation on any evacuation platform.			
Role 1c • Continue and/or initiate the Role 1a/Role 1b phases as detailed above. • Replace ready-heat-blanket when using >10 hours.			
• Perform all recommended interventions from guidelines for above Tier level • Additional interventions include: **Role 1a** • Communicate re-supply requirements.			
Role 1b • Protect the casualty from exposure to wind and precipitation on any evacuation platform.			
Role 1c • Continue and/or initiate the Role 1a/Role 1b phases as detailed above • Replace ready-heat-blanket when using >10 hours.			
• Interventions for both CMC and CPP are the same. • Ensure all interventions noted above are completed by TCCC ASM and CLS personnel • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include:			

(continues)

Table 7 *Cont.*

PCC Role-based Guidance for Hypothermia Management		
TCCC-CMC	TCCC-CPP	**Role 1a** • Use a battery-powered warming device to deliver IV resuscitation fluids, in accordance with current TCCC guidelines, at flow rate up to 150mL/min with a 38°C output temperature. • Communicate re-supply requirements.
		Role 1b • Convert to continuous temperature monitoring. » **Minimum:** Scheduled temperature measurement with vital sign evaluations. » **Better:** Continuous forehead dot monitoring. » **Best:** Continuous core temperature monitoring. • Protect the casualty from exposure to wind and precipitation on any evacuation platform.
		Role 1c • Continue and/or initiate the Role 1a/Role 1b phases as detailed above. • Replace ready-heat-blanket when using >10 hours.
		• Interventions for both CMC and CPP are the same.

*Hypothermia Prevention, Monitoring and Management, 18 Sep 2012 CPG[12]
https://jts.health.mil/assets/docs/cpgs/Hypothermia_Prevention_Monitoring_and_Management_20_Sep_2012_ID23.pdf

Hyperthermia

Background

1. Hyperpyrexia is elevated body temperature.
2. Fever is elevated body temperature in response to a change in hypothalamic set point (infections).
3. Hyperthermia is elevated body temperature without a change in hypothalamic set point (heat illness, hyperthyroid, drugs).
4. The Second Law of Thermodynamics states that heat flows from hot to cold.
5. Heat transfer can occur through several processes:
   a. Radiation
   b. Conduction
   c. Convection
   d. Evaporation

Heat exhaustion

Symptoms: weak, dizzy, nauseated, headache, sweating, normal mental status. Heat exhaustion requires replacement of fluids and electrolytes.

Heat stroke

Symptoms: Hyperthermia + mental status changes. Heat stroke requires immediate cooling.

Table 8 *PCC Role-based Guideline for Hyperthermia Management*

PCC Role-based Guidance for Hyperthermia Management			
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP
			Complete Basic TCCC Management Plan for Hyperthermia then:
			Role 1a • Move the casualty to the shade if possible. • Insulate the casualty from the ground (conduction). • Remove the casualty from a vehicle (radiation). • If situation allows, remove the casualty's helmet and vest (evaporation). • Fan the casualty (convection). • If the casualty is conscious and not vomiting, give liquids. • Protect the casualty from exposure to sources of heat if possible. • DO NOT give acetaminophen, aspirin, or ibuprofen for hyperthermia, only for fever. • Prevent heat illness/injury in casualties by maintaining hydration, adding salt to food, resting in shade, staying off hot surfaces (ground or vehicle), removing tactical gear when possible.
			Role 1b Continue and/or initiate above hyperthermia interventions.
			Role 1c Continue and/or initiate the Role 1a/Role 1b phases as detailed above.
			• Perform all recommended interventions from guidelines for above tier level • Additional interventions include:
			Role 1a • If the casualty is unconscious or vomiting, use IV/IO fluids. • Communicate re-supply requirements.
			Role 1b Continue and/or initiate above hyperthermia interventions.
			Role 1c Continue and/or initiate the Role 1a/Role 1b phases as detailed above.
			• Interventions for both CMC and CPP providers are the same. • Ensure all interventions noted above are completed by TCCC ASM and CLS personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include: **Role 1a** • If the casualty is unconscious or vomiting, use IV/IO fluids. • Monitor for signs and symptoms of heat exhaustion – if present: Immediately replace fluids and electrolytes. • Monitor for signs and symptoms of heat stroke – if present: • Immediate cooling must be initiated. » **Minimum:** Wetting clothing. » **Better:** Fanning the casualty after wetting clothing. » **Best:** Immersion in water. • Casualties should eat, if possible, to prevent sodium loss, which may lead to dilutional hyponatremia (low sodium). • Dilutional hyponatremia may look like heat illness but is due to drinking and not eating. • Seizures should be treated with benzodiazepines. • Communicate re-supply requirements.

(continues)

Table 8 *Cont.*

PCC Role-based Guidance for Hyperthermia Management		
TCCC-CMC	TCCC-CPP	**Role 1b** • Convert to continuous temperature monitoring. » **Minimum:** Scheduled temperature measurement with vital sign evaluations. » **Better:** Continuous forehead dot monitoring. » **Best:** Continuous core temperature monitoring. • Prevent heat illness/injury in casualties by maintaining hydration, adding salt to food, resting in shade, staying off hot surfaces (ground or vehicle), removing • tactical gear when possible.
		Role 1c • Continue and/or initiate the Role 1a/Role 1b phases as detailed above.
		Interventions for both CMC and CPP are the same.

Head Injury/TBI

Background

TBI occurs when external mechanical forces impact the head and cause an acceleration/deceleration of the brain within the cranial vault which results in injury to brain tissue. TBI may be closed (blunt or blast trauma) or open (penetrating trauma).[13] Signs and symptoms of TBI are highly variable and depend on the specific areas of the brain affected and the injury severity. Alteration in consciousness and focal neurologic deficits are common. Various forms of intracranial hemorrhage, such as epidural hematoma, subdural hematoma, subarachnoid hemorrhage, and hemorrhagic contusion can be components of TBI. The vast majority of TBIs are categorized as mild and are not considered life threatening; however, it is important to recognize this injury because if a patient is exposed to a second head injury while still recovering from a mild TBI, they are at risk for increased long-term cognitive effects. Moderate and severe TBIs are life-threatening injuries.

Pre-deployment, Mission Planning, and Training Considerations

1. Conduct unit level TTD/Titer testing and develop an operational roster.
2. Conduct baseline neurocognitive assessment per Service guideline.
3. When possible and practical, keep patient in an elevated orientation to approximately 30 degrees while maintaining C-spine precautions (as clinically indicated) and airway control (don't just elevate the head by bending the neck).
4. Define CSWB distribution quantities in area of responsibility.
5. Determine feasibility and requirement for pre-deployment unit level blood draw.
6. Conduct unit level pre-deployment blood draw as required.
7. Ensure critical head-injury adjunct medications appropriately stocked and storage requirements met.

Treatment Guidelines

Table 9 *PCC Role-based Guideline for Head Injury/TBI Management*

PCC Role-based Guidance for Head Injury/TBI Management			
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP
Complete Basic TCCC Management Plan for Heat Injury/TBI then: **Role 1a** • Identification and local wound management of any open head wounds/skull fractures. Priorities should include hemorrhage control, removal of gross contamination, and protection/coverage of any exposed dura or brain matter. • Military Acute Concussive Evaluation 2 (MACE2) (*See Appendix E) examination per DoD/TCCC guideline. • Communicate evacuation requirements (need for TBI evaluation, neurosurgery) • Communicate re-supply requirements.			
Role 1b/1c • Re-assess and re-apply MARCH interventions. • Serial neurologic checks, including pupil exam and identify signs of elevated or rising intracranial pressure (Appendix E) – at least hourly. • Identify catastrophic/non-survivable brain injury. • Upgrade evacuation priority and destination (facility with neurosurgical capabilities) • for any patient with initial mild TBI who deteriorates to moderate/severe TBI category.			
• Re-assess and re-apply MARCH interventions. • Conduct inventory of all treatment supplies. • Document all pertinent information on PCC Flowsheet (attached).			
Role 1a • Identification and local wound management of open head wounds/skull fractures. Priorities should include hemorrhage control, removal of gross contamination, and protection/coverage of any exposed dura or brain matter. • MACE2 examination per TCCC guideline. • Communicate evacuation requirements (need for TBI evaluation, neurosurgery). • Communicate re-supply requirements.			
Role 1b/1c • Re-assess and re-apply MARCH interventions. • Serial neurologic checks and identify signs of elevated or rising intracranial pressure (Appendix E). • Administer appropriate antibiotics for any open head wounds or skull fracture (see antibiotics section). • Identify the critical observations that should be reported to medical personnel for trauma casualties with a suspected head injury, in accordance with the MACE2. • Teleconsultation with trauma surgeon and/or neurosurgeon as available. • Upgrade evacuation priority and destination (facility with neurosurgical capabilities) for any patient with initial mild TBI who deteriorates to moderate/severe TBI category.			
• Re-assess and re-apply MARCH interventions. • Ensure all interventions noted above are completed by non-medical TCCC ASM and CLS personnel and CLS-trained service members. • Conduct inventory of all treatment supplies. • Document all pertinent information on PCC Flowsheet (attached). **Role 1a** • Identification and local wound management of any open head wounds/skull • fractures. Priorities should include hemorrhage control, removal of gross contamination, and protection/coverage of any exposed dura or brain matter.			

(continues)

Table 9 *Cont.*

PCC Role-based Guidance for Head Injury/TBI Management		
TCCC-CMC	TCCC-CPP	• Identify signs of elevated or rising intracranial pressure (ICP) per Appendix E. Initiate immediate treatment for signs of elevated ICP including initial bolus of 3% hypertonic saline (HTS) 250–500mL if available. Alterative: 23.4% sodium chloride. • Administer TXA as single 2g IV or IO bolus (no second dose required). • Communicate evacuation requirements (need for TBI evaluation, neurosurgery). • Communicate re-supply requirements.
		Role 1b • Re-assess and re-apply MARCH interventions. • Administer appropriate antibiotics for any open head wounds or skull fracture (see antibiotics section). • Maintain goal SBP >90mmHg with initial fluid/blood product resuscitation. • Serial neurologic checks and identify signs of elevated or rising intracranial pressure (Appendix E); If noted, the following interventions are recommended, if possible: » HTS administration (intermittent bolus versus continuous infusion) per Appendix E. Alterative: 23.4% sodium chloride. » Supplemental oxygen to maintain O_2 sats >94% and <99%, $EtCO_2$ if intubated with goal of mild hyperventilation to 35–40. » Brief (less than 30 minutes) moderate hyperventilation to goal pCO_2/$EtCO_2$ 20–30 may be performed for signs of impending/active herniation (pupil becomes fixed and dilated); if there is a neurosurgical capability. **Note: Use hyperventilation only as a temporizing measure while additional ICP treatments are being administered or tactical evacuation is in process. • Repeat primary and secondary survey for any abrupt decline in the Glasgow Coma Scale (GCS) or change in pupil exam to rule out non-neurologic causes. • Minimize analgesia and sedation agents, and avoid paralyses, if possible, to preserve ability to obtain neurologic exam, but medical and operational considerations should take priority if deeper sedation or paralysis required. • Teleconsultation with Trauma Surgeon and/or Neurosurgeon as available. • Upgrade evacuation priority and destination (facility with neurosurgical capabilities) for any patient with initial mild TBI who deteriorates to moderate/severe TBI category. • Repeat triage evaluation and identification of likely non-survivable condition (or associated injuries) based on injury types/severity and required vs available resources.
		Role 1c • Continue serial neurologic checks including GCS and pupil exam at least hourly. • Immediate seizure treatment with benzodiazepines, consider ketamine for refractory seizures. • Temperature management and aggressive fever control. • Teleconsultation with trauma surgeon and/or neurosurgeon as available. • Upgrade evacuation priority and destination (facility with neurosurgical capabilities) for any patient with initial mild TBI who deteriorates to moderate/severe TBI.
		• Re-assess and Re-apply MARCH interventions. • Ensure all basic nursing interventions noted above are completed by non-medical TCCC ASM and CLS personnel, CLS-trained service members and medics/corpsmen. • Conduct inventory of all treatment supplies. • Document all pertinent information on PCC Flowsheet (attached).

(continues)

Table 9 *Cont.*

PCC Role-based Guidance for Head Injury/TBI Management	
TCCC-CPP	**Role 1a** • Identification and local wound management of any open head wounds/skull fractures. Priorities should include hemorrhage control, removal of gross contamination, and protection/coverage of any exposed dura or brain matter. • MACE2 examination per TCCC guideline. • Serial GCS exams (Appendix E.) • Identify signs of elevated or rising ICP per Appendix E. • Initiate immediate treatment for signs of elevated ICP including initial bolus of 3% hypertonic saline (HTS) 250–500mL. Alterative: 23.4% sodium chloride. • Administer TXA as single 2g IV or IO bolus (no second dose required). • Communicate evacuation requirements (need for TBI evaluation, neurosurgery). • Communicate re-supply requirements.
	Role 1b • Re-assess and re-apply MARCH interventions. • Administer antibiotics for any open head wounds or skull fracture. (See Antibiotics). Cons tinue resuscitation until: » **Minimum:** palpable radial pulse or improved mental status » **Better:** SBP >90mmHg » **Best:** SBP between 100–110mmHg • If SBP remains less than 100–110mmHg despite appropriate resuscitation and hemorrhage control, a vasopressor agent should be started if available. • norepinephrine continuous infusion 0.1–0.4mcg/kg/min • vasopressin continuous infusion 0.01–0.04 units ***All use of pressers should be administered by role-based approved protocols or teleconsultation approval** • Serial neurologic checks and identify signs of elevated or rising intracranial pressure (Appendix E); If noted, the following interventions are recommended, if possible: » HTS administration (intermittent bolus versus continuous infusion) per Appendix E. Alternative: 23.4% sodium chloride. » Administer seizure prophylaxis (1g Levetiracetam), if available. » Supplemental oxygen to maintain O_2 sats >94%, $EtCO_2$ if intubated with goal of normocapnia with pCO_2 of 35–40. » Brief (less than 30 min) moderate hyperventilation to goal pCO_2/$EtCO_2$ 20–30 may be performed for signs of impending/active herniation (pupil becomes fixed and dilated). » ****Note:** Use hyperventilation only as a temporizing measure while additional ICP treatments are being administered or tactical evacuation is in process. • Repeat primary and secondary survey for any abrupt decline in the GCS or change in pupil exam to rule out non-neurologic causes. • Minimize analgesia and sedation agents, if possible, to preserve ability to obtain neurologic exam, but medical and operational considerations should take priority if deeper sedation or paralysis required. • Teleconsultation with trauma surgeon and/or neurosurgeon as available. • Upgrade evacuation priority and destination (facility with neurosurgical capabilities) for patients with initial mild TBI who deteriorates to moderate/severe TBI category. • Repeat triage evaluation and identification of non-survivable condition (or associated injuries) based on injury types/severity and required vs available resources.
	Role 1c • Continue serial neurologic checks including GCS and pupil exam at least hourly. • Immediate seizure treatment with benzodiazepines, consider ketamine for refractory seizures. • Temperature management and aggressive fever crosurgeon as available. • Upgrade evacuation priority and destination (facility with neurosurgical capabilities) for patients with initial mild TBI who deteriorates to moderate/severe TBI category.

See Appendix E for additional TBI resources.

*Traumatic Brain Injury in Prolonged Field Care, 6 December 2017 CPG[14]
https://jts.health.mil/assets/docs/cpgs/Traumatic_Brain_Injury_PFC_06_Dec_2017_ID63.pdf

Pain Management (Analgesia and Sedation)

Background

A provider of PCC must first and foremost be an expert in TCCC and then be able to identify all the potential issues associated with providing analgesia with or without sedation for a prolonged (4–48 hours.) period.

These PCC pain management guidelines are intended to be used after TCCC Guidelines at the Role 1 setting, when evacuation to higher level of care is not immediately possible. They attempt to decrease complexity by minimizing options for monitoring, medications, and the like, while prioritizing experience with a limited number of options versus recommending many different options for a more customized fashion. Furthermore, it does not address induction of anesthesia before airway management (i.e., rapid sequence intubation).

Remember, YOU CAN ALWAYS GIVE MORE, but it is very difficult to take away. Therefore, it is easier to prevent cardiorespiratory depression by being patient and methodical. TITRATE TO EFFECT.

Priorities of Care Related to Analgesia and Sedation

1. Keep the casualty alive. DO NOT give analgesia and/or sedation if there are other priorities of care (e.g., hemorrhage control).
2. Sustain adequate physiology to maintain perfusion. DO NOT give medications that lower blood pressure or suppress respiration if the patient is in shock or respiratory distress (or is at significant risk of developing either condition).
3. Manage pain appropriately (based on the pain categories below).
4. Maintain safety. Agitation and anxiety may cause patients to do unwanted things (e.g., remove devices, fight, fall). Sedation may be needed to maintain patient safety and/or operational control of the environment (i.e., in the back of an evacuation platform).
5. Stop awareness. During painful procedures, and during some mission requirements, amnesia may be desired. If appropriate, disarm or clear their weapons and prevent access to munitions/ mission essential communications.

General Principles

Consider pain in three categories:

1. **Background:** the pain that is present because of an injury or wound. This should be managed to keep a patient comfortable at rest but should not impair breathing, circulation, or mental status.
2. **Breakthrough:** the acute pain induced with movement or manipulation. This should be managed as needed. If breakthrough pain occurs often or while at rest, pain medication should be increased in dose or frequency as clinically prudent but within the limits of safety for each medication.

3. **Procedural:** the acute pain associated with a procedure. This should be anticipated and a plan for dealing with it should be considered.

Analgesia is the alleviation of pain and should be the primary focus of using these medications (treat pain before considering sedation). However, not every patient requires (or should receive) analgesic medication at first, and unstable patients may require other therapies or resuscitation before the administration of pain or sedation medications.

Sedation is used to relieve agitation or anxiety and, in some cases, induce amnesia. The most common causes of agitation are untreated pain or other serious physiologic problems like hypoxia, hypotension, or hypoglycemia. Sedation is used most commonly to ensure patient safety (e.g., when agitation is not controlled by analgesia and there is need for the patient to remain calm to avoid movement that might cause unintentional tube, line, dressing, splint, or other device removal or to allow a procedure to be performed) or to obtain patient amnesia to an event (e.g., forming no memory of a painful procedure or during paralysis for ventilator management).

In a Role 1 (or PCC) setting, intravenous (IV) or interosseous (IO) medication delivery is preferred over intramuscular (IM) therapies. The IV/IO route is more predictable in terms of dose-response relationship.

Each patient responds differently to medications, particularly with respect to dose. Some individuals require substantially more opioid, benzodiazepine, or ketamine; some require significantly less. Once you have a "feel" for how much medication a patient requires, you can be more comfortable giving it to patient with a broad range of injuries.

Similar amounts during redosing. In general, a single medication will achieve its desired effect if enough is given; however, the higher the dose, the more likely the side-effects.

Additionally, ketamine, opioids, and benzodiazepines given together have a synergistic effect: the effect of medications given together is much greater than a single medication given alone (i.e., the effect is multiplied, not added, so go with less than what you might normally use if each were given alone).

Pain medications should be given when feasible after injury or as soon as possible after the management of MARCH and appropriately documented (medication administered, dose, route, and time). Factors for delayed pain management (other than Combat Pill Pack) are need for individual to maintain a weapon/security and inability to disarm the patient.

PCC requires a different treatment approach than TCCC. Go slowly, use lower doses of medication, titrate to effect, and re-dose more frequently. This will provide more consistent pain control and sedation. High doses may result in dramatic swings between over sedation with respiratory suppression and hypotension alternating with agitation and emergence phenomenon.

Drips and Infusions

For IV/IO drip medications: Use normal saline to mix medication drips when possible, but other crystalloids (e.g., lactated Ringer's, Plasmalyte, and so forth) may be used if normal saline is not available. DO NOT mix more than one medication in the same bag of crystalloid. Mixing medications together, even for a relatively short time, may cause changes to the chemical structure of one or both medications and could lead to toxic compounds.

If a continuous drip is selected, use only a ketamine drip in most situations, augmented by push doses of opioid and/or midazolam if needed. Multiple drips are difficult to manage and should only be undertaken with assistance from a Teleconsultation with critical care experience. Multiple drips are most likely to be helpful in patients who remain difficult to sedate with ketamine drip alone and can "smooth out" the sedation (e.g., fewer peaks and troughs of sedation with corresponding deep sedation mixed with periods of acute agitation).

Other medications that should be available when providing narcotic pain control is Naloxone. If the patient receives too much medication, consider dilution of 0.4mg of naloxone in 9mL saline (40mcg/mL) and administer 40mcg IV/IO PRN to increase respiratory rate, but still maintaining pain control.

The PCC Pain Management Guideline Tables

These tables are intended to be a quick reference guide but are not standalone: you must know the information in the rest of the guideline. The tables are arranged according to anticipated clinical conditions, corresponding goals of care, and the capabilities needed to provide effective analgesia and sedation according to the minimum standard, a better option when mission and equipment support (all medics should be trained to this standard), and the best option that may only be available in the event a medic has had additional training, experience, and/or available equipment.

Medications in the table are presented as either give or consider:

a. **Give:** Strongly recommended.
b. **Consider:** Requires a complete assessment of patient condition, environment, risks, benefits, equipment, and provider training.

Use these steps when referencing the tables:

Step 1. Identify the clinical condition

a. Standard analgesia is for most patients. The therapies used here are the foundation for pain management during PCC. Expertise in dosing fentanyl (OTFC or IV) and ketamine IV or IO is a must. Intramuscular and intranasal dosing of medications isn't recommended in a PCC setting.

b. Difficult analgesia or sedation needed is for patients in whom standard analgesia does not achieve adequate pain control without suppressing respiratory drive or causing hypotension, OR when mission requirements necessitate sedating a patient to gain control over their actions to achieve patient safety, quietness, or necessary positioning.
c. Protected airway with mechanical ventilation is for patients who have a protected airway and are receiving mechanical ventilatory support or are receiving full respiratory support via assisted ventilation (i.e., bag valve).
d. Shock present is for patients who have hypotension, active hemorrhage, and/or tachycardia.

Step 2. Read down the column to the row representing your available resources and training.

Step 3. Provide analgesia/sedation medication accordingly.

Step 4. Consider using the Richmond Agitation-Sedation Scale (RASS) score (Appendix E) as a method to trend the patient's sedation level.

Table 10 *PCC Role-based Guideline for Pain Management (Analgesia and Sedation)*

PCC Role-based Guideline for Pain Management (Analgesia and Sedation)

TCCC-ASM | TCCC-CLS | TCCC-CMC | TCCC-CPP

Complete Basic TCCC Communication Plan for Pain Management then:

- Administer meloxicam and acetaminophen (pain medications in Joint First Aid Kit [JFAK]) per TCCC guidelines if not already given.
- Identify painful conditions that can be treated without the use of medications.
  - » Fractures: apply splint per TCCC guidelines.
  - » Exposed burns: burn care per TCCC guidelines.
  - » Tourniquets will cause significant pain – DO NOT remove a tourniquet in an attempt to alleviate pain unless directed to do so by a higher medical authority.

Drug/Interactions/Dose	Onset	Duration	Side-Effects
Acetaminophen • Mild-moderate pain, able to fight • Use with meloxicam • 1g q6hr	<1 hr when given by mouth	4–6 hours	• Allergic Reaction (rare) • Liver damage: limit daily dose of acetaminophen and acetaminophen-containing products (e.g., Percocet) to 4,000mg/day
Meloxicam • Mild-moderate pain, able to fight • Use with acetaminophen • 15mg daily	<1 hr when given by mouth	24 hours	• Reflux • Abdominal pain • Nausea/vomiting • Diarrhea and/or constipation

Administer meloxicam and acetaminophen (in JFAK) per TCCC guidelines if not already given.

- Pain medications should be given when feasible after injury or as soon as possible after the management of MARCH and appropriately documented (medication administered, dose, route, and time).
- Pain meds initiated in TCCC can often be continued in the PCC environment for both ongoing analgesia and sedation, as long as the duration and cumulative side effects are well understood and mitigated.

(continues)

Table 10 *Cont.*

PCC Role-based Guideline for Pain Management (Analgesia and Sedation)					
TCCC-CMC	TCCC-CMC	Drug/Interactions/Dose	Onset	Duration	Side-Effects
		OTFC (Oral Transmucosal Fentanyl Citrate) • Moderate to severe pain, unable to fight without hemorrhagic shock or respiratory distress • 800mcg q30min	5 mins when given by mouth	20–40 minutes	• Respiratory/cardiac/mental status depression • Nausea/vomiting • Pruritus (itching) • Constipation
		• **Ketamine** • Moderate to severe pain, unable to fight with hemorrhagic shock or respiratory distress • 30mg (or 0.3mg/kg) slow IV or IO push q20min • May repeat • Ketamine 50–100mg (or 0.5–1mg/kg) IM or IN q20–30min • May repeat **For Sedation** • 1–2mg/kg slow IV push initial dose • 300 mg IM (or 2–3mg/kg IM) initial dose • May repeat	30 secs IV or 1–5 mins IM	10–15 mins IV or 20–30 mins IM	• Cataleptic-like state (dissociated from the surrounding environment) • Respiratory depression at higher doses (>1mg/kg), especially with fast administration IV/IO • Hypersalivation (can be problematic in an austere setting) • Increased blood pressure and heart rate. • Nausea/vomiting
		Ondansetron (Zofran) • For nausea/vomiting • 1–2 tabs PO/SL q 4–6hr PRN • 4mg IV, may repeat • 1 time in 2 hours if N/V returns	30 min – hr when given PO or SL, 5–10 mins when given IV	3–6 hour	• Drowsiness • Fatigue • Anxiety
		Naloxone (Narcan) • For complete or partial reversal of opioid depression (respiratory/cardiac/mental) • 0.4–2mg IV/IM/IO • May repeat q2–3min (MAX dose 10mg)	1–2 minutes IV or 2– 5 minutes IM/IO	30–90 mins **Note:** some opioids have longer duration so naloxone may need to be repeated	• Abrupt withdrawal reaction from opioid depression should be anticipated and preparations should be made. • This reaction may include vomiting, sweating, tachycardia, increased blood pressure, agitation.

(continues)

Table 10 *Cont.*

PCC Role-based Guideline for Pain Management (Analgesia and Sedation)

TCCC-CMC

- Pain medications should be given when feasible after injury or as soon as possible after the
- management of MARCH and appropriately documented (medication administered, dose, route, and time).
- Pain meds that are initiated in TCCC can often be continued in the PCC environment for both ongoing analgesia and sedation, as long as the duration and cumulative side-effects are well understood and mitigated.

Drug/Interactions/Dose	Onset	Duration	Side-Effects
Fentanyl • Moderate to severe pain, unable to fight without hemorrhagic shock or respiratory distress • 50mcg IV (0.5–1mcg/kg) or • 100mcg IN, may repeat q1–2hr	1–2 minutes when given IV	30–60 minutes	• Respiratory/cardiac/mental status depression • Nausea/vomiting • Pruritus (itching) • Constipation
Ketamine • Moderate to severe pain, unable to fight with hemorrhagic shock or respiratory distress • 30mg (or 0.3mg/kg) slow IV or IO push q20min • May repeat • Ketamine 50–100mg (or 0.5–1mg/kg) IM or IN q20–30min • May repeat **For sedation** • 1–2mg/kg slow IV push initial dose • 300mg IM (or 2–3mg/kg IM) initial dose **For longer duration analgesia** • Slow IV infusion 0.3mg/kg in 100mL 0.9% sodium chloride over 5–15 minutes q45min prn for IV or IO	30 secs IV or 1–5 mins IM	10–15 mins IV or 20–30 mins IM	• Cataleptic-like state (dissociated from the surrounding environment) • Respiratory depression at higher doses (>1mg/kg), especially with fast administration IV/IO • Hypersalivation (can be problematic in an austere setting) • Increased blood pressure and heart rate • Nausea/vomiting

- When available and applicable, other medications can be considered.
- These medications should be used based on local protocols and policies put in place by your medical director or through direct teleconsultation guidance.

(continues)

Table 10 *Cont.*

PCC Role-based Guideline for Pain Management (Analgesia and Sedation)				
TCCC-CMC	**Drug/Interactions/Dose**	**Onset**	**Duration**	**Side-Effects**
	Midazolam (Versed) • For sedation and anxiolysis; will also cause anterograde amnesia • 2–4mg IM • 0.5–1mg IV (push slowly over 1–2 minutes)	15–20 mins when given IM, 2 mins when given IV	1–6 hr when given IM, 15 min–6 hrs (HIGH variability)	• Drowsiness • Respiratory depression ESPECIALLY when used with any narcotic • Nausea/vomiting
	Acetaminophen/ Hydrocodone (Norco) • For moderate-severe pain • Comes in multiple strengths of hydrocodone – 5/7.5.10mg • 1–2 tabs PO q4–6hr PRN for 5mg hydrocodone strength	10–20 minutes	3–4 hours	• Drowsiness • Respiratory depression • Sedation • Nausea/vomiting • Itching **Note:** contains acetaminophen. Be aware of total dose when given with other drugs that contain acetaminophen
	Acetaminophen/ Oxycodone (Percocet) • For moderate-severe pain • Comes in multiple strengths of oxycodone – 5/7.5/10mg • 1–2 tabs PO q4–6hr PRN for 5mg oxycodone dose	10–20 minutes	3–4 hours	• Drowsiness • Respiratory depression • Sedation • Nausea/vomiting • Itching **Note:** contains acetaminophen. Be aware of total dose when given with other drugs that contain acetaminophen
	Hydromorphone (Dilaudid) • For severe pain • 1–2mg IM • 0.5–1mg IV	15–20 mins when given IM; 2 mins when given IV	3–4 hours	• Drowsiness • Respiratory depression • Sedation • Nausea/vomiting • Itching
	Morphine • For severe pain • 5–10mg IM • 2–4mg IV	15–20 mins when given IM; 2–5 mins when given IV	3–4 hours	• Drowsiness • Respiratory depression • Sedation • Nausea/vomiting • Itching

(continues)

Table 10 *Cont.*

PCC Role-based Guideline for Pain Management (Analgesia and Sedation)				
	Drug/Interactions/Dose	**Onset**	**Duration**	**Side-Effects**
T C C C - C M C	**Tramadol (Ultram)** • For moderate-severe pain • 1–2 tabs PO q4–6hr PRN (DO NOT exceed 400mg tramadol/day)	10–20 minutes	4–6 hours	• Drowsiness • Respiratory depression • Sedation • Nausea/vomiting • CNS stimulation including seizures at high doses **Note:** Some preparations (i.e., Ultram) contain acetaminophen. Be aware of total dose when given with other drugs that contain acetaminophen.
	Codeine/acetaminophen • For moderate-severe pain • 1–2 tabs PO q4–6hr PRN (for tabs with 15mg Codeine)	30 minutes–1 hour	4–6 hours	• Drowsiness • Respiratory depression • Sedation • Nausea/vomiting • Itching **Note:** Contains acetaminophen. Be aware of total dose when given with other drugs that contain acetaminophen.
	• In some cases, local anesthetics or even limited regional anesthesia is the best option for pain control (For more information, see Military Analgesia Regional Anesthesia Guidelines.) • While side effects are real and toxic levels of these drugs must be understood and avoided, the benefit can often be achieved without sedation when appropriate for the tactical environment.			

Special Considerations

Patient Monitoring During Sedation

Patients receiving analgesia and sedation require close monitoring for life-threatening side-effects of medications.

a. **Minimum:** Blood pressure cuff, stethoscope, pulse oximeter; document vital signs trends.
b. **Better:** Capnography in addition to minimum requirements
c. **Best:** Portable monitor providing continuous vital signs display and capnography; document vital signs trends frequently.

Analgesia and Sedation for Expectant Care (i.e., End-of-Life Care)

An unfortunate reality of our profession, both military and medical, is that we encounter clinical scenarios that will inevitably end in a patient's death. In these situations, it is a

healthcare provider's obligation to give palliative therapy to minimize the person's suffering. In these circumstances, the use of opioid analgesics and sedative medications is therapeutic and indicated, even if these medications worsen a patient's vital signs (i.e., cause respiratory depression and/or hypotension). If a patient is expectant:

a. Teleconsultation
b. Prepare to:
    i. Give opioid until the patient's pain is relieved. If the patient is unable to communicate their pain, give opioid medication until the respiratory rate is less than 20/min.
    ii. If the patient complains of feeling anxious (i.e., is worrying about the future but not complaining of pain) or he cannot express himself but is agitated despite having a respiratory rate less than 20/min, give a benzodiazepine until the anxiety is relieved or the patient is sedated (i.e., is not feeling anxious or is no longer agitated).
c. Position the patient as comfortably as possible. Pad pressure points.
d. Provide anything that gives the patient comfort (e.g., water, food, cigarette).
e. Under no circumstances should paralytics be used without analgesia/sedation

*Analgesia and Sedation Management in Prolonged Field Care, 11 May 2017 CPG[15]
https://jts.health.mil/assets/docs/cpgs/Analgesia_and_Sedation_Management_during_Prolonged_Field_Care_11_May_2017_ID61.pdf

*Pain, Anxiety and Delirium, 26 April 2021 CPG[16]
https://jts.health.mil/assets/docs/cpgs/Pain_Anxiety_Delirium_26_Apr_2021_ID29.pdf

Antibiotics, Sepsis, and Other Drugs

Background

Complete Basic TCCC Management Plan for Antibiotics then:

a. Antibiotics should be given immediately after injury or as soon as possible after the management of MARCH and Pain Management and appropriately documented (medication administered, dose, route, and time).
b. Confirm that initial TCCC dose of moxifloxacin (Avelox®) or Ertapenem (Invanz) have already been given for any penetrating trauma. If available, administer tetanus toxoid IM as soon as possible.
c. Antibiotics should be given daily for seven to 10 days, depending on the type of antibiotic given (see below tables for antibiotics). When able/available, transition IV/IO antibiotics to PO as soon as possible to conserve supplies and equipment.

Table 11 *TCCC Antibiotics*

TCCC Antibiotics	
Moxifloxacin (Avelox®)	Administer 400mg PO daily for 10 days
Ertapenem (Invanz®)	Administer 1g daily IV/IO/IM for 10 days
IV/IO to PO transition	When transitioning from Ertapenem to Moxifloxacin, begin Moxifloxacin immediately after the final dose of Ertapenem for antibiotic overlap

Table 12 *Alternative Antibiotics*
(used if supplies of TCCC antibiotics are limited, or as directed by medical control)

Alternate Antibiotics			
	Good	**Better**	**Best**
Soft Tissue Injury	Cefalexin PO or Bactrim DS PO Topical: Bacitracin	Cefazolin IM/IV/IO	Moxifloxacin PO or Ertapenem IV/IO Topical: Mupriocin
Suspected MRSA	Topical: Mupirocin	Ertapenem IV/IO	Moxifloxacin PO or Ertapenem IV/IO + Vancomycin
Open Fx (I/II)	Beta-lactam Allergy: Clindamycin IV/IO	Cefazolin IV/IO	Ertapenem IV/IO or Moxifloxacin PO
Open Fx (III) no contamination	Beta-lactam Allergy: Clindamycin IV/IO + Levofloxacin IV/IO	Ceftriaxone IV/IO	Ertapenem IV/IO or Moxifloxacin PO
Open Fx (III) soil or fecal contamination	Beta-lactam Allergy: Levofloxacin IV/IO + Metronidazole IV/IO	Ceftriaxone IV/IO + Metronidazole IV/IO	Ertapenem IV/IO or Moxifloxacin PO
Penetrating Head Injury		Ceftriaxone IV/IO + Metronidazole IV/IO	Ertapenem IV/IO or Moxifloxacin PO
Penetrating Chest Injury			Ertapenem IV/IO or Moxifloxacin PO
Penetrating Abdominal Injury		Ceftriaxone IV/IO + Metronidazole IV/IO	Ertapenem IV/IO or Moxifloxacin PO
Burns (only when sepsis is suspected)			Ertapenem IV/IO or Moxifloxacin PO
Eye Injuries	Erythromycin ointment/drops	Ciprofloxacin drops (or if penicillin allergy)	Moxifloxacin PO or Ertapenem IV/IO
Dental Injuries	Pen-VK or Augmentin PO	Clindamycin PO (or IV/IO) or if penicillin allergy	Moxifloxacin PO or Ertapenem IV/IO

Sepsis Management

a. Blunt or penetrating injuries may cause sepsis in untreated or undertreated patients
b. Early recognition of impending sepsis and immediate treatment are imperative to improve changes of survival
c. Maintain a high degree of suspicion for signs of early and/or progressing sepsis while performing continuous triage
d. Sepsis is defined as suspected or proven infection plus evidence of end organ dysfunction.
e. The National Early Warning Score (NEWS)[17] is an aggregate scoring system indicating early physiologic derangements:

Table 13 *Physiologic Parameters and NEWS Score*

Physiologic Parameters	3	2	1	0	1	2	3
Respiratory Rate	≤8		9–11	12–20		21–34	≥25
Oxygen Saturation	≤91	92–93	94–95	≥96			
Temperature	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	
Systolic BP	≤90	91–100	101–110	111–219			
Heart Rate	≤40		41–50	51–90	91–110	111–130	≥131
Level of Consciousness				A			V,P,U

f. For the purposes of this guideline, a NEWS score of >2 is used to increase the sensitivity for detection of and evaluation for sepsis.
g. Early teleconsultations should be used for any signs of sepsis
h. Additional parenteral antibiotics may be required to treat sepsis as well as vasopressors.
i. All use of pressers should be administered by role-based approved protocols or teleconsultation approval.

NOTE: Surgical telemedicine consultation is highly recommended to guide management of intra-abdominal infections (i.e., appendicitis, cholecystitis, diverticulitis, abdominal abscess).

Sepsis Treatment

Table 14 *Sepsis Treatments/Interventions*

Intervention	Paradigm
Antimicrobial Therapy	• **Minimum:** Moxifloxacin 400mg PO daily • **Better:** Ertapenem 1g IV/IO q24hr OR ceftriaxone 2g IV/IO q24hr • **Best:** ceftriaxone 2gIV/IO q24hr, PLUS vancomycin 1.5mg/kg IV/IO q12hr, PLUS metronidazole 500mg IV/PO/IO q8hr
Antiparasitic Regimens	• **Minimum:** Atovaquone/progauanil (Malarone) 4x3 regimen – 4 tablets PO daily for 3 days • **Better/Best:** Artemether/lumefantrine (Coartem) 4 tablets PO initially, then 4 tablets after 8 hours, then 4 tablets PO twice daily for 2 more days (24 tablets total)
Antifungal Regimens	• **Minimum/Better/Best:** Fluconazole 400mg PO/IV daily
Fluid Resuscitation	• **Minimum:** In the absence of IV/IO capability, have the patient drink water » If available, include electrolyte oral rehydration solution, especially for patients who cannot consume food • **Better:** IV/IO crystalloids: » Initial rapid infusion of 30mL/kg should be given upon identification of sepsis » LR or NS to maintain SBP >90mmHg or MAP ≥ 65mmHg » If plasma is being given that volume can count toward the 30mL/kg goal • **Best:** The same fluid resuscitation strategy as above with the addition of a urinary catheter for more precise measuring of UOP
Vasopressors	• After fluid resuscitation, if there is no observed positive change in SBP, MAP, UOP and/or mental status, vasopressor medications should be given • ***All use of pressers should be administered by role-based approved protocols or teleconsultation approval*** • First-line – norepinephrine infusion • Second-line – epinephrine infusion • Refer to Drip table below for preparation, starting dose, and drip rates
Additional Medications	• Consider hydrocortisone or dexamethasone administration for possible adrenal insufficiency if there is a poor response to vasopressor initiation/titration » Administer antipyretics (acetaminophen, if available. Non-steroidal anti-inflammatory drugs [NSAIDs] should be avoided as they may impair renal function)

Table 15 *Epinephrine 1:10,000 (Adrenaline) or Norepinephrine (Levophed) Drip*

0.9% NaCl IVF Bag Size	Add to bag: EPI (or NOREPI): 1:10,000 (0.1 mg or 100mcg)/mL	Starting Dose (mcg/min)	DRIP SET: 10gtts (Drops/mL) DRIP RATE: (Drops/min or gtts/min)	DRIP SET: 15gtts (Drops/mL) DRIP RATE: (Drops/min or gtts/min)
50 mL	1mL (100mcg)	4 mcg/min	20 drops/min	30 drops/min
100 mL	2mL (200mcg)	4 mcg/min	20 drops/min	30 drops/min
250 mL	5mL (500mcg)	4 mcg/min	20 drops/min	30 drops/min
500 mL	10mL (1mg)	4 mcg/min	20 drops/min	30 drops/min
1000 mL (1L)	20mL (2mg)*	4 mcg/min	20 drops/min	30 drops/min

*This is the least recommended approach as it commits a high volume of epinephrine to a large bag. If the patient's vital signs (BP/MAP/HR) stabilize, the bag must be discontinued and the medic risks wasting some of their resources – "you can mix a drug in an IV bag, but you can't take it out."

Ancillary Medications

During PCC, additional medications may be required during the extended treatment of casualties, in addition to pain and antibiotic medications. These medications may have synergistic effects to further reduce pain or fever. Some medications may be utilized to treat side-effects of medications, to include nausea or other GI related issues.

Deep vein thrombosis (DVT) prophylaxis is also recommended for patients that are expected to be in a PCC setting for greater than 48 hours that have achieved hemostasis from wounds or are not at risk for further hemorrhage.

Table 16 *Ancillary Medications*

	Minimum	Better	Best
Airway	Albuterol MDI Suctioning: Sterile water or 0.9% saline	Albuterol (Neb)	Albuterol (Neb) + Atrovent (Neb)
***Antipyretic**	Meloxicam	Acetaminophen PO/PR or Ibuprofen	Acetaminophen IV/IO or Ketoralac IM/IV/IO
Anxiety/Behavioral	See "Pain and Sedation"		
DVT Prophylaxis	Aspirin PO	Heparin SQ	Lovenox SQ
Hydration (PO)	Water	Water + salt + sugar	Water + Gatorade (or other oral rehydration salt)
Hydration (IV/IO)	0.9% Saline or Lactated Ringers	Plasma-Lyte	
Nausea / Vomiting	Alcohol Pad (inhale vapor)	Ondansetron PO or ODT Promethazine	Ondansetron IV/IO or Metoclopramide IV/IO
GI Medications	Ranitidine PO	Prilosec PO	Protonix IV/IO H1/H2 Blockers IV/IO
GI – Constipation	Bisacodyl PO Glycerin Suppository	Mirilax PO Senna PO	Enema
Sleep	Melatonin PO	Diphenhydramine PO	Zolpidem PO Temazepam PO
Other Medications:	Oral Care (toothbrush/tooth paste and Chapstick) Eye drops (intubated/sedated) Multi-Vitamins (PO daily) Animal Bites: Rabies Vaccine and Rabies Immunoglobulin HIV Prophylaxis (exposure from combat: civilians or enemy forces): PEP Guidance Regional Medications: Ensure continuing prophylaxis (malaria, etc.)		

*Antipyretic: Use caution with NSAIDs with urgent or priority patients. Ensure patient can void normally (no impaired renal function).

*Infection Prevention in Combat-related Injuries, 27 Jan 2021 CPG[18]
https://jts.health.mil/assets/docs/cpgs/Infection_Prevention_in_Combat-related_Injuries_27_Jan_2021_ID24.pdf

*Sepsis Management in Prolonged Field Care, 28 Oct 2020 CPG[19]
https://jts.health.mil/assets/docs/cpgs/Sepsis_Management_PFC_28_Oct_2020_ID83.pdf

Wound Care and Nursing

Background

Nursing interventions may not appear important to the medical professionals caring for a patient, but such interventions greatly reduce the possibility of complications such as DVT, pneumonia, pressure sores, wound infection, and urinary tract infection; therefore, essential nursing and wound care should be prioritized in the training environment. Critically ill and injured casualties are at high risk for complications that can lead to adverse outcomes such as increased disability and death. Nursing care is a core principle of PCC to reduce the risk of preventable complications and can be provided without costly or burdensome equipment.[20]

a. Using a nursing care checklist assists with developing a schedule for performing appropriate assessments and interventions.
b. Cross training all team members on these interventions prior to deployment will lessen the demand on the medic, especially when caring for more than one patient.
c. Prolonged Casualty Care Flowsheets, Nursing Care Checklists, Nursing Care Plans, Assessment/Intervention Packing List, and Recommended Nursing Skill Checklist for Clinical Rotations are included as a PCC Guidelines Appendix. (Also located in JTS Nursing Intervention in Prolonged Field Care CPG, 22 Jul 2018[18]).
https://jts.health.mil/assets/docs/cpgs/Infection_Prevention_in_Combat-related_Injuries_27_Jan_2021_ID24.pdf

Pre-deployment, Mission Planning, and Training Considerations

a. Hands-on experience is optimal; simulation is a reasonable substitute
b. Practice with minimal technology so you are prepared when you lose access to electricity, water
c. Regular monitoring, reassessment, and intervention is lifesaving but can be resource-intensive
d. Utilize the Recommended Nursing Skill Checklist for Clinical Rotations included in Appendix B to maximize training opportunities.

Table 17 *PCC Role-based Guidelines for Nursing Care and Wound Management*

PCC Role-based Guidelines for Nursing Care and Wound Management						
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP			
				All Personnel - Complete Basic TCCC Management Plan for Nursing/Wound Management then: • Many "nursing" interventions are actually basic soldier skills that need to be performed on those casualties who cannot perform them on themselves. • Therefore, many traditional non-medical tasks are listed at the Tier 1 level since they can essentially be performed by anyone, but the activity can be overseen by medical personnel.		
				Intervention	**Frequency**	**Paradigm**
				Lip care	Every hour	• **Minimum:** Commercial lip balm • **Better:** Moisturizing lotion • **Best:** Petroleum jelly
				Oral/Nasal Care	24 hours	• **Minimum:** Rotate site around mouth/nares, as feasible. • **Better:** Rotate site and suction. • **Best:** Rotate and suction with commercial device.
				Oral/Dental Care	Every 12 hours	• **Minimum:** Brush with gauze, water, and gloved finger • **Better:** Brush with toothbrush with toothpaste. • **Best:** Use toothbrush with Chlorhexidine rinse.
				Cough/Deep Breathing	Every hour	• **Minimum**: Encourage deep breathing/forced cough x 10. • **Better:** Sit up. Encourage deep breathing/forced cough x 10. • **Best:** Sit up, turn, and encourage deep breathing with incentive spirometer/forced cough x 10.
				Repositioning/ Check Padding	Every 2 hours	• **Minimum:** Turn to opposite side, pad with clothing or textiles. • **Better:** Turn to opposite side, pad with pillows or blankets. • **Best:** Turn to opposite side, pad with pillows to all bony prominences and between legs.
				Splint Care	Every 2 hours	• **Minimum:** Use improvised splints (i.e., wood fence, plank). • **Better:** Use commercial splinting device (e.g., SAM splint). • **Best:** Use ortho-fiberglass splint with fluffing and elastic wrap. • **Re-check all pulses after splint placement.
				Hypothermia Prevention	Continuous	• **Minimum:** Wrap patient in dry clothes or blankets. • **Better:** Wrap patient in commercially available hypothermia prevention kit, using air-activated heating element. • **Best:** As above, add use of warmed, forced air and infusion of warmed fluids using commercially available devices.

(continues)

Table 17 *Cont.*

PCC Role-based Guidelines for Nursing Care and Wound Management						
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP	**Intervention**	**Frequency**	**Paradigm**
				Head Injury	Continuous	Elevate head of bed 30 degrees and then: • **Minimum:** Lay patient against ruck sack/ backpack • **Better:** Pillows or blankets • **Best:** NATO litter back rest
				Non-medical Interventions	Every hour	• **Minimum:** Distract the patient and perform guided imagery. • **Better:** Splint wounds, pad boney prominences, provide ice packs to injured/ swollen areas (or alternate with warm packs). • **Best:** As above, combine both elements.
				Psycho-social Needs	Continuous	• **Minimum:** Speak in calm tone, addressing casualty concerns, to reduce fear and anxiety. • **Better:** Support with caring touch, listening to fears/concerns; explain all procedures. • **Best:** Institute rest/sleep cycle system to minimize delirium.
				Nutrition	Every 4–6 hours	• **Minimum:** If patient is alert, encourage oral food/water intake. • **Better:** As above, use MRE protein powder mixed with water. • **Best:** As above, use commercially available tube feeding products or protein shakes.
				Hygiene	Every 24 hours	• **Minimum:** Rinse face, armpits, and groin with warm water, soap, and gauze roll. • **Better:** As above, use baby wipes or wash cloth. • **Best:** As above, use chlorhexidine-impregnated cleansing wipes.
				Bowel Management	As required	• **Minimum:** Cleanse soiled skin as described for bath; reapply new dressings/hypothermia management as appropriate. • **Better:** As above, add a cloth/linen/plastic barrier to protect wounds/hypothermia management kit from future soiling. • **Best:** As above, add barrier cream to skin for protection against breakdown.
				• Perform all recommended interventions from guidelines for above Tier level. • Additional interventions include:		

(continues)

Table 17 *Cont.*

PCC Role-based Guidelines for Nursing Care and Wound Management					
TCCC-CLS	TCCC-CMC	TCCC-CPP	**Intervention**	**Frequency**	**Paradigm**
			IV/IO Site Care		• **Minimum:** Flush intravenous catheter every 12 hours; change intravenous infusion tubing every 96 hours. • **Better:** Flush intravenous catheter every 8 hours; change intravenous infusion tubing every 72 hours. • **Best:** Flush intravenous catheter every 4 hours. Change intravenous infusion tubing every 48 hours. • For IO: monitor the site closely for skin compromise (underneath the hub of the IO); if possible, convert to an IV within 24 hours.
			Wound Irrigation	Every 24 hours	• **Minimum:** Irrigate wound with potable water (cooled before use if boiled) poured across wound • **Better:** As above, use 10cc syringe and 18-gauge angio-catheter. • **Best:** As above, using sterile saline or sterile water or appropriate antimicrobial cleaning solution (i.e., Dankins).
			Dressing Change		• **Minimum:** Reinforce dressings. • **Better:** Replace when soiled. • **Best:** Change every 24 hours.
			• Ensure above nursing interventions are completed by non-medical TCCC ASM and CLS personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include:		
			Suction mouth/airway, if indicated	As often as required	• **Minimum:** Toomey syringe attached to thin tubing • **Better:** Manual suction device • **Best:** Powered suction device
			Monitor assisted ventilation	Continuous: every hour	• **Minimum:** Use bag-valve-mask ventilation. • **Better:** Mechanical ventilator (without oxygen support), titrate settings based on pulse oximetry. • **Best:** Mechanical ventilator (with oxygen support).
			IV Fluid Calculation		• **Minimum:** Estimate fluid rate using infusion drip rate calculation. • **Better:** Use "dial-a-flow" technology to control rate of infusion. • **Best:** Use commercial infusion pump.

(continues)

Table 17 *Cont.*

PCC Role-based Guidelines for Nursing Care and Wound Management				
TCCC-CMC	TCCC-CPP	**Intervention**	**Frequency**	**Paradigm**
		Deep Vein Thrombosis Prevention ***Pay attention to any wounds to the affected limb***	Every 1–2 hours	• **Minimum:** Massage lower extremities • **Better:** As above; add application of compression stockings or elastic bandages to improve venous return. • **Best:** As above; add application of commercial mechanical compression stockings.
		Head Injury (Serial Neuro Exams)		• **Minimum:** Assess pupillary response, GCS and level of consciousness/orientation, every 8–12 hours; MACE Exam x 1. • **Better:** Neuro exam (as above) every 4 hours; MACE exam every 24 hours. • **Best:** Neuro exam (as above) every 1 hour, MACE exam every 24 hours.
		Hyperthermia Prevention/Treatment		• **Minimum:** Expose skin to air. • **Better:** Place cold, wet cloths to groin, neck, armpits (ice packs may cause hypothermia). • **Best:** Use of cooled, forced air and infusion of cooled fluids using commercially available devices.
		Administer Antibiotics		• **Minimum:** Provide oral or intramuscular injection of antibiotics per CPG. • **Better:** Administer intravenous infusion of broad-spectrum antibiotics, per CPG. • **Best:** Administer wound- or mechanism-specific antibiotics via intravenous infusion, as directed by provider oversight.
		Pain Control		• **Minimum:** Intermittent dosing of analgesics given oral/intramuscular/intravenous/subcutaneous • **Better:** Continuous infusion of analgesics • **Best:** Regional nerve blocks
		• Ensure above nursing interventions are completed by non-medical TCCC ASM and CLS personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include:		
		Suction Advanced Airway	Every hour	• **Minimum:** Manual suction device or improvised suction device, such as a 25cm length portion of IV tubing connected to a 60mL syringe • **Better:** Open suction tube, suction machine • **Best:** Closed inline suction tube, suction machine

(continues)

Table 17 *Cont.*

PCC Role-based Guidelines for Nursing Care and Wound Management			
TCCC-CPP	**Intervention**	**Frequency**	**Paradigm**
	Oro/naso-gastric Tube Management		• **Minimum:** Cleanse area and rotate position every 12 hours; flush with water every 12 hours (check residuals prior) • **Better:** As above, every 8 hours (check residuals prior) • **Best:** As above, every 4 hours (check residuals prior)
	Foley Care	24 hours	• **Minimum:** Cleanse around catheter insertion site as part of bath, every 24 hours. • **Better:** Cleanse around catheter insertion site using soap and water, every 12 hours. • **Best:** Cleanse around catheter insertion site using chlorhexidine-impregnated cleansing wipes, every 12 hours.

*Nursing Intervention in Prolonged Field Care, 22 Jul 2018 CPG[20]
https://jts.health.mil/assets/docs/cpgs/Nursing_Intervention_Prolonged_Field_Care_22_Jul_2018_ID70.pdf

*Acute Traumatic Wound Care in the Prolonged Field Care Setting, 24 Jul 2017 CPG[21]
https://jts.health.mil/assets/docs/cpgs/Wound_Management_PFC_24_Jul_2017_ID62.pdf

Splinting and Fracture Management

Table 18 *Splinting and Fracture Treatment*

Intervention	Paradigm
Litter Padding	• **Minimum:** Excess uniforms or other textiles • **Better:** Blankets or military sleep pad • **Best:** Blankets or military sleep pad
Splint Placement	• **Minimum:** Improvised splints (wood fence, metal plank, etc.) • **Better:** Commercial splinting device (e.g., SAM splint) • **Best:** Commercial splinting device (e.g., SAM splint) • *Re-check all pulses after splint placement*
Pressure Injury Prevention	• Examine skin, including nares and mouth, for changes and ensure splints are fitted properly and pulses are present below splint. • Monitor for allergic reactions to tape, developing erythema, excessive dryness, pressure indenting the skin, cracking, or breakdown. • **Minimum:** As described above, every 2 hours • **Better:** As above, adding padding to elevate bony prominences off the ground/litter/bed • **Best:** As above, adding commercial barrier creams and pressure injury dressings (e.g., Mepilex) to bony prominences
Straps	• Patient secured for transport with padding/hypothermia considerations • All patient care items secured for flight or seaboard transport » Waterproof outer shell (HPMK) » Packaged to resist heavy wind from rotor wash and wind
Litter Padding	• **Minimum:** Allow casualty to maintain airway • **Better:** Facial burns may be associated with inhalation injury. Aggressively monitor airway status and place the casualty in a recovery position IAW TCCC Guidelines • **Best:** Given a trauma casualty who is unresponsive or has an airway obstruction, perform a Head-Tilt Chin Lift or Jaw-thrust maneuver to open the airway IAW with TCCC guidelines

*JTS Orthopaedic Trauma: Extremity Fractures CPG, 26 Feb 2020[22]
https://jts.health.mil/assets/docs/cpgs/Orthopaedic_Trauma_Extremity_Fractures_26_Feb_2020_ID56.pdf

Burn Treatment

Background

a. Interrupt the burning process
b. Address any life-threatening process based on MARCH assessment as directed by TCCC.
c. A burned trauma casualty is a trauma casualty first
d. All TCCC skills can be performed through burned tissue

Burn Characteristics

a. **Superficial burns (1st degree)** appear red, do not blister, and blanch readily.
b. **Partial thickness burns (2nd degree)** are moist and sensate, blister, and blanch.
c. **Full thickness burns (3rd degree)** appear leathery, dry, non-blanching, are insensate, and often contain thrombosed vessels

Table 19 *PCC Role-Based Guidelines for Burn Management*

PCC Role-based Guidelines for Nursing Care and Wound Management			
TCCC-ASM	TCCC-CLS	TCCC-CMC	TCCC-CPP
• Perform primary and secondary surveys for any trauma patient. Acute injuries found in the primary and secondary survey should be addressed as per standard trauma protocols • Avoid becoming distracted by the appearance of burned tissues.			
Interventions	**Paradigm**		
Airway (Roles 1a/1b/1c)	• **Minimum:** Allow casualty to maintain airway. • **Better:** Facial burns may be associated with inhalation injury. Aggressively monitor airway status and place the casualty in a recovery position IAW TCCC Guidelines. • **Best:** Given a trauma casualty who is unresponsive or has an airway obstruction, perform a Head-Tilt Chin Lift or Jaw-thrust maneuver to open the airway in accordance with TCCC guidelines.		
Fluid Resuscitation (Roles 1a/1b/1c)	• Estimate body total surface area (TBSA) burned using the Rule of Nines initially (DD Form 1380). • **Note:** Superficial (First-degree burns) are NOT used in the TBSA calculation. • If burns >20% TBSA, fluid resuscitation should be initiated as soon as IV/IO access is established. • **Minimum:** Oral intake of water • **Better:** Oral intake of electrolyte solution • **Best:** Oral intake of electrolyte solution		
Hypothermia (Roles 1a/1b/1c)	• Hypothermia prevention is extremely important for burn patients. • For Burns >20%, place the casualty in the Heat-Reflective Shell or Blizzard Survival blanket for the Hypothermia Prevention Kit to both cover the burned areas and prevent hypothermia.		
Pain Control	• Analgesia in accordance with the PCC Guidelines may be administered to treat burn pain.		
Wounds (Roles 1a/1b)	• **Minimum:** Cover with clean sheet or dry gauze. Leave blisters intact. Avoid wet dressings. • **Better:** Clean wounds by washing with any clean water (preferably with antibacterial soap if available), dress wounds with any available dressings; optimize wound and patient hygiene to the extent possible given the environment. • **Best:** Clean wounds by scrubbing gently with gauze and clean water, followed by gauze dressing.		
Wounds (Role 1c)	• **Best:** Clean wounds by scrubbing gently with gauze and chlorhexidine gluconate solution (if available) in clean water, followed by gauze dressing. Repeat daily. • Monitor vital signs.A		
• Ensure all interventions noted above are completed by TCCC ASM and CLS personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached). • Additional interventions include:			

(continues)

Table 19 *Cont.*

PCC Role-based Guidelines for Nursing Care and Wound Management			
TCCC-CMC	TCCC-CPP	Interventions	Paradigm
		Airway (Roles 1a/1b/1c)	• **Minimum:** Allow casualty to maintain airway. • **Better:** Facial burns may be associated with inhalation injury. Aggressively monitor airway status and consider early surgical airway for respiratory distress or oxygen saturation and/or $EtCO_2$ (purple-gold colorimetric device). • **Best:** Given a trauma casualty who is unresponsive or has an airway obstruction, consider early surgical airway.
		Fluid Resuscitation (Roles 1a/1b/1c)	• **Minimum:** Oral intake of water. Rectal infusion of up to 500mL/h can be supplemented with oral hydration. • **Better:** Oral intake of electrolyte solution. • **Best:** Start intravenous (IV) or intraosseous (IO) administration immediately. **NOTE:** an IV/IO can be placed through burned skin if necessary. • Use isotonic crystalloids (i.e. Lactated Ringers). • DO NOT circumferentially tape lines around extremities; this may further impede circulation and cause limb ischemia as extremities swell during resuscitation. • NO bolus (unless hypotensive, in which case, bolus only until palpable pulses are restored). • Initial IV rate 500mL/h; start while completing initial assessment • Give fluids per TCCC burn treatment guidelines. • If resuscitation is delayed, DO NOT try to "catch up" by giving extra fluids. • Blood products may be used in major burn resuscitation due to coagulopathy, anemia, and bleeding from escharotomy sites or other traumatic injuries. • Maintain a UOP of 30–50mL/hr. in adults; decrease or increase isotonic fluid rate by 20–25% per hour. • If UOP >50 mL/hr., then decrease the fluid rate by 20–25% for the next hour and reassess. • Minimize fluid administration while maintaining organ perfusion; hour-to-hour fluid management is critical. • **8–12 hours post-burn**, if the hourly IV fluid rate exceeds 1500mL/hr. or if the projected 24-hour total fluid volume approaches 250 mL/kg consult burn team or medical director. • **24–48 hours post burn**, plasma is lost into the burned and unburned tissues, causing hypovolemic shock (when burn size is >20%). The goal of burn-shock resuscitation is to replace these ongoing losses while avoiding over-resuscitation. • **48–72 hours post-burn**, completion of the resuscitation is marked by stabilizing hemodynamic parameters and reduction of IV fluid rate to a maintenance level.
		Hypothermia (Roles 1a/1b/1c)	• Hypothermia prevention is extremely important for burn patients. • For Burns >20%, place the casualty in the Heat-Reflective Shell or Blizzard Survival blanket for the Hypothermia Prevention Kit to both cover the burned areas and prevent hypothermia. • Use Blood/Fluid Warmer as needed and if available.

(continues)

Table 19 *Cont.*

PCC Role-based Guidelines for Burn Management			
TCCC-CMC	TCCC-CPP	Interventions	Paradigm
		Pain Control (Roles 1a/1b/1c)	Analgesia in accordance with the PCC Guidelines may be administered to treat burn pain.
		Medications (Roles 1a/1b)	• Prophylactic antibiotics (oral or IV) are not indicated for burn injury in the absence of infection. • Penetrating wounds or open fractures should be treated with antibiotics according to current TCCC guidelines.
		Medications (Role 1c)	• After several days, if the patient develops cellulitis (spreading erythema around edges of burn), treat for gram-positive organisms, (e.g., cefazolin or clindamycin). • If patient develops invasive burn wound infection (signs: sepsis/septic shock, changes in color of wound, possible foul smell of wound), treat with broad-spectrum antibiotics.
		Wounds (Role 1a)	• **Minimum:** Cover with clean sheet or dry gauze. Leave blisters intact. Avoid wet dressings. • **Better:** Clean wounds by washing with any clean water (preferably with antibacterial soap if available), dress wounds with any available dressings; optimize wound and patient hygiene to the extent possible given the environment. • **Best:** Clean wounds by scrubbing gently with gauze and clean water, followed by gauze dressing. • DO NOT debride blisters until the patient has reached a facility with surgical capability. • Every patient with facial burns should have a thorough eye exam. Conduct an eye exam early, before edema begins. • If a corneal injury is identified, use a rigid shield to cover the eyes and apply ophthalmic erythromycin or neomycin ointment every 2 hours.
		Wounds (Roles 1b/1c)	• **Better:** Clean wounds and **debride loose skin** by washing with any clean water (preferably with antibacterial soap if available), dress wounds with any available dressings; optimize wound and patient hygiene to the extent possible given the environment. • **Best:** Clean wounds by scrubbing gently with gauze and **chlorhexidine gluconate solution (if available)** in clean water, apply topical antimicrobial cream followed by gauze dressing.
		Monitoring	• Monitor vital signs and urine output (UOP) closely. • **Minimum:** Use other measures If unable to measure UOP, adjust IV rate to maintain HR less than 140, palpable peripheral pulses, good capillary refill, intact mental status. • **Better:** Capture all spontaneously voided urine in premade or improvised (i.e. Nalgene® water bottle) graduated cylinder; >180mL every 6 hours is adequate for adults. • **Best:** Measure UOP with Foley catheter (burns to the penis are NOT a contraindication to catheter placement).

(continues)

Table 19 *Cont.*

PCC Role-based Guidelines for Burn Management		
TCCC-CPP	**Interventions**	**Paradigm**
	• Ensure all above interventions are completed by TCCC ASM, CLS and CMC personnel. • Conduct inventory of all resources. • Document all pertinent information on PCC Flowsheet (attached.) • Additional interventions include:	
	Airway (Roles 1a/1b/1c)	• **Minimum:** Allow casualty to maintain airway. Edema after burn injury causes most supraglottic airway devices such as LMAs to be inadequate. • **Better:** Facial burns may be associated with inhalation injury. Aggressively monitor airway status and consider early surgical airway for respiratory distress or oxygen saturation and/or $EtCO_2$ (purple-gold colorimetric device). • **Best:** Indications for endotracheal intubation include: a comatose patient, symptomatic inhalation injury, deep facial burns, and burns over 40% TBSA. • Utilize an EMMA (or other Capnography) $EtCO_2$ device if possible. • Use a large-bore endotracheal tube if inhalation injury is suspected (Size 8 ETT or larger is preferred for adults). • Secure ETT with cotton umbilical ties (standard adhesive ETT holders do not work around burned skin). • Frequently reassess position of the ETT during the acute resuscitation period as edema waves and wanes.

*Burn Wound Management in Prolonged Field Care, 13 Jan 2017 CPG[23]
https://jts.health.mil/assets/docs/cpgs/Burn_Management_PFC_13_Jan_2017_ID57.pdf

Special Considerations in Burn Injuries

Chemical Burns

NOTE: Refer to the JTS Inhalation Injury and Toxic Industrial Chemical Exposure CPG for additional information.

a. Expose body surfaces, brush off dry chemicals, and copiously irrigate with clean water. Large volume (>20L) serial irrigations may be needed to thoroughly cleanse the skin of residual agents. Do not attempt to neutralize any chemicals on the skin.
b. Use personal protective equipment to minimize exposure of medical personnel to chemical agents.
c. White phosphorous fragments ignite when exposed to air. Clothing may contain white phosphorous residue and should be removed. Fragments embedded in the skin and soft tissue should be irrigated out if possible or kept covered with soaking wet saline dressings or hydrogels.
d. Seek early consultation from the USAISR Burn Center (DSN 312-429-2876 (BURN); Commercial (210) 916-2876 or (210) 222-2876; email burntrauma.consult.army@mail.mil).

Electrical Burns

a. TCCC ASM and CLS personnel should remove the patient from the electricity source while avoiding injury themselves.
b. For cardiac arrest due to arrhythmia after electrical injury, follow advanced cardiac life support (ACLS) protocol and provide hemodynamic monitoring if spontaneous circulation returns.
c. Small skin contact points (cutaneous burns) can hide extensive soft tissue damage.
d. Observe the patient closely for clinical signs of compartment syndrome.
e. Tissue that is obviously necrotic must be surgically debrided.

NOTE: Escharotomy, which relieves the tourniquet effect of circumferential burns, will not necessarily relieve elevated muscle compartment pressure due to myonecrosis associated with electrical injury; therefore, fasciotomy is usually required.

a. Compartment syndrome and muscle injury may lead to rhabdomyolysis, causing pigmenturia and renal injury.
b. Pigmenturia typically presents as red-brown urine. In patients with pigmenturia, fluid resuscitation requirements are much higher than those predicted for a similar-sized thermal burn.
c. Isotonic fluid infusion should be adjusted to maintain UOP 75–100mL/hr in adult patients with pigmenturia.
d. If the pigmenturia does not clear after several hours of resuscitation consider IV infusion of mannitol, 12.5g/L of lactated Ringer's solution, and/or sodium bicarbonate (150mEq/L in D5W). These infusions may be given empirically; it is not necessary to monitor urinary pH. In patients receiving mannitol (an osmotic diuretic), close monitoring of intravascular status via CVP and other parameters is required.
e. Seek early consultation from the USAISR Burn Center (DSN 312-429-2876 (BURN); Commercial (210) 916-2876 or (210) 222-2876; email burntrauma.consult .army@mail.mil).

Pediatric Burn Injuries

a. Children with acute burns over 15% of the body surface usually require a calculated resuscitation.
b. Place a bladder catheter if available (size 6 Fr for infants and 8 Fr for most small children).
c. The Modified Brooke formula (3mL/kg/%TBSA LR or other isotonic fluid divided over 24 hours, with one-half given during the first 8 hours) is a reasonable starting point. This only provides a starting point for resuscitation, which must be adjusted based on UOP and other indicators of organ perfusion. Goal UOP for children is 0.5–1mL/kg/hr.
d. Very young children do not have adequate glycogen stores to sustain themselves during resuscitation. Administer a maintenance rate of D5LR to children weighing <20kg. Utilize the 4-2-1 rule: 4mL/kg for the first 10kg + 2mL/kg 2nd 10kg + 1mL/kg over 20kg.

e. In children with burns >30% TBSA, early administration may reduce overall resuscitation volume.
f. Monitor resuscitation in children, like adults, based on physical examination, input, and output measurements, and analysis of laboratory data.
g. The well-resuscitated child should have alert sensorium, palpable pulses, and warm distal extremities; urine should be glucose negative.
h. Cellulitis is the most common infectious complication and usually presents within 5 days of injury. Prophylactic antibiotics do not diminish this risk and should not be used unless other injuries require antimicrobial coverage (penetrating injury or open fracture).
i. Most antistreptococcal antibiotics such as penicillin are successful in eradicating infection. Initial parenteral administration is advised for most children presenting with fever or systemic toxicity.
j. Nutrition is critical for pediatric burn patients. Nasogastric feeding may be started immediately at a low rate in hemodynamically stable patients and tolerance monitored. Start with a standard pediatric enteral formula (i.e., Pediasure) targeting 30–35kcal/kg/day and 2g/kg/day of protein.
k. Children may rapidly develop tolerance to analgesics and sedatives; dose escalation is commonly required. Ketamine and propofol are useful procedural adjuncts.
l. When burned at a young age, many children will develop disabling contractures. These are often very amenable to correction which may be performed in theater with adequate staff and resources.
m. Seek early consultation from the USAISR Burn Center (DSN 312-429-2876 (BURN); Commercial (210) 916-2876 or (210) 222-2876; email burntrauma.consult.army@mail.mil).
n. Opportunities for pediatric surgical care provided by Non-Governmental Organizations (NGOs) may be the best option but require the coordinated efforts of the military, host nation, and NGOs.

Rule of Nines

On the DD Form 1380 the percentage of coverage on the casualty's body will need to be documented. The Rule of Nines will help with the estimation. The below figure shows the approximation for each area of the body:

a. Eleven areas each have 9% body surface area (head, upper extremities, front and backs of lower extremities, and front and back of the torso having two 9% areas each).
b. General guidelines are that the size of the palm of the hand represents approximately 1% of the burned area.
c. When estimating, it is easiest to round up to the nearest 10.
d. If half of the front or rear area is burned, the area would be half of the area value.

e. For example, if half of the front upper/lower extremity is burned, it would be half of 9%, or 4.5%. If half of the front torso is burned, say either the upper or lower part of the front torso, then it would be half of 18%, or 9%.
f. Remember, the higher the percentage burned, the higher the chance for hypothermia.
g. For children, the percentage of BSA is calculated differently due to the distinctive proportion of major areas.

Figure 2 *Adult Rule of Nines*

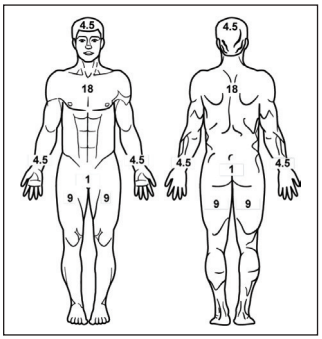
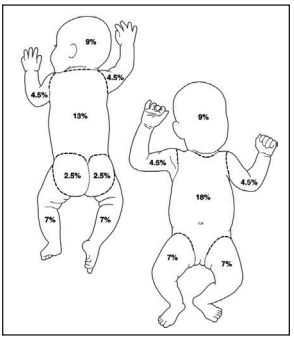


Figure 3 *Pediatric Rule of Nines*



*Burn Wound Management in Prolonged Field Care, 13 January 2017 CPG[23]
https://jts.health.mil/assets/docs/cpgs/Burn_Management_PFC_13_Jan_2017_ID57.pdf

Logistics

Background

Reducing the time to required medical or surgical interventions prevents death in potentially survivable illness, injuries and wounds. When evacuation times are extended, en route care (ERC) capability must be adequately expanded to mitigate the delay. In January 2010, the *Joint Force Health Protection Joint Patient Movement Report* stated "the current success of the medical community is colored by the valiant ability to overcome deficiencies through 'just-in-time workarounds;' many systemic shortfalls are resolved and become transparent to patient outcomes. However, future operations may not tolerate current deficiencies."[24]

a. Patient packaging is highly dependent upon the transportation or evacuation platform that is available
b. If possible, rehearse patient packaging internally and with the external resources.
c. Train with all possible assets, familiarizing them with standard operating procedures
d. Ensure the patient is stable before initiating a critical patient transfer

Table 20 *Logistics Interventions*

Intervention	Paradigm
Prepare Documentation	• **Minimum:** TCCC Card – DA1380 • **Better:** Prolonged Field Care Casualty Work Sheet • **Best:** PCC Card with TCCC Card and any additional information, reference DA Form 4700 (SMOG 2021) for transport documentation standard.
Prepare Report	• Report should give highlights, expected course, and possible complications during transport. • *The hand-off is the most dangerous time for the patient;* it is as important as treatments or medications. • If it is rushed, things can easily be missed. • Make sure you highlight non-obvious interventions and aspects of care (drugs given, repeat doses, etc.). • **Minimum:** Verbal report describing the patient from head to toe with interventions or a SOAP note. • **Better:** MIST (Mechanism, Interventions, Symptoms, Treatments) • **Best:** MIST with appropriate SBAR (Situation, Background, Assessment, Recommendations) and pertinent labs and other diagnostic information
Prepare Medications	• **Minimum:** Prepare medication list with doses and time of next dose. • **Better:** Above with additionally preparing next dose of medication for transport crew appropriately labeled. • **Best:** Above with fresh IV fluids if indicated and fresh bags of drip medications with appropriate labeling and 72 hours of antibiotic for extended transports.
Hypothermia Management	• **Minimum:** Blankets • **Better:** Sleep system and blankets. • **Best:** HPMK with Ready Heat or Absorbent Patient Litter System (APLS). • If possible, identify with tape the location of interventions or access points on top of hypothermia management to allow transport teams quick identification of location.
Flight Stressor/ Altitude Management	• **Minimum:** Ear Protection and Eye Protection, if nothing available sunglasses and gauze may be used, if patient is sedated and intubated eyes can be taped shut. • **Better:** Ear Pro and Eye Pro and blankets in all bony areas, Ear Protection and Eye Protection – foam ear plugs or actual hearing protection inserts, goggles. • **Best:** Above with gastric tube (NG/OG) or chest tube for decompression, if indicated. Depending on altitude/platform, consider bleeding air of out bags of fluid.

(continues)

Table 20 *Cont.*

Intervention	Paradigm
Secure Interventions and Equipment	• **Minimum:** Tape: » Securely tape all interventions to include IVs, IOs, airway interventions, gastric tubes and TQs). » Oxygen tanks should be placed between the patients' legs and the monitor should be secured on the oxygen cylinder to prevent injury to the patient. » Pumps should be secured to the litter. • **Better:** Additional litter straps to secure equipment and extend the litter with back support as indicated for vented patients to prevent VAP • **Best:** Above. Use the Special Medical Emergency Evacuation Device (SMEED) to keep the monitor and other transport equipment off patient.
Prepare Dressings	• AE and Other MEDEVAC assets *do not routinely change dressings during transport;* therefore, ensure all dressings are changed, labeled, and secured before patient pick up. • **Minimum:** Secure and reinforce dressings with tape, date, and time all dressings. • **Better:** Change dressings within 24 hours of departure, secure as above. • **Best:** Change and reinforce dressings within 4 hours of departure. Ensure additional Class VIII is available for any unforeseen issues in flight. • **CAUTION:** Circumferential/constricting dressings MUST be limited/monitored due to swelling during prolonged aerial transport.
Secure the Patient	• **Minimum:** Litter with minimum of 2 litter straps. • **Better:** Litter with padding (example: AE pad or Sleep Mat) with minimum of 3 litter straps. • **Best:** Litter with padding and flight approved litter headrest with minimum of 3 litter straps. • Additional litter straps can be used to secure patient or equipment.
Moving a Critical Care Patient	• **Minimum:** Two-person litter carry to CASEVAC/MEDEVAC platform. • **Better:** Three-person litter carry to CASEVAC/MEDEVAC platform. • **Best:** Four-person litter carry to CASEVAC/MEDEVAC platform.

*Interfacility Transport of Patients between Theater Medical Treatment Facilities, 24 Apr 2018 CPG https://jts.health.mil/assets/docs/cpgs/Interfacility_Transport_of_Patients_between_Theater_Medical_Treatment_Facilities_24_Apr_2018_ID27.pdf

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APPENDIX A: TCCC GUIDELINES

TCCC Guidelines

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://deployedmedicine.com/market/31/content/40

APPENDIX B: AIRWAY RESOURCES

Nursing Care Checklist

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://prolongedfieldcare.org/wp-content/uploads/2018/05/PFC-Nursing-Care-Plan_.pdf

APPENDIX C: MASCAL RESOURCES

Triage Guiding Principles

a. Priorities change based on time from injury
b. Activities in first hour are **CRITICAL**
c. Don't waste time with formal triage tools
d. Just extricate/stop threat, stop external bleeding, clear airway
e. Transfusion and ventilator support within the first hour identify a resource-intensive patient
f. Damage control surgery has little impact after the first hour

Figure 4 *TRIAGE cheat cards START*

START TRIAGE: Assess, *Treat* (use bystanders) When you have a color: STOP – TAG – MOVE ON			
MINOR	*Move walking wounded*		
	DECEASED	No RESPIRATIONS after *head tilt*	
		IMMEDIATE	**Breathing** but UNCONSCIOUS
			Respirations over 30
			Perfusion capillary refill >2 or NO RADIAL PULSE *Control bleeding*
			Mental Status: unable to follow simple commands
		DELAYED	Otherwise
			Remember: Respirations – 30 Perfusion – 2 Mental Status – Can Do

Table 21 *Triage Assessment*

Each Patient Triage Assessment Should Be Complete in Less Than 60 Seconds		
Category	**Examples**	
Category I: Immediate (red chemlite)	• (Any MARCH issue) • Airway obstruction • Flail/open chest wound • Tension-Pneumothorax/hemothorax	• Massive hemorrhage • 20–70% Burns • Unstable Vital Signs • Severe TBI (unconscious alive Pt)
Category II: Delayed (green chemlite)	• Open fractures with PMS intact • Soft tissue injuries	• Moderate TBI (stable vital signs) • Open abdominal wounds
***Category III: Minimal (no chemlite) remain armed continue to engage**	• Minor abrasions, burns, sprains lacerations • Moderate/Mild anxiety	• Fractures/dislocations with PMS • Mild TBI
****Category IV: Expectant or Hero (blue chemlite)**	• Massive head or spinal injury	• Third degree burns >70% BSA • Injuries incompatible with life

**In combat, it is assumed that minimals will continue to stay armed/engaged if no mental status altering pharmaceuticals are given for pain.*

**Expectant category is ONLY used in combat operations and/or when the requirements to adequately treat these patients exceed the available resources. In peacetime, it is generally assumed that all patients have a chance of survival.

Source: *Special Operations Force Medic Handbooks (PJ, Ranger)*

Triage Class 1 (MASCAL)

Adequate medics to treat critical patients and handle the rest

a. Many casualties
b. Threat controlled
c. Resources not severely limited
d. Medical personnel can arrive
e. Evacuation possible

Table 22 *Triage Class 1 Actions and Goals*

<1 Hour After Injury	1–4 Hours After Injury	>4 Hours After Injury
Goals	**Goals**	**Goals**
• Eliminate Threat • Establish CCP • Blood transfusion within 30 minutes • Evacuate to DCR/DCS within 1 hour	• DCR/DCS as soon as possible • Use advanced resuscitation to "extend the Golden Hour"	• Evacuate
Actions	**Actions**	**Actions**
• Stop external bleeding • Clear airway • Ensure ventilation • Formal triage • Transfuse	• MARCH PAWS • Transfuse	• Use prolonged care to optimize outcomes

Triage Class 2 (MASCAL)

Unable to manage the number of critical patients
a. Numerous casualties or MASCAL (i.e. <100 Casualties)
b. Threat has been controlled or partially controlled
c. Resources are very limited
d. Medical personnel can arrive (may be delayed >1 hour)
e. Evacuation is possible (may be delayed >1 hour)

Table 23 *Triage Class 2 Actions and Goals*

<1 Hour After Injury	1–4 Hours After Injury	>4 Hours After Injury
Goals	**Goals**	**Goals**
• Eliminate threat • Get medical personnel on scene • Begin evacuation of urgent but survivable patients	• Evacuate urgent and priority patients • DCR/DCS as soon as possible	• Evacuate remainder of patients
Actions	**Actions**	**Actions**
• Stop external bleed • Clear airway • Reserve intubation/ transfusion • CCP if able, otherwise get a count	• Formal triage • MARCH PAWS if able • Transfuse • Establish CCP • Utilize minimals/returns to duty	• Re-triage • Complete MARCH PAWS • Use prolonged care to optimize outcomes • Wound/fracture management

Triage Class 3 (Ultra-MASCAL)

Absolutely overwhelming number of casualties
a. Ultra-MASCAL (i.e. >100, possibly thousands of casualties)
b. Threat is ongoing
c. Resources are severely limited
d. Medical personnel unable to arrive in <1 Hour
e. Evacuation not possible in <1 Hour

Table 24 *Triage Class 3 Actions and Goals*

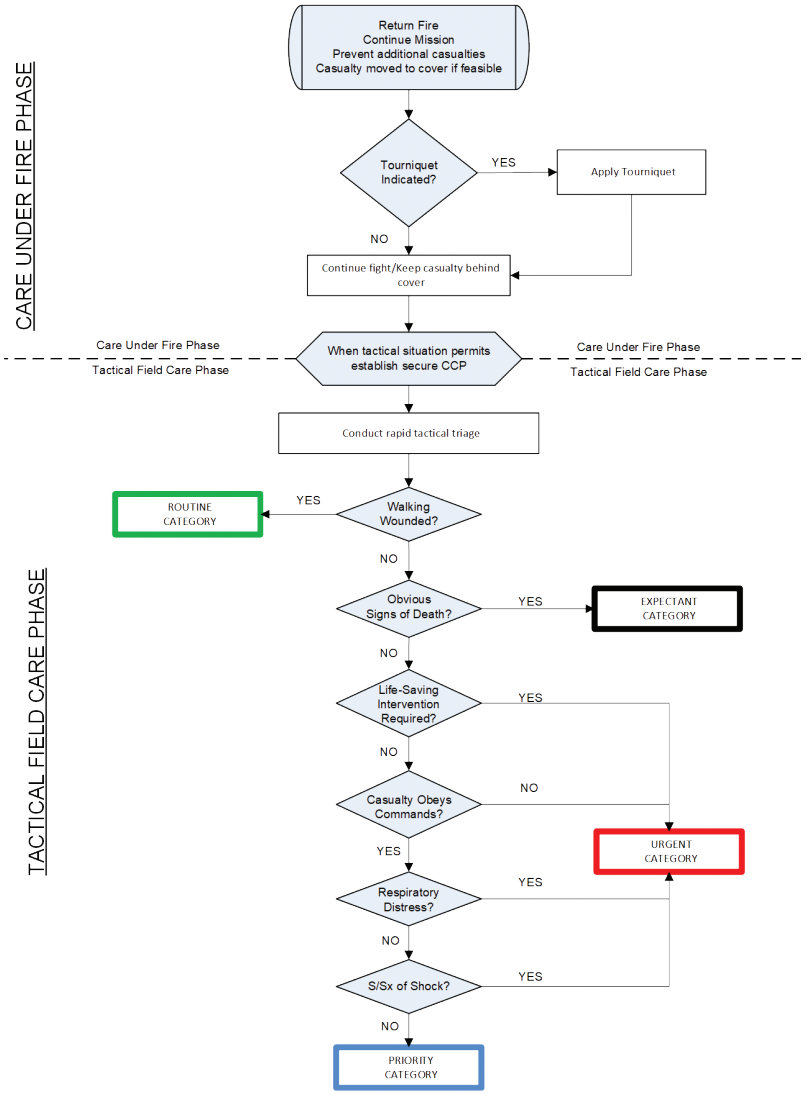
<1 Hour After Injury	1–4 Hours After Injury	>4 Hours After Injury
Goals	**Goals**	**Goals**
• Respond to threat • Self-aide, buddy care • Separate ambulatory/ non-ambulatory	• Eliminate threat • Get medical personnel on scene • Begin evacuation	• Evacuate • Distribute patients
Actions	**Actions**	**Actions**
• Stop external bleed • Clear airway • Reverse intubation/ transfusion • Get a count	• Stop external bleed • Reserve intubation/ transfusion • Begin to establish CCPs • Utilize minimals/return to Duty	• Formal triage • Use prolonged care to optimize outcomes • Wound/fracture management • Utilize minimals/return to duty

MASCAL/Austere Team Resuscitation Record

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://jts.amedd.army.mil/assets/docs/forms/MASCAL_Austere_Trauma_20_Jan_2020.pdf
Instructions: https://jts.amedd.army.mil/assets/docs/forms/MASCAL_Form_Instructions.pdf

Tactical Triage Protocol (algorithm)

Figure 5 *Tactical Triage Protocol*



APPENDIX D: DOCUMENTATION RESOURCES

The following resources and associated links are included in this CPG as attachments.

a. DD 1380 TCCC Card and accompanying POI TCCC After Action Report
b. DD 3019 Resuscitation Record
c. DA 4700 TACEVAC form
d. Nursing care grid (See Appendix B)
e. Teleconsultation Script

DD 1380 TCCC Card

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://jts.health.mil/assets/docs/forms/DD_Form_1380_TCCC_Card_Jun_2014.pdf

DD 1380 - POI TCCC After Action Report

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://jts.health.mil/assets/docs/forms/POI_TCCC_AAR.pdf

DD 3019 Resuscitation Record

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd3019.pdf

DA 4700 TACEVAC Form

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://jts.health.mil/assets/docs/forms/DA4700_OP5_JTS_TACEVAC-AAR&PCR.pdf
Instructions: https://jts.health.mil/assets/docs/forms/DA4700_OP4_JTS_TACEVAC-AAR-PCR_Instruction_20141002.pdf

Prolonged Field Care Casualty Card v22.1, 01 Dec 2020

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://jts.health.mil/assets/docs/forms/Prolonged_Field_Care_Casualty_Card-Worksheet.pdf

Virtual Critical Care Consultation Guide

Guide is to be used with the Prolonged Field Care Card.

1. Before calling, E-mail image of the casualty (wounds, environment, etc.), "capabilities" (back of page), & vital signs trends to _____
2. If call not answered: a) call next number on PACE or call back in 5 – 10 min.
3. If unable to provide information due to operational security, state so.

P:
A:
C:
E:

This is _____ I am a (job/ position) _____
My best contact info is: _____
YOUR best contact info is (Consultant's number): _____Alternate e-mail: _____

****** PAUSE POINT to CONFIRM CONTACT INFO******

I have a _____ year–old _____(sex) _____ (active duty/foreign national/OGA,etc.), who has the following:
Mechanism of Injury or known diagnosis(es) that occurred in (location)
The injury/start of care occurred *hours ago*. Anticipated *evacuation time* is (range)
Injuries/Problems/**S**ymptoms:
Treatments:
He/she is currently (circle) stable/ unstable, getting better/ getting worse/ getting worse rapidly
Known Medication Allergies/Past medical/Surgical history is:
I need help with (*be specific if possible, i.e. "I need help reading this ECG," or "I need help stabilizing this patient," etc.)*
Other Consultants have recommended:

****** PAUSE POINT for Remote Consultant to ask clarification questions ******

VITALS (*current* & *trend* as of): HR	BP	RR	SpO2	ETCO2
Temp.....				
UOP(ml/hr) over		(# hours) Mental Status (GCS/ AVPU)		
EXAM: Neuro		Ext/ MSK		
Heart		Pulses		
Lungs		Skin/ Wounds		
Abd				
LABS: ABG:	Lactate:	Other:		

*** PAUSE POINT for Remote Consultant to ask clarification questions **

Virtual Critical Care Consultation Guide – page 2

Plans/Recommendations		
PRIORITY	**SYSTEM/PROBLEM**	**RECOMMENDATION**
	Neuro or problem #1	
	CV or problem #2	
	Pulm or problem #3	
	GI or problem #4	
	Renal or problem #5	
	Endocrine or problem #6	
	MSK/ Wound or problem #7	
	Tubes, lines, drains or problem #8	
	Prophylaxis/prevention or prob#9	
	Other	

TO-DO/ FOLLOW-UP/TO-STOP	**NOTES**
1.	
2.	
3.	
4.	
5.	
6.	

****** PAUSE POINT, for Medic/Local Caregiver to ask clarification questions/READBACK******

Available "kit" (supplies, equipment, medications) !! IF POSSIBLE PHOTOGRAPH AND SEND VIA EMAIL BEFORE CALLING !!

IV access: IV Central line IO (location) Other:_____

Monitor: Propaq Tempus Foley Graduated urinal PulseOx only Exam Only

Other:_____

Commo: Tempus i2i ID: _____THIAB:_____SAT#_____Local Cell#_____

Web VTC Address_____

Other (e.g. "FaceTime, VSee, Skype, etc.):_____

IV Fluids: Plasma-Lyte LR Normal Saline 3% saline Other:_____

Colloids: Hetastarch Albumin Other:_____

Blood products: Whole blood PRBC Plasma FDP Platelets Other:_____

Medications: Antibiotics: name/route/dose_____

Morphine IV/ PO Other opioid (name/ IV/ PO): _____

Fentanyl IV/ PO (pop) Ketamine

Midazolam Diazepam (IV/ PO)

TXA Other(s):

_____

Airway supplies: ETT Cric kit LMA Ventilator BVM O2 Suction

Misc:

APPENDIX E: TBI RESOURCES

Neurological Examination

MENTAL STATUS

Level of Consciousness: Note whether the patient is:

- Alert/responsive
- Not alert but arouses to verbal stimulation
- Not alert but responds to painful stimulation
- Unresponsive

Orientation: Assess the patient's ability to provide:

- Name
- Current location
- Current date
- Current situation (e.g., ask the patient what happened to him/her)

Language: Note the fluency and appropriateness of the patient's response to questions. Note patient's ability to follow commands when assessing other functions (e.g., smiling, grip strength, wiggling toes). Ask the patient to name a simple object (e.g., thumb, glove, watch).

Speech: Observe for evidence of slurred speech.

CRANIAL NERVES

All patients:

- Assess the pupillary response to light.
- Assess position of the eyes and note any movements (e.g., midline, gaze deviated left or right, nystagmus, eyes move together versus uncoupled movements).
- Noncomatose patient:
- Test sensation to light touch on both sides of the face.
- Ask patient to smile and raise eyebrows and observe for symmetry.
- Ask the patient to say "Ahhh" and directly observe for symmetric palatal elevation.
- Comatose patient:
- Check corneal reflexes; stimulation should trigger eyelid closure.
- Observe for facial grimacing with painful stimuli.
- Note symmetry and strength.
- Directly stimulate the back of the throat and look for a gag, tearing, and/or cough.

MOTOR

Tone: Note whether resting tone is increased (i.e., spastic or rigid), normal, or decreased (flaccid).

Strength: Observe for spontaneous movement of extremities and note any asymmetry of movement (i.e., patient moves left side more than right side). Lift arms and legs, and note whether the limbs fall immediately, drift, or can be maintained against gravity. Push and pull against the upper and lower extremities and note any resistance given. Note any differences in resistance provided between the left and right sides.

*(**NOTE:** it is often difficult to perform formal strength testing in TBI patients. Unless the patient is awake and cooperative, reliable strength testing is difficult.)*

Involuntary movements: Note any involuntary movements (e.g., twitching, tremor, myoclonus) involving the face, arms, legs, or trunk.

SENSORY

If patient is not responsive to voice, test central pain and peripheral pain.

Central pain: Apply a sternal rub or supraorbital pressure, and note the response (e.g., extensor posturing, flexor posturing, localization).

Peripheral pain: Apply nail bed pressure or take muscle between the fingers, compress, and rotate the wrist (do not pinch the skin). Muscle in the axillary region and inner thigh is recommended. Apply similar stimulus to all four limbs and note the response (e.g., extensor posturing, flexor posturing, withdrawal, localization).

NOTE: *In an awake and cooperative patient, testing light touch is recommended. It is unnecessary to apply painful stimuli to an awake and cooperative patient.*

GAIT

If the patient is able to walk, observe his/her casual gait and note any instability, drift, sway, and so forth.

Ultrasonic Assessment of Optic Nerve Sheath Diameter

If a patient is unconscious (i.e. does not follow commands or open eyes spontaneously), they may have elevated ICP. There is no reliable test for elevated ICP available outside of a hospital; however, optic nerve sheath diameter (ONSD) measurement is a rapid, safe, and easy-to-perform ultrasonographic assessment that may help identify elevated ICP when more definitive monitoring devices are not available.

a. The optic nerve sheath directly communicates with the intracranial subarachnoid space. Increased ICP, therefore, displaces cerebrospinal fluid along this pathway. Normal ONSD is 4.1–5.9mm.[30]
b. A 10–5-MHz linear ultrasound probe can be used to obtain ONSDs. ONSD is measured from one side of the optic nerve sheath to the other at a distance of 3mm behind the eye immediately below the sclera.[31]
c. In general, ONSDs >5.2mm should raise concern for clinically significant elevations in ICP in unconscious TBI patients.[5,32] The ONSD can vary significantly in normal individuals, so one single measurement may not be helpful; however, repeated measurements that detect gradual increases in ONSD over time may be more useful than a single measurement.
d. ONSD changes rapidly when the ICP changes, so it can be measured frequently.[33] If ONSD is used, it is best to check hourly along with the neurologic examination.

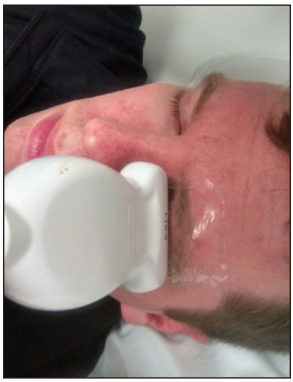
Technique

1. Check to make sure there is no eye injury. A penetrating injury to the eyeball is an absolute contraindication to ultrasound because it puts pressure on the eye.
2. Ensure the head and neck are in a midline position. Gentle sedation and/or analgesia may be necessary to obtain accurate measurements.
3. Ensure the eyelids are closed.
4. If available, place a thin, transparent film (e.g., Tegaderm; 3M, http://www.3m.com) over the closed eyelids.
5. Apply a small amount of ultrasound gel to closed eyelid.
6. Place the 10(–5) MHz linear probe over the eyelid. The probe should be applied in a horizontal orientation (Figure 1) with as little pressure as possible applied to the globe.
7. Manipulate the probe until the nerve and nerve sheath are visible at the bottom of screen. An example of a proper ultrasonagraphic image of the optic nerve sheath can be seen in Figure 2.
8. Once the optic nerve sheath is visualized, freeze the image on the screen.
9. Using the device's measuring tool, measure 3mm back from the optic disc and then obtain a second measurement perpendicular to the first. The second measurement should cover the horizontal width of the optic nerve sheath (Figure 2). An abnormal ONSD is shown in Figure 3.

10. Repeat the previous sequence in the opposite eye. Annotate both ONSDs on the PFC Casualty Card.
11. ONSDs should be obtained, when possible, at regular intervals to help assess changes in ICP, particularly when the neurologic examination is poor and/or unreliable (i.e., with sedation). Serial measurements with progressive diameter enlargement and/or asymmetry in ONSDs should be considered indicative of worsening intracranial hypertension.

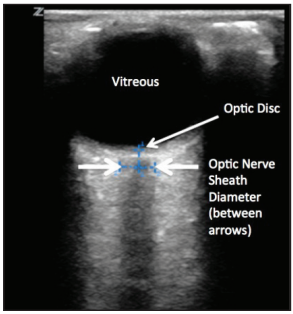
CAUTION: ONSD measurements are contraindicated in eye injuries. NEVER apply pressure to an injured eye.

Figure 1 *Appropriate placement of the linear probe.*



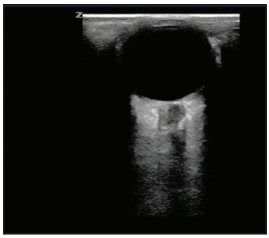
Ultrasound gel is placed over a closed eyelid and the probe placed horizontally over the eyelid, applying as little pressure to the globe as possible. If available, Tegaderm or other thin covering (e.g., Latex glove) should be placed over a closed eyelid for further protection.

Figure 2 *An ultrasonographic view of a normal eye and optic nerve sheath.*



To measure ONSD, apply the ultrasound measuring device to the optic disc and measure back 3mm along the length of the optic nerve. A second, perpendicular measurement is obtained at the previously measured point that spans the horizontal width of the optic nerve sheath. In this image, ONSD was determined to be 5.1mm, a normal value.

Figure 3 *Ultrasound image of the right optic nerve sheath of a 61-year-old man with a traumatic subdural hematoma.*



The optic nerve sheath measured 6.8mm in diameter. Elevated ICP was subsequently confirmed (26mmHg) after the placement of an ICP bolt monitor.

Spontaneous Venous Pulsations

a. Spontaneous venous pulsations (SVPs) are subtle, rhythmic variations
b. in retinal vein caliber on the optic disc and have an association with ICP.
c. It is difficult to see SVPs without advanced equipment; however, if a handheld ophthalmoscope is available, it is worth an attempt to visualize the retinal veins.
d. Don't worry if you cannot see SVPs; this may actually be normal. However, if you do see them, it is very reassuring that ICP is normal.[10]

e. If SVPs are initially present and can no longer be seen on subsequent examinations, the provider should be concerned for increasing ICP.

Technique

1. Gently lift the eyelid until the pupil is in view.
2. Using a handheld ophthalmoscope, the provider should maneuver himself or herself to a position where the optic disc can be visualized.
3. Identify the retinal veins as they emerge from the optic disc. Retinal veins are typically slightly larger and darker than retinal arteries. Figure at right demonstrates the typical appearance of the retina.
4. Observe the retinal veins for pulsations. Note the presence or absence of spontaneous venous pulsations
5. Repeat the step 1–4 sequence in the contralateral eye.

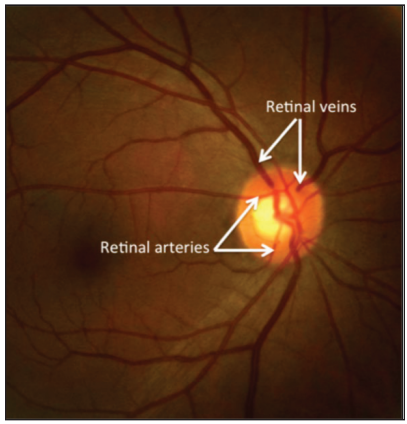


Figure 6 *Typical appearance of a healthy retina.*

The retinal vessels can be seen emerging from the optic disc. Retinal veins can be identified by their slightly larger, thicker size and darker color. Retinal arteries are small, thin, and lighter in color than retinal veins.

Glasgow Coma Scale

TBI severity classification using the GCS score:

a. Mild: 13–15
b. Moderate: 9–12
c. Severe: 3–8

Eye Opening	Verbal Response	Motor Response
4 – Spontaneous 3 – To verbal command 2 – To painful stimuli 1 – No response	5 – Oriented 4 – Confused 3 – Inappropriate words 2 – Incomprehensible sounds 1 – No response	6 – Obeys commands 5 – Localizes to painful stimuli 4 – Withdraws from pain 3 – Flexion to pain 2 – Extension to pain 1 – No response

Richmond Agitation Sedation Scale (RASS)

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff.	
+3	Very Agitated	Pulls or removes tube(s) or catheter(s); aggressive.	
+2	Agitated	Frequent non-purposeful movement, fights ventilator.	
+1	Restless	Anxious but movements not aggressive vigorous.	
0	Alert, Calm		
–1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (>10 seconds).	Verbal Stimulation
–2	Light Sedation	Briefly awakens with eye contact to voice (<10 seconds).	
–3	Moderate Sedation	Movement or eye opening to voice (but no eye contact).	
–4	Deep Sedation	No response to voice, but movement or eye opening to physical stimulation.	Physical Stimulation
–5	Unarousable	No response to voice or physical stimulation.	

Procedure for RASS Assessment	
1. Observe patient: Patient is alert, restless, or agitated.	Score 0 to + 4
2. If not alert, state patient's name and say to open eyes and look at speaker	Score –1
a. Patient awakens with sustained eye opening and eye contact.	Score –2
b. Patient awakens with eye opening and eye contact, but not sustained.	Score –3
c. Patient has any movement in response to voice but no eye contact.	
3. When no response to verbal stimulation, physically stimulate patient by shaking shoulder and/or rubbing sternum.	
a. Patient has any movement to physical stimulation.	Score –4
b. Patient has no response to any stimulation.	Score –5

*Sessler CN, Gosnell M. Grap MJ, Brophy GT, O'Neal PV, Keane KA et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care patients. Am J Respir Crit Care Med 2002; 166:1338–1344.

*Ely EW, Truman B, Shintani A., Thomason JWW, Wheeler AP, Gordon S et al. Monitoring sedation status over time in ICU patients: the reliability and validity of the Richmond Agitation Sedation Scale (RASS). JAMA 2003; 289:2983–2991.

Signs and Symptoms of Elevated Intracranial Pressure

a. GCS<8 and suspected TBI
b. Rapid decline in mental status
c. Fixed dilated pupils(s)
d. Cushing's triad hemodynamics (hypertension, bradycardia, altered respirations)
e. Motor posturing (unilateral or bilateral)
f. Penetrating brain injury and GCS <15
g. Open skull fracture

Hypertonic Saline (HTS) Protocol (goal Na 140–165meq/L)

a. 3% HTS: 250–500mL bolus, then 50mL/hr infusion, rebolus as needed for clinical signs
b. 7.5% HTS: decrease above doses by 50%
c. 23.4%: dilute to 3% and use as above. If unable to dilute, can be given as 30mL bolus and re-dose as needed.
d. Central venous line (CVL) preferred for 3% (can be given initially via peripheral IV/IO)
e. CVL **REQUIRED** for 7.5% or higher concentration

Military Acute Concussion Evaluation 2 (MACE 2) Form, 2021

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://www.health.mil/Reference-Center/Publications/2020/07/30/Military-Acute-Concussion-Evaluation-MACE-2

MHS Progressive Return to Activity Following Acute Concussion/Mild TBI

Open the attachment on the side menu or open the below link to print or fill out electronically.
https://jts.health.mil/assets/docs/cpgs/Progressive_Return_to_Activity_Following_Acute_Concussion_mTBI_Clinical_Recommendation_2021.pdf

APPENDIX F: LOGISTICS RESOURCES

Prolonged Field Care – Patient Packaging, 11 Aug 2021

Patient packaging is highly dependent upon the Casualty Evacuation (CASEVAC)/Medical Evacuation (MEDEVAC) platform that is operationally available. If possible, rehearse patient packaging internally and with the external resources. Train with MEDEVAC assets understand transporting teams' standard operating procedures in order to best prepare the patient for transport. (Example some teams want to secure the patient and interventions themselves while others may be okay with a fully wrapped patient).

Ensure the patient is stable before initiating a critical patient transfer. For POI/unstable patients ensure the appropriate transport team (MEDEVAC with enroute critical care nurse or advanced provider).

Interfacility transfers should meet the following minimum:

1. Hemorrhage control
2. Resuscitation adequate (SBP 70–80mmHg, MAP >60, or UOP >0.5mL/kg/hr)
3. Initial post-op recovery as indicated
4. Stabilization of fractures

Prepare Documentation

Good: TCCC Card – DA1380

Better: Prolonged Field Care Casualty Work Sheet

Best: PFC Card with TCCC Card and any additional information, reference DA Form 4700 (SMOG 2021) for transport documentation standard

*Preference: secure to patient strip of 3in Tape with medications administered attached to blanket or HPMK

Prepare Report

Report should give highlights, expected course, and possible complications during transport. The hand-off is the most dangerous time for the patient it is as important as treatments or medications. If it is rushed things can easily be missed.

Good: Verbal report describing the patient from head to toe with a SOAP note.

Best: MIST (Mechanism, Interventions, Symptoms, Treatments)

Better: MIST with appropriate SBAR (Situation, Background, Assessment, Recommendations) and pertinent labs and other diagnostic information

Prepare Medications

Good: Prepare medication list with doses and time of next dose

Better: Above with additionally preparing next dose of medication for transport crew appropriately labeled.

Best: Above with fresh IV fluids if indicated and fresh bags of drip medications with appropriate labeling and 72 hours of antibiotic for extended transports.

Hypothermia Management

Good: Blankets

Better: Sleep system and blankets

Best: HPMK with Ready Heat or Absorbent Patient Litter System (APLS)

Flight Stressor/ Altitude Management

Good: Ear Protection and Eye Protection, if nothing available sunglasses and gauze may be used, if patient is sedated and intubated eyes can be taped shut

Better: Ear Pro and Eye Pro and blankets in all bony areas, Ear Protection and Eye Protection – foamies or actual hearing protection inserts, goggles

Best: Above with gastric tube (NG/OG) or chest tube for decompression, if indicated. Depending on altitude/platform, consider bleeding air of out bags of fluid.

Secure Interventions and Equipment

Good: Tape (securely tape all interventions to include IVs, IOs, Airway interventions, Gastric Tubes and TQs). Oxygen tanks should be placed between the patient's legs and the monitor should be secured on the oxygen cylinder to prevent injury to the patient. Pumps should be secured to the litter

Better: Additional litter straps to secure equipment and extend the litter with back support as indicated for vented patients to prevent VAP.

Best: Above and use the SMEED to keep the monitor and other transport equipment off patient

*if possible, identify with tape the location of interventions or access points on top of hypothermia management to allow transport teams quick identification of location.

Prepare Dressings

Air Evacuation and other MEDEVAC assets do not routinely change dressings during transport; therefore, ensure all dressings are changed, labeled, and secured before patient pick up

Good: Secure and reinforce dressings with tape, date, and time all dressings.

Better: Change dressings within 24 hours of departure, secure as above.

Best: Change and reinforce dressings within 4 hours of departure. Ensure additional Class VIII is available for any unforeseen issues in flight.

Secure the Patient

Good: Litter with minimum of 2 litter straps

Better: Litter with padding (example: AE pad or Sleep Mat) with minimum of 3 litter straps

Best: Litter with padding and flight approved litter headrest with minimum of 3 litter straps (additional litter straps can be used to secure patient or equipment)

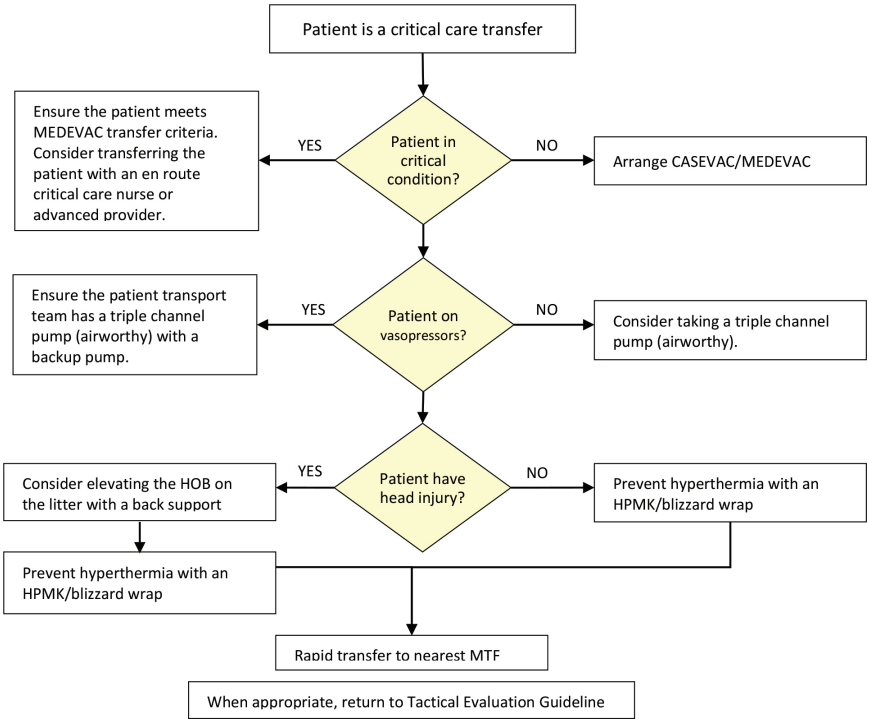
Moving a Critical Care Patient

Good: Two-person little carry to CASEVAC/MEDEVAC platform
Better: Three-person little carry on a rickshaw to CASEVAC/MEDEVAC platform
Best: Four-person little carry on a rickshaw to CASEVAC/MEDEVAC platform

Prolonged Casualty Care Patient Packaging Flowchart

Equipment:
- Litter with at least three litter straps
- Three channel IV pump (airworthy)
- Cardiac monitor and cables
- Suction Device

Possible Complications:
- Inadequate medications
- Injuries not addressed before transport
- Inexperienced provider on flight
- Equipment issues



Pearls:

a. Document all times – TCCC Card or DA4700.
b. Assist Ensure the patient is stable before initiating a critical patient transfer.
c. POI/unstable patients ensure the appropriate transport team (MEDEVAC W/ECCN or Advanced provider)
d. Interfacility transfers should meet the following minimum:
    i. Hemorrhage control
    ii. Resuscitation adequate (SBP 70–80mmHg, MAP >60, or UOP >0.5mL/kg/hr)
    iii. Initial post-op recovery as indicated
    iv. Stabilization of fractures

JOINT TRAUMA SYSTEM CLINICAL PRACTICE GUIDELINE (JTS CPG)	
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*Denotes a sub-working group chair
Publication Date: 21 Dec 2021

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. Whole blood must be ABO compatible.
3. You must have a plan if you intend to use whole blood. You may use a strategy of type A for type A and type O low titer in order to maximize the donor pool or type O low titer as a "universal donor."[47] You may use type specific if you are absolutely certain of the blood types.[37] *In extremis,* type O, non-titered whole blood may be used. The consequences of infusing a unit of possibly high titer fresh whole blood far outweigh the risk of patient death if a transfusion is not performed.[35,36,46]
4. Once you begin transfusion type O blood, if the patients' blood type is not type O you may not switch to any other type. Doing so can cause a fatal hemolytic reaction.
5. 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.
6. The only solutions approved by the FDA and AABB for use with blood and blood components are normal saline (NS) and Plasma-Lyte A pH 7.4. 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]
7. 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.
8. 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 IAW the most current CoTCCC guidelines.

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° F (1–6° 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)
   f. Freeze dried plasma (FDP)*

*FDP is being used under an investigational new drug (IND) protocol within USSOCOM. This is the ONLY authorized manner by which FDP can be administered in a role I setting.

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.

Although identification tags for ABO/Rh verification is authorized it should be utilized as a last resort only.[26] 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.

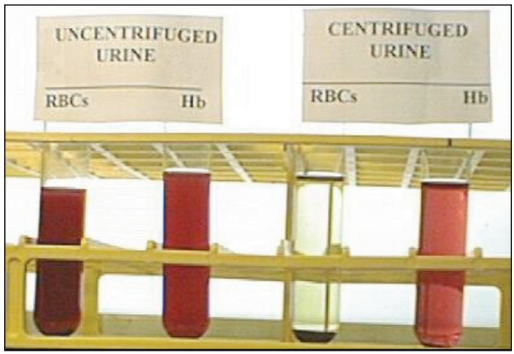
Transfusions

1. Ideally blood products should be warmed to approximately 98.6° F (37° C) prior to transfusion. Do not exceed 102° F (39° 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 temperature of more than 2° F (1° 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).



Tube: 1 2 3 4

Uncentrifuged and Centrifuged Urine Samples

(Retrieved from http://img.medscape.com/pi/emed/ckb/hematology/197800-206885-156.jpg)

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 on page 42), but will be pink-red if significant intravascular hemolysis (e.g., hemoglobinemia) has occurred within the previous few hours (tubes 2–4 on page 42).

c. Febrile Nonhemolytic Reactions
i. Fever not as severe as with an acute hemolytic reaction
ii. Chills
iii. Dyspnea

d. Urticarial Reactions – Urticaria
i. Flushing (especially in the face), urticaria, or edema

Tube: **1** **2** **3** **4**

Centrifuged Blood Samples Showing Clear Plasma and Worsening Levels of Hemolysis

(Retrieved from http://clinical-laboratory.blogspot.com/2013/06/preventing-pre-analytical-errors.html)

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

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

h. **Severe Toxicity –** Give 0.45mEq elemental calcium or approximately 1mL of a 10% calcium gluconate (100mg/mL) for each 100mL citrated blood infused. Infuse over 10–20min for each 1–2g of calcium gluconate. Diluted prior to administration (D5W or NS 100–250mL).

Note: 10% calcium gluconate solution (100mg/mL): 1mL = 0.46 mEq elemental Ca = 9mg elemental Ca

i. Can be repeated every 4–6hr depending on symptoms.

Use a 0.22 micron filter for administration.

Do not rapidly infuse calcium or give more than one dose without the ability to monitor electrolytes. This may lead to cardiac arrhythmias and could cause necrosis of the vein.

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).

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®) 20g IV over 5min using a 0.22 micron filter to prevent infusion of mannitol crystals. If diuresis does not occur, repeat the 20g dose once. The patient should receive a Foley catheter to monitor urine output.

If crystals are observed, the container should be warmed by appropriate means to not greater than 60° C, shaken, then cooled to body temperature before administering. If all crystals cannot be completely redissolved, the

container must be rejected. Administer intravenously using sterile, filter-type administration set."

(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 100–200mL/hr.

(f) However, if urine output is not obtained within 2–3hr of administration of fluid, consider the development of acute renal failure and discontinue further fluids.

(g) Consider using acetaminophen (Tylenol®) 1g PO, PR, or IV q6hr 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.

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 Nonhemolytic Reactions

i. Treat with antipyretics. Acetaminophen (Tylenol®) 1g PO, PR, or IV (avoid the use of aspirin and other NSAIDs). For ease of administration, consider the use of rapid release acetaminophen through a nasogastric (NG) tube. Rapid release acetaminophen can be dissolved in water within 5 minutes and then delivered through the NG tube.

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 not recommended in this protocol. Although it is commonly done there is no evidence that is decreases the incidence of fever and urticaria associated with transfusions. It could also mask the symptoms of a hemolytic reaction.[28-35]

Acetaminophen rapid release

(Retrieved from http://www.drugs.com/imprints/l-5-10933.html)

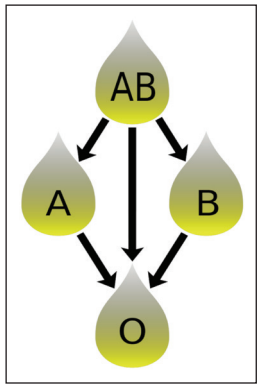
d. Urticarial Reactions

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° F (–18° 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° F (37° C) or by using a method and/or equipment that is intended (validated) for such use. Do not exceed 107° F (42° 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° F (1–6° C) prior to administration.
6. Thawed plasma can be stored for 3 days at 33–43° F (1–6° 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° F (1–6° C) for 5 days. Thawed plasma can only be kept for 30min at room temperature (68–75° F [20–24° 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.



Plasma Compatibility Diagram

(Retrieved from https://en.wikipedia.org/wiki/Blood_type)

Perform a Whole Blood (FWB) Transfusion

1. LOCATE A SUITABLE DONOR.
   a. Identify a blood donor who is ABO compatible with the intended recipient.
   b. Due to the prevalence of Type A blood follow the rule, "Type A to Type A and then Type O for everyone else."
   c. Rh+ (positive) patients may receive either Rh+ (positive) or Rh– (negative) blood.
   d. Rh– (negative) patients should receive Rh– (negative) blood if possible, but this may be disregarded in extremis unless the patient has received OR been exposed to Rh+ (positive) blood and "sensitized" to the Rh antigen.

e. Rh– (negative) females with childbearing potential must be given priority for Rh– (negative) blood to avoid the risk of Rh sensitization.
f. Low titer blood should be used first. There is no universally accepted titer level for a unit to be considered "low titer." There are two methods of determining titer levels; the indirect antiglobulin technique (IgG) and the saline technique (IgM). Based on safe historical use and other precedents, levels of IgG<400, and IgM<100 have been used successfully.[36] **USSOCOM recommends a titer level of <IgM256.**[46]
g. "Type O" non-titered whole blood may be used in extremis circumstances. The consequences of infusing a unit of possibly high titer fresh whole blood far outweigh the risk of patient death if a transfusion is not performed.[35,36,46]
h. Donors should not be consangenous to the recipient (closely related family members) in order to lessen the possibility of graft versus host disease.[37]
i. When appropriate, set up a "walking blood bank" with pre-screened donors prior to deployment.
j. 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 heath of the donor on the day of donation (see Enclosure #1: Donor Questionnaire).
k. Donor should preferably be U.S. military.
l. 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.
m. 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).
n. 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.
o. 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).
p. 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.
q. The donor should report to the nearest MTF capable of performing blood sample collection and processing IAW the applicable theater.

r. 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.

s. 

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 10 August 2016, OPNAVINST 3710.7U dtd 23 November 2009). All other donors should be given light duty or quarters for at least 72 hours following donation.[38,39]

t. 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 1 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.

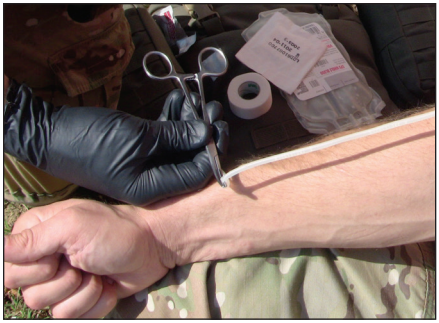
c. Place a constricting band tightly around the donor's arm or alternatively a blood pressure cuff inflated to 80mmHg.

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.

Do not infuse blood from an incompletely filled collection bag faster than the time needed to infuse a completely filled collection bag, because this would result in an increased risk of citrate toxicity.

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°. 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



Clamping – *the line must be clamped or pinched approximately 6 inches from the needle to avoid air entering the line and preventing negative pressure formation from gravity pulling the liquid into the collection bag when the cap is removed.*

of the needle to approximately 10° 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° after inserting it bevel up. Alternatively, you can prop up the needle using a rolled up 2-inch × 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. Loosen the constricting band or deflate the blood pressure cuff to 40–60mmHg and maintain this pressure throughout the collection.
g. Place the collection bag below the donor's heart and release the clamp or pinch in the line.

   If the flow is sluggish, consider removing the constricting band or deflating the blood pressure cuff and reapplying or re-inflating respectively. This may be necessary to ensure good back pressure from venous return and will lessen the possibility of incomplete filling of the collection bag.
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 2 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 ± 50g plus weight of blood bag). Alternatively, a 9.5-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 9.5-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.

Never collect more than one unit from an individual.

Measurement – *bring the ends of a 9.5-inch piece of cord together around the bag until they just meet.*

k. If at a fixed facility a blood trip scale can be constructed with a counterweight of 585 grams. The counterweight can be approximated by adding 450mL of fluid to a blood collection bag and tying off the collection tubing.

3. 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.
4. If donor is expected to perform physical labor such as in a tactical situation. Have donor drink 500mL of Oral Rehydration Salts (ORS) mixed in a ratio of 1 packet in 1000mL of potable water.
5. Donor should lie down during collection because of the risk of syncope.
6. Donor should take food and drink immediately after donation.
7. Donor must wait at least 56 days between donations, unless the blood is reinfused into the donor in which case there is no time limit between donations.

Blood trip scale made from a balance beam scale with improvised counterweight

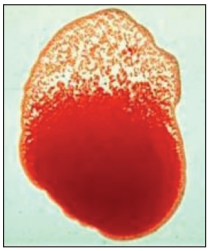
(Photo courtesy LTC Shawn C. Nessen, MD)

Make no attempt to bank blood. Collected blood should be transfused immediately, and must be used within 24 hours. Unused blood may be reinfused into the donor, but must be discarded after 24 hours. Do not attempt to reinfuse 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!**

8. In extremis you may transfuse an incoplementtely filled bag by one of two methods. Method #1 (preferred)—Fill the remainder of the collection bag with compatible fluid like Plasma-Lyte A pH 7.4 or Normal Saline until the collection bag is properly filled. Method #2-Infuse the bag slowly to avoid citrate toxicity.
9. 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.
10. 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.
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° F (18° C) and optimally at 98.6° F (37° C). Stirring the mixture should help determine if there is any agglutination. A magnifying lens and bright light can aid in determining if there is agglutination present.

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



Agglutination

(Image can also be found at https://www.researchgate.net/figure/Positive-results-from-a-slide-agglutination-test_fig4_6113239)

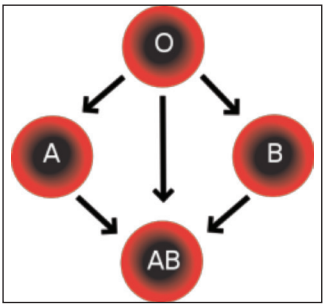
Canine Considerations

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 an FWB transfusion is performed.[46]
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 50lb 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° F (1–6° 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

(Retrieved from https://en.wikipedia.org/wiki/Blood_type)

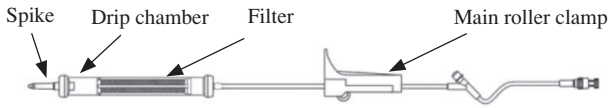
   a. In a patient with a history of allergies or an allergic transfusion reaction, give diphenhydramine (Benadryl®) 25–50mg IV (through a separate line), IM, or PO prophylactically just before or at the beginning of the transfusion.

      Antihistamine must never be mixed with blood or blood products.

   b. In a patient with a history of a febrile reaction acetaminophen (Tylenol®) 1g PO, PR, or IV may be given prophylactically before the transfusion.

   c. 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 and 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.



Filtered Blood/Solution Set

i. Close clamp on the tubing.
ii. Aseptically uncap and insert the spike into the blood or PRBC port and hang the blood or PRBCs at the same level as the NS container.
iii. There is no need to prime the administration set with NS.

d. 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.

e. 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.
      (a) Set the flow rate to deliver approximately 10–30mL of blood or PRBCs over the first 15min.
      (b) 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.
      (c) Anytime an adverse reaction is suspected, immediately stop the blood or PRBCs and infuse NS through a completely separate catheter and IV line.

(d) If after the first 15min 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.

f. 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.

g. 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.

h. 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.

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Enclosure #1 – Questionnaire

EMERGENCY WHOLE BLOOD DONATION RECORD

Blood Unit Number
Use Donor SSN if ISBT # Not Available

MTF/Location: _____ Donation Date: _____

Donor's Full Name: _____ Rank: _____ Branch: USA USAF USN USMC CIV

SSN: _____ Date of Birth: _____ Sex: M / F Ht/Wt: _____ (> 110 lbs) ABO/Rh (Blood Type) :_____

Deployed Unit/Location: _____ Local DSN Phone: _____ Redeployment Date: _____
Current Residence: Bldg/Tent # _____ RM # _____
Home Address (Stateside) _____
Home Phone Number: (____) _____ Email: _____

Y 21. N	Female Donors: Are you pregnant now, or have you been Pregnant in the last 6 weeks?	Y 36. N	Have you ever had Chagas' disease, babesiosis, or Leishmaniasis?
Y 22. N	Are you feeling well and healthy today?	Y 37. N	In the past 12 months, have you been given a rabies shot?
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 38. N	In the past 12 months, have you had an accidental needle stick or come in contact with someone else's blood?
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 39. N	In the past 12 months, have you had a tattoo, ear or skin piercing, or acupuncture?
Y 25. N	Have you ever given blood under another name or Social Security Number?	Y 40. N	In the past 12 months, have you had close contact with a person with yellow jaundice or hepatitis or been given Hepatitis B Immune Globulin (HBIG)?
Y 26. N	In the past 8 weeks have you given blood, plasma or platelets?	Y 41. N	Have you ever had yellow jaundice, liver disease, hepatitis, or a positive test for hepatitis?
Y 27. N	Have you ever been refused as a blood donor or told not to donate blood?	Y 42. N	In the past 4 weeks, have you had any shots or vaccinations?
Y 28. N	In the past 12 months have you been under a doctor's care, had an illness, or surgery?	Y 43. N	In the past 8 weeks, have you received a smallpox vaccination or had close contact with the vaccination site of anyone else?
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 (autologous)?	Y 44. N	In the past month, have you taken Finasteride (Proscar, Propecia) or Isotretinoin (Accutane, Amnesteem, Claravis, Sotret) or in the past 6 months, have you taken Dutasteride (Avodart)
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 dura mater (or brain covering) graft?		
Y 33. N	Have you ever taken Etretinate (Tegison) or Acitretin (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: ____/____ (≤ 180/100) Pulse: _____ (< 100 bpm) HCT/Hgb: _____ (> 38% or 12.5 g/dL)

31. Medications: _____

Malaria Prophylaxis: Daily____(Doxycycline) Weekly____(Mefloquin) N/A _____

Your blood will **NOT** be tested for viral diseases prior to transfusion due to the emergency, if you any reason you feel your blood may not be safe or you could answer yes to the high risk questions, please do not donate today. I have read had 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 verify 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 (WB)
Version: 13 August 2009

DIRECT ORAL QUESTIONS

PREAMABLE

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 only give me one 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?

IF Response is	THEN
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 Zambia?
If No	Go to Group B, Question 3
If Yes – Travel Only	Proceed to Group B Question 2
If 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?

IF Response is	THEN
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?

IF Response is	THEN
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 Zambia?
If 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 sine 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?

(A "Yes" answer to Group D is an INDEFINITE DEFERRAL)

Direct Oral Questions January 10, 2010
Army Blood Program Policy Letter 2010-01-02

Enclosure #2 – Field Emergency Donor Panel Questionnaire and Triage Tool

- **Give blood donor briefing to potential donor group**
- **Confirm blood group(s) required**
- **Exclude air crew, HGV drivers and key machinery operators**

Primary Triage (Question as a group)

Serial	Question	Yes	No	Action
1	**Do you want to give blood?**			Disqualify if NO
2	**Have you given blood before**			If yes - Consider early selection

Secondary Triage (Question individually)

Serial	Question	Yes	No	Action
3	**Are you unwell now?** New Fever/ Diarrhea / Vomiting Chronic medical condition and not well			Disqualify if YES
4	**Are you taking medication for blood pressure; stroke or heart, lung, kidney, cancer or blood conditions?**			Disqualify if YES
5	**Have you had a blood transfusion or blood products in the last year**			Disqualify if YES Accept after 1 year
6	**Are you living with HEP B,C / HIV / AIDS – OR living with anyone with these conditions**			Disqualify if YES
7	**Have you ever been refused as a donor or told not to donate blood** (a past history of treated anemia may be acceptable)			Disqualify if YES
8	**Male donors only.** Have you **ever** had sex with another male?			Disqualify if YES
9	**Have you ever taken illegal drugs with a needle (even steroids)**			Disqualify if YES
11	**Are you currently pregnant or breast-feeding?**			Disqualify if YES
12	**Conduct a physical examination Check: Temperature / Rash / Malnutrition, / Pallor / Jaundice / Cyanosis / Shortness of breath / Intoxication from alcohol or drugs / Veins**			Disqualify any potentially unwell donor or donors with very difficult veins

- **The remaining group form the Emergency Donor Panel (EDP)**
- **Use the Risk Triage Screen to risk score the potential donors**

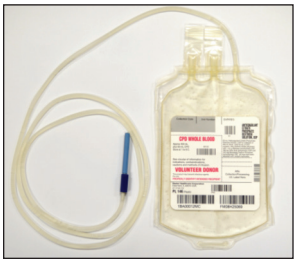
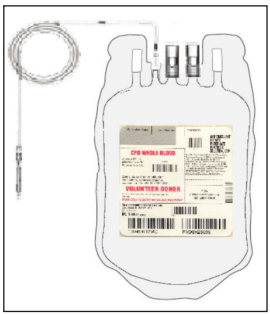
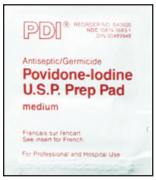
Risk Triage (Question Individually)

Score	Questions	Subtotal	Notes
	Blood donation history		
1	Regular Donor		Optimum
2	Previous Donor		
3	Non Donor		
	Veins and body weight		
1	Good lateral (outer) vein		Optimum
3	Poor or difficult vein		
3	Under 60 kg		Risk of fainting
	Infection		
1	> 21 Days Well		Optimum
3	< 21 Days Well		
	Travel		
1	No travel in the countries below in the last 6 months		Optimum
2	South America		
4	Asia and Africa		
	Life style:		
1	Sex with one partner		Optimum
3	Sex with multiple partners but protected		
-	Sex with a sex worker or in exchange for money/drugs		Avoid for 12 months
	Serious medical conditions		
1	None		Optimum
3	Past or present serious medical conditions but managed and well		
3	Untreated current medical conditions but well		
	TOTAL		

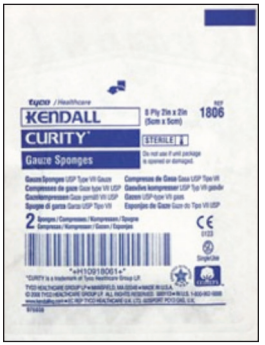
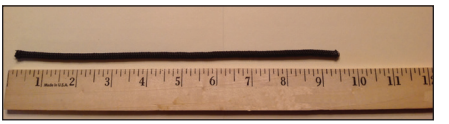
- **Add up score and record: Lowest score = Lowest Risk**
- **Use Point of Care Test for TTI's – Eliminate and counsel any positives**
- **Blood type donors and document results**

Enclosure #3 – Suggested Packing List

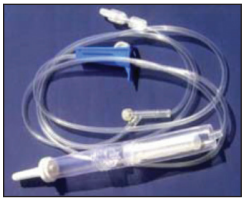
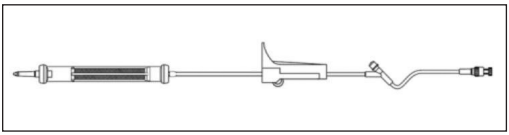
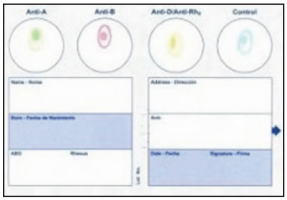
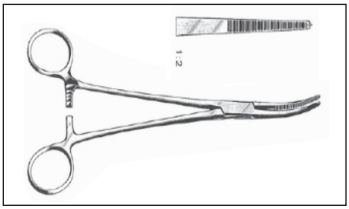
Suggested Minimum Equipment for Blood Collection and Administration

	Item Description	National Stock Number (NSN)
  	BLOOD COLLECTING AND DISPENSING BAG, CPD	6515-01-523-5964
	NITRILE GLOVES, OD	Medium: 6515-01-521-7501 Large: 6515-01-521-7505 X-Large: 6515-01-521-7508
	PAD, ISOPROPYL ALCOHOL IMPREGNATED	6510-00-786-3736
	PAD, POVIDONE-IODINE IMPREGNATED	6510-01-010-0307

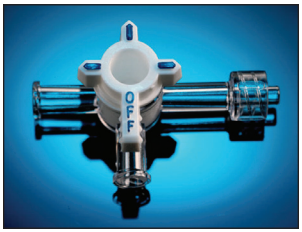
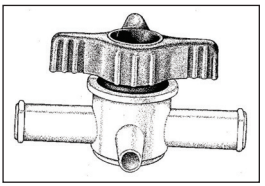
Enclosure #3 – Suggested Packing List (cont.)

	Item Description	National Stock Number (NSN)
	TOURNIQUET, NONPNEUMATIC (CONSTRICTING BAND)	6515-01-146-7794
	SPONGE SURGICAL, STERILE, 2X2 INCH	6510-01-530-9413
	ADHESIVE TAPE, SURGICAL	6510-01-497-5161
	PIA-C-5040/MIL-C-5040, TYPE III, 9.5-0INCH 	4020-00-246-0688

Enclosure #3 – Suggested Packing List (cont.)

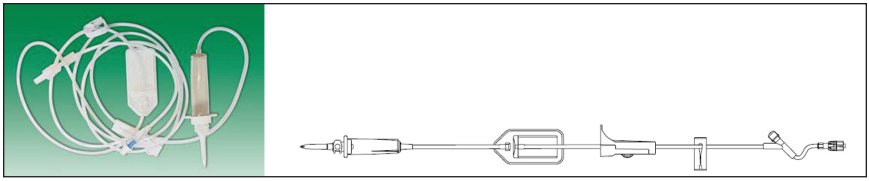
	Item Description	National Stock Number (NSN)
	BLOOD RECIPIENT SET, INDIRECT TRANSFUSION	6515-00-457-8131
		
	BLOOD TYPING CARD (ELDONCARD®)	6550-01-511-9294
		
	FORCEPS, HEMOSTATIC	6515-01-459-3970
		

Enclosure #3 – Suggested Packing List (cont.)

	Item Description	National Stock Number (NSN)
	UNDERPAD, BLUE (CHUX)	6530-01-027-0179
	STOPCOCK, IV THERAPY, 3 WAY 	6515-00-864-8864
	CALCIUM GLUCONATE INJECTION	6505-00-097-8138
	MANNITOL INJECTION	6505-01-125-3253

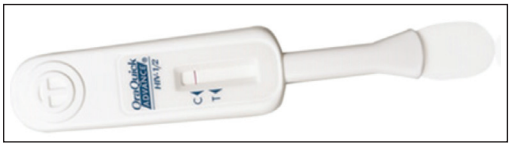
Enclosure #3 – Suggested Packing List (cont.)

Item Description	National Stock Number (NSN)
INTRAVENOUS INJECTION SET, FILTERED, 0.22 micron	6515-99-001-9683

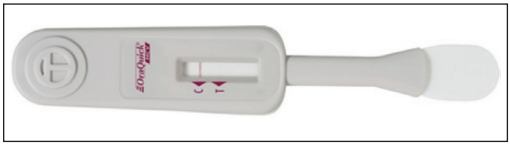


BIORAPID HBSAG BIOKIT (SPAIN)	6550-08-133-2246
BIORAPID HCV BIOKIT (SPAIN)	6550-08-133-2247

HIV 1/2 RA ORAQUICK	6550-01-526-7424



ORAQUIK HCV	6550-01-589-9845



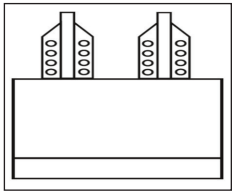
ONSITE (CTK) HBSAG (HEP B)	6550-01-472-6534

Enclosure #3 – Suggested Packing List (cont.)

	Item Description	National Stock Number (NSN)
	MALARIA RAPID DIAGNOSTIC DEVICE (MRDD)	6550-01-554-8536
	TEST KIT, SYPHILIS DETECTION	6550-01-511-0291
	PLASMA OVERWRAP BAGS	6515-01-511-3624

Enclosure #3 – Suggested Packing List (cont.)

Item Description	National Stock Number (NSN)
THAWING SYSTEM, PLASMA (4 UNIT)	6640-01-510-3136



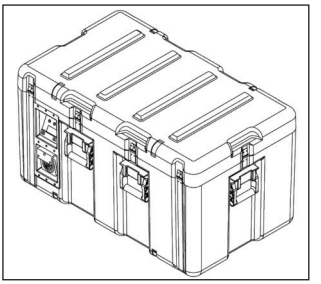
GOLDEN MINUTE CONTAINER
CONTAINER, THERMAL, BLOOD TRANSPORT 6530-01-654-0062

GOLDEN HOUR CONTAINER

Woodland Marine Pixel	6530-01-505-5308
Desert Pattern	6530-01-505-5306
Woodland Army	6530-01-505-5301
Thermal Chamber, Replacement Part	6530-01-505-5311

Enclosure #3 – Suggested Packing List (cont.)

Item Description	National Stock Number (NSN)
BLOOD PRODUCT REFRIGERATOR/FREEZER	4110-01-506-0895



CRUSH SYNDROME PROTOCOL

SPECIAL CONSIDERATIONS

1. Be aware of development of crush syndrome starting as early as 4 hours post injury.
2. There is a theoretical benefit from using non-potassium containing fluids due to the increased risk of hyperkalemia, but the important goal is to establish adequate renal output regardless of which fluid is available.
3. 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 noncompressible (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 O_2 saturation with pulse oximetry and administer high flow oxygen if available.
3. Give initial bolus of 1–1.5L of any available crystalloid **PRIOR** to attempts at extrication and continue at 1.5L/hr.
4. Maintain urine output at greater than or equal to 200mL/hr. If possible, insert Foley catheter.
5. Assess and reassess mental status.
6. Follow ***Pain Management Protocol (TMEP)***
7. Consider prophylactic antibiotics—Ertapenem (Invanz[c]) 1g IV.
8. Utilize Propaq® or AED cardiac monitoring if available.

PHASE 2: IMMEDIATELY PRIOR TO EXTRICATION

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

Phase 2 Recommended Additional Resuscitative Drugs

10. 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

11. CPR **should be** initiated if cardiac arrest develops following extrication. **DO NOT** follow the TCCC guidelines on cardiac arrest.
12. If dysrhythmias are present, consider administering the following (adult doses): calcium gluconate 10% 10mL or calcium chloride 10% 5mL IV over 2 minutes.

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

    Calcium Chloride should be given SLOW IV push to prevent vein necrosis.
13. Additional dosing of sodium bicarbonate may be required if dysrhythmias or cardiac arrest persist after giving calcium gluconate or calcium chloride.
14. Administer 12mL of albuterol sulfate inhalation solution, 0.083% (2.5mg/3mL) in nebulizer. Onset of effect: 30 minutes. Duration of action: 2 hours.
15. Alternatively, administer albuterol (Ventolin®), 2–3 puffs q5min, repeat up to 3 times. The metered dose inhaler works best when used with a commercially produces spacer or improvised spacer (e.g., cardboard from toilet paper roll, etc.).
16. Following extrication, once the patient is stabilized, be prepared to treat hyperkalemia as tourniquets are released.

Disposition

Urgent Surgical evacuation

Crush Injury Kit

Item Description	National Stock Number (NSN)

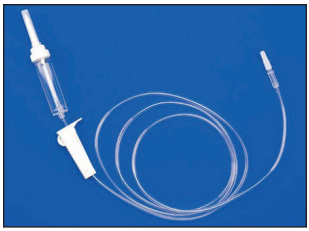
Example of crush injury kit with enough supplies to provide the initial treatment for 3 casualties with crush syndrome.

Standard size M-9 bag with:

- 6L of NS
- 4 IV starter kits
- 3 drug kits (pelican case), each containing;
  - 100mEq sodium bicarbonate (2 bristojets)
  - 10mL 10% calcium gluconate aqueous solution (1g in 10mL vial) (3 ampules)

Equipment For Crush Injury Treatment Kit

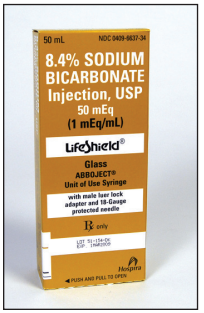
SODIUM CHLORIDE INJECTION 0.9% 6505-01-330-6269



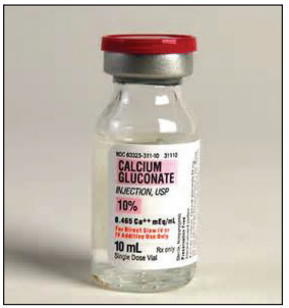
IV ADMINISTRATION SET 6810-00-290-3834

Equipment For Crush Injury Treatment Kit (cont.)

Item Description	National Stock Number (NSN)
SODIUM BICARBONATE INJECTION	6810-00-290-3834

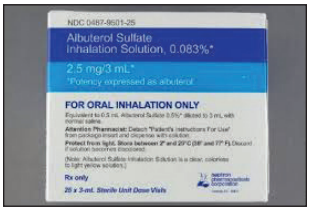
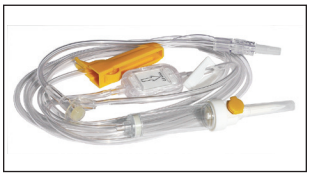
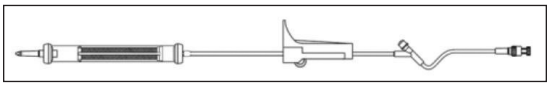


CALCIUM GLUCONATE INJECTION	6505-00-097-8138



ALBUTEROL INHALATION AEROSOL	6505-01-116-9245

Equipment For Crush Injury Treatment Kit (cont.)

	Item Description	National Stock Number (NSN)
	NEBULIZER, ULTRASONIC	6515-01-614-9279
	ALBUTEROL SULFATE 2.5 mg/3mL	6505-01-258-0960
	INTRAVENOUS INJECTION SET, FILTERED, 0.22 micron 	6515-99-001-9683

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"
      i. Pain
      ii. Pallor
      iii. Pulselessness: Be aware that peripheral pulses are present in 90% of patients with compartment syndrome.
      iv. Paresthesia
      v. Paralysis
   b. More common acute findings
      i. Increasing pain
      ii. Pain out of proportion to injury
      iii. Pain with passive motion of muscles in the involved compartment
      iv. Pallor
      v. 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, reevaluate every 30 minutes for 2 hours, then ever hour for 12 hours, then every 2 hours for 24 hours, and then ever 4–6 hours for 48 hours.
   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
      i. Perfusion pressure <30mmHg is diagnostic for compartment syndrome
      ii. 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. Nonsurgical Treatment
   a. Pain Management: See ***Pain Management Protocol (TMEP)***
      i. Increasing pain medication requirements may mask development of a compartment syndrome.
      ii. 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 (TMEP)*** prior to doing procedures
   b. Only consider fasciotomy if:
      i. Evacuation is delayed 6 hours or longer
      ii. **AND fasciotomy is within the scope of practice of the treating medic**
      iii. **AND** the following indications exist:
         (a) Pain with passive motion of the involved muscle group
            • Increasing pain with decreasing response to pain meds
            • Increasing swelling and tightness in the involved compartment
      iv. **OR** There are elevated compartment pressures as defined above (#5).
   c. Fasciotomy may be a limb saving procedure in the proper clnical setting. When done for the wrong reasons, or done incorrectly, the potential for serious complications exists.
   d. Procedure: Utilize ***Procedural Analgesia Protocol (TMEP)***.
      i. Thigh: anterior skin incision, ID muscle fascia and split fascia only
      ii. Lower leg/Calf:
         (a) Anterior and Lateral Compartments:

- 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.

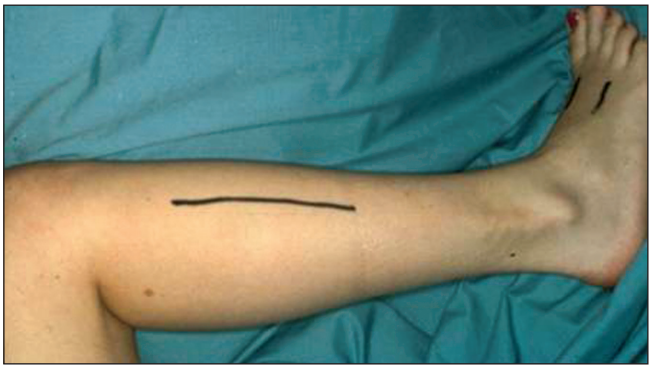


Figure 1. *The incision is anterior to the fibula. The lines on the foot are used ONLY for a foot compartment syndrome.*

- 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.

(b) Posterior Compartment:

- 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.

(c) Foot

- Make longitudinal incisions between the metacarpals along the dorsal aspect of the foot as shown in figure 1 and ID the underlying fascia and

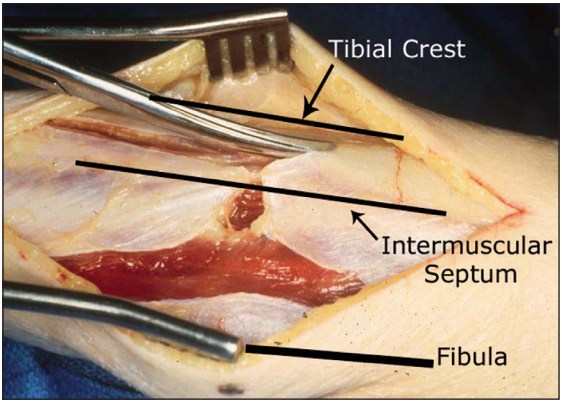


Figure 2. *Identify the tibia, fibula and the intermuscular septum. Make the Fasciotomy incisions anterior and posterior to the septum.*

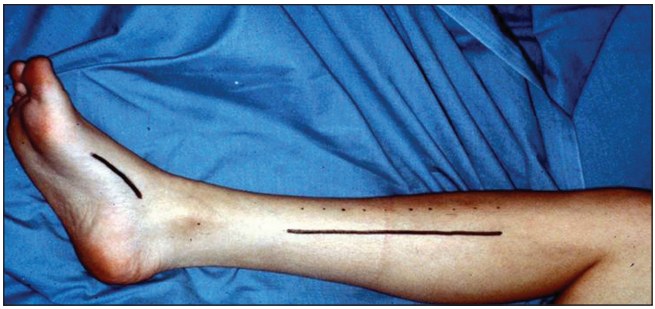


Figure 3. *The dotted line represents the palpable tibial border and the solid line on the tibia represents the incision line. The solid line on the foot is done ONLY for foot compartment syndromes.*

incise it. Make a medial foot incision as shown in Figure 3 and incise the underlying fascia.

(d) 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.

(e) 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.
(f) Leave all wounds open and apply dressings.

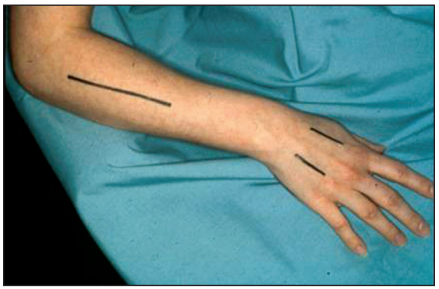


Figure 4. *Dorsal arm incision for forearm dorsal compartment release. Dorsal hand incisions used only for hand compartment syndrome.*

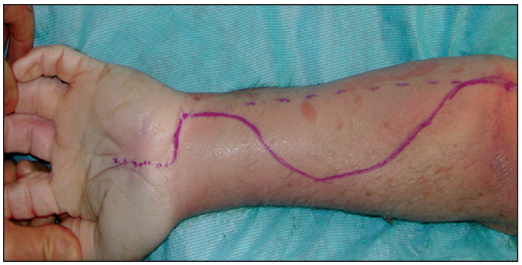


Figure 5. *Volar arm incision used for forearm compartment syndrome release.*

Disposition

Urgent evacuation

MILD TRAUMATIC BRAIN INJURY (mTBI) PROTOCOL

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. **DO NOT** allow a patient with an 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
      i. Witnessed loss of consciousness
      ii. Amnesia/memory problems
      iii. Unusual behavior/combative
      iv. Seizures
      v. Worsening headache
      vi. Cannot recognize people
      vii. Disoriented to time and/or place
      viii. Abnormal speech
   b. Eyes
      i. Double vision
   c. General
      i. 2 or more blast exposures within 72 hours
      ii. Repeated vomiting
      iii. Weakness
      iv. 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-hr rest and reevaluate
5. Follow Service specific, DVBIC, Joint Trauma System (JTS) Clinical Practice Guidelines (CPGs)
6. **Contraindications:**
   a. If possible, avoid the use of COX 1 NSAID medication (Motrin®/ibuprofen, Aleve®/naproxen) 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 possible alteration of the patient's level of consciousness.
   d. Avoid the use of narcotics due to alteration of the patient's level of consciousness.

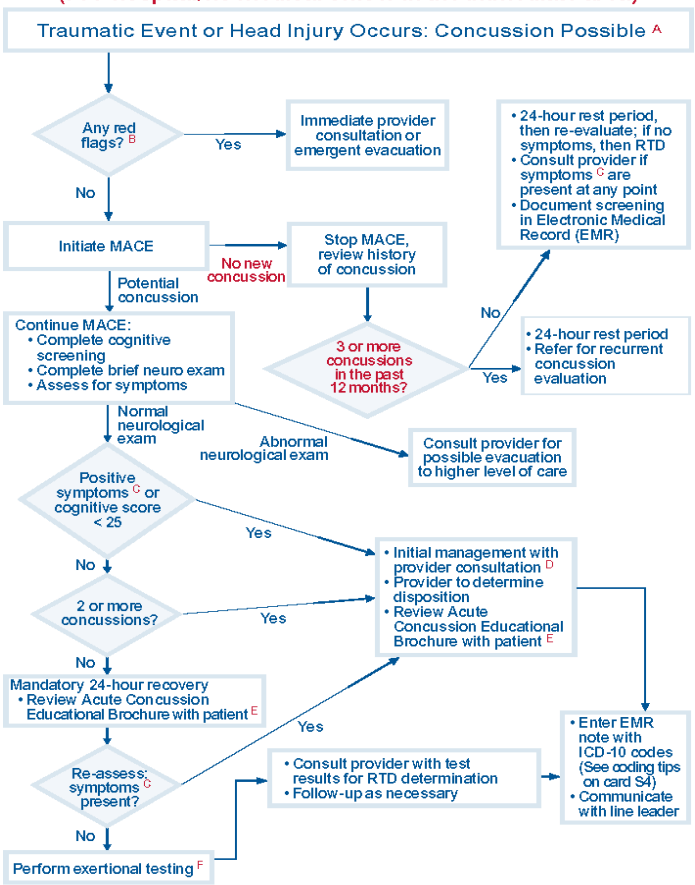
Disposition

- *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

1. Concussion Management in Deployed Settings

COMBAT MEDIC/CORPSMAN ALGORITHM

(Pre-hospital/no medical officer in the immediate area)

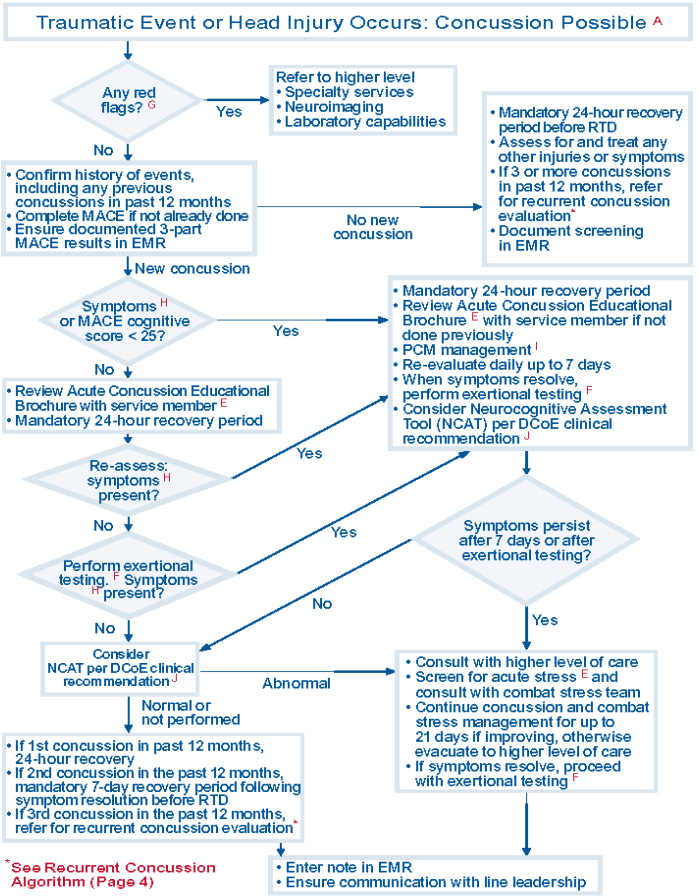


Priority: Quickly assess for red flags

2. Concussion Management in Deployed Settings

INITIAL PROVIDER ALGORITHM

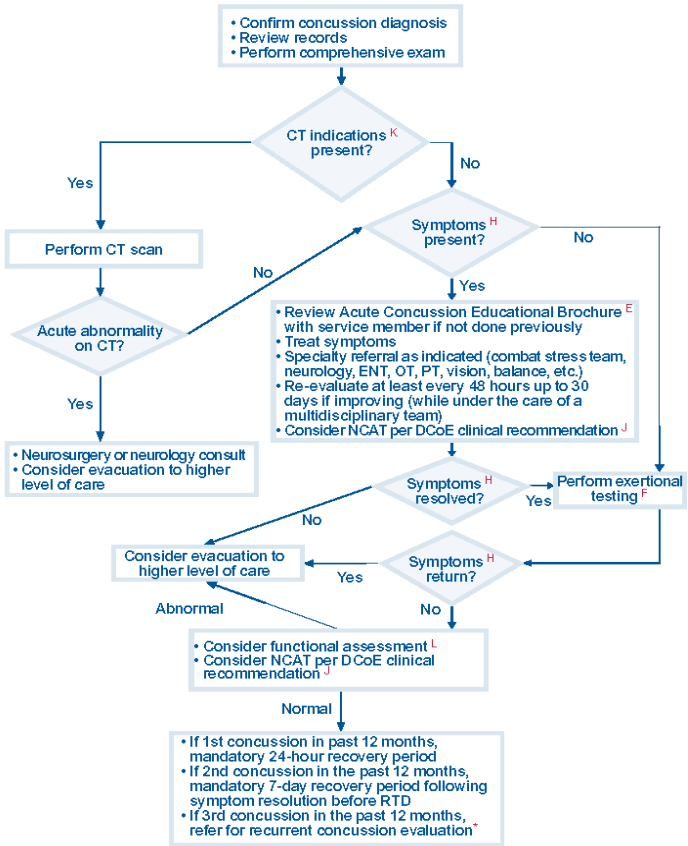
(Management of Concussion in Deployed Setting)



3. Concussion Management in Deployed Settings

COMPREHENSIVE CONCUSSION ALGORITHM

(Referral to military treatment facility with neuroimaging capabilities)



*See Recurrent Concussion Algorithm (Page 4)

4. Concussion Management in Deployed Settings

Recurrent Concussion Evaluation

(three or more documented in 12-month span)

1. Comprehensive neurological evaluation by neurologist or otherwise qualified provider
   - Review of prior concussion history with focus on timeline or resolution of symptoms
   - Assessment of symptoms (face-to-face interview by provider)
     Consider:
     - Neurobehavioral Symptom Inventory [E]
     - Acute Stress Reaction Questionnaire [E]
   - Balance assessment [M]

2. Neuroimaging per provider judgement

3. Neuropsychological assessment by psychologist
   - Evaluate: attention, memory, processing speed and executive function
   - Perform a psychosocial and behavioral assessment
   - Include measure of effort
   - Consider NCAT per DCoE clinical recommendation [J]

4. Functional assessment [L] completed by occupational therapy/physical therapy

5. Neurologist (or qualified provider) determines RTD status

S1 Concussion Management in Deployed Settings

Traumatic Event or Head Injury Occurs: Concussion Possible

A Mandatory Events Requiring Concussion Evaluation:

1. Any service member in a vehicle associated with a blast event, collision or rollover
2. Any service member within 50 meters of a blast (inside or outside)
3. Anyone who sustains a direct blow to the head
4. Command directed — such as, but not limited to, repeated exposures

B Medic/Corpsman Algorithm Red Flags:

1. Witnessed loss of consciousness (LOC)
2. Two or more blast exposures within 72 hrs
3. Unusual behavior/combative
4. Unequal pupils
5. Seizures
6. Repeated vomiting
7. Double vision/loss of vision
8. Worsening headache
9. Weakness on one side of the body
10. Cannot recognize people or disoriented to place
11. Abnormal speech

C Medic/Corpsman Algorithm Symptoms:

(Persisting beyond initial traumatic event)

1. Headache
2. Dizziness
3. Memory problems
4. Balance problems
5. Nausea/vomiting
6. Difficulty concentrating
7. Irritability
8. Visual disturbances
9. Ringing in the ears
10. Other_____

D Medic/Corpsman Initial Management of Concussion:

1. Give Acute Concussion Educational Brochure to all concussion patients, available at: dvbic.dcoe.mil
2. Reduce environmental stimuli
3. Mandatory 24-hour recovery period
4. Aggressive headache management
   – Use acetaminophen q 6 hrs x 48 hrs
   After 48 hours may use naproxen prn
5. Avoid tramadol, Fioricet, excessive triptans and narcotics

E Available Resources (dvbic.dcoe.mil):

- Acute Stress Reaction Questionnaire
- Acute Concussion Educational Brochure
- Neurobehavioral Symptom Inventory
- Line Leader Fact Sheet
- Coding Guidance
- DCoE Neurocognitive Assessment Tool (NCAT) Recommendation

S2 Concussion Management in Deployed Settings

[F] Exertional Testing:

1. Exert to 65-85% of target heart rate (THR=220-age) using push-ups, sit-ups, running in place, step aerobic, stationary bike, treadmill and/or hand crank
2. Maintain this level of exertion for approximately 2 minutes
3. Assess for symptoms (headache, vertigo, photophobia, balance, dizziness, nausea, visual changes, etc.)
4. If symptoms/red flags exist with exertional testing, stop testing, and consult with provider

[G] Provider Algorithm Red Flags:

1. Progressively declining level of consciousness
2. Progressively declining neurological exam
3. Pupillary asymmetry
4. Seizures
5. Repeated vomiting
6. Clinically verified GCS < 15
7. Neurological deficit: motor or sensory
8. LOC > 5 minutes
9. Double vision
10. Worsening headache
11. Cannot recognize people or disoriented to place
12. Slurred speech
13. Unusual behavior

[H] Provider Algorithm Symptoms:

1. Confusion (24 hours)
2. Irritability
3. Unsteady on feet
4. Vertigo/dizziness
5. Headache
6. Photophobia
7. Phonophobia
8. Sleep issues

[I] Primary Care Management (PCM):

1. Give Acute Concussion Educational Brochure to all concussion patients, available at: dvbic.dcoe.mil
2. Reduce environmental stimuli
3. Mandatory 24-hour recovery period
4. Aggressive headache management
   – Use acetaminophen q 6 hrs x 48 hrs
   After 48 hours may use naproxen prn
5. Avoid tramadol, Fioricet, excessive triptans and narcotics
6. Consider nortriptyline q HS or amitriptyline q HS for persistent headache (> 7 days). Prescribe no more than 10 pills.
7. Implement duty restrictions
8. Review current medications and sleep hygiene (Healthy Sleep Fact Sheet available at dvbic.dcoe.mil) and consider short-term low dose non-benzodiazepine hypnotic (e.g., zolpidem 5mg)
9. Pain management if applicable
10. Send consult to med.consult.army@mail.mil for further guidance if needed
11. Consider evacuation to higher level of care if clinically indicated
12. Document concussion diagnosis in EMR

med.consult.army@mail.mil is a Department of Defense email consultation service provided by the Army OTSG Telemedicine Teleconsultation Programs to assist deployed clinicians with the treatment of TBI and RTD decisions.

S3 Concussion Management in Deployed Settings

J DCoE Neurocognitive Assessment Tool (NCAT) Recommendation:

Current DoD policy is that all service members must be tested with a neurocognitive assessment tool (NCAT) prior to deployment. Among several tests that are available, the DoD has selected the Automated Neuropsychological Assessment Metrics (ANAM) as the NCAT to use for both pre-deployment baseline testing and for post-concussion assessment in theater. Detailed instructions for administering a post-injury ANAM are provided at dvbic.dcoe.mil.

For ANAM baseline results send requests to:
usarmy.jbsa.medcom.mbx.otsg--anam-baselines@mail.mil

K CT Indications:*

1. Physical evidence of trauma above the clavicles
2. Seizures
3. Vomiting
4. Headache
5. Age > 60
6. Drug or alcohol intoxication
7. Coagulopathy
8. Focal neurologic deficits

* Haydel MJ, Preston CA, Mills TJ, Luber S, Blaudeau E, DeBlieux PM. Indications for computed tomography in patients with minor head injury. N Engl J Med. 2000 Jul 13;343(2):100-5.

L Functional Assessment:

Assess the service member's performance of military-relevant activities that simulate the multi-system demands of duty in a functional context. Selected assessment activities should concurrently challenge specific vulnerabilities associated with mTBI including cognitive (such as executive function), sensorimotor (such as balance and gaze stability), and physical endurance. Rehabilitation providers should not only evaluate the service member's performance but also monitor symptoms before, during and after functional assessment.

M The Balance Error Scoring System (BESS - Modified):**

Stand on flat surface, eyes closed, hands on hips in 3 positions:

1. On both feet (20 seconds)
2. On one foot (20 seconds)
3. Heel-to-toe stance (20 seconds)

For each position, score 1 point for any of the following errors:

1. Stepping, stumbling or falling
2. Opening eyes
3. Hands lifted above the iliac crests
4. Forefoot or heel lifted
5. Hip moved > 30 degrees flexion or abduction
6. Out of test position > 5 seconds

Score 10 points if unable to complete

Total Balance Score_____

** Guskiewicz KM, Ross SE, Marshall SW. Postural Stability and Neuropsychological Deficits After Concussion in Collegiate Athletes. J Athl Train. 2001 Sep;36(3):263-273.

S4 Concussion Management in Deployed Settings

2015 DoD Definition of Traumatic Brain Injury:

A traumatically induced structural injury or physiological disruption of brain function, as a result of an external force, that is indicated by new onset or worsening of at least one of the following clinical signs immediately following the event:

- Any alteration in mental status (e.g., confusion, disorientation, slowed thinking, etc.).
- Any loss of memory for events immediately before or after the injury.
- Any period of loss of or a decreased level of consciousness, observed or self-reported.

Coding Tips:

1. Primary code (corpsman/medics require co-sign)
   - S06.0X0A - Concussion without LOC
   - S06.0X1A - Concussion with LOC ≤ 30 min.
2. Z787.802- Personal history of other TBI (healed) physical injury and trauma
3. Symptom codes
   - As appropriate
4. Deployment status code
   - Z56.82 - During deployment encounter
5. Screening code for TBI
   - DOD0122
6. External cause of injury code
   - Y36.290A (if applicable) - Operations involving explosions and fragments

Key Algorithm Directives:

- Personnel are required to use the algorithms to treat concussion in the deployed setting
- Mandatory event-driven protocols for exposure to potentially concussive events
  – Requires a medical evaluation and minimum 24-hour rest period
- All sports and activities with risk of concussion are prohibited until after a 24-hour rest period
- Military Acute Concussion Evaluation (MACE) documentation will address all 3 MACE parts
- Service members diagnosed with concussion will be given the Acute Concussion Educational Brochure available at: dvbic.dcoe.mil
- Specific protocols for anyone sustaining ≥ 2 concussions within 12 months

MACE Documentation

Document using the mnemonic "CNS"

(1) C – Cognitive score
(2) N – Neurological exam reported as normal or abnormal
(3) S – Symptoms reported as present or absent

If a head injury event or AOC/LOC/PTA is not reported, then a concussion has not occurred. The MACE is stopped because the cognitive portion is not valid in non-concussed patients. Evaluate and treat any other symptoms or injuries, and document the event in the EMR. The MACE score should be reported as N/A.

Repeat MACE Tips:

Repeating the MACE's cognitive exam with a different version (A-F) may be used to evaluate acute concussion recovery; however, a physical exam and symptom assessment must accompany any repeated cognitive exam. Providers should be mindful of other factors affecting the MACE cognitive score such as sleep deprivation, medications or pain.

PUID 4148
Released: August 2012 | Revised: March 2017
This product is reviewed annually and current until superseded. Visit dvbic.dcoe.mil for the latest information.
DVBIC is the TBI operational component of the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury.

Defense Centers of Excellence
for Psychological Health and Traumatic Brain Injury
Defense and Veterans Brain Injury Center
1335 East West Highway | Suite 6-100 | Silver Spring, Maryland 20910
dvbic.dcoe.mil | dcoe.mil
DCoE Outreach Center 866-966-1020

MACE 2

Military Acute Concussion Evaluation

Use MACE 2 as close to time of injury as possible.

Service Member Name: _____

DoDI/EDIPI/SSN: _____ Branch of Service & Unit: _____

Date of Injury: _____ Time of Injury: _____

Examiner: _____

Date of Evaluation: _____ Time of Evaluation: _____

Purpose: MACE 2 is a multimodal tool that assists providers in the assessment and diagnosis of concussion. The scoring, coding and steps to take after completion are found at the end of the MACE 2.

Timing: MACE 2 is most effective when used as close to the time of injury as possible. The MACE 2 may be repeated to evaluate recovery.

RED FLAGS

Evaluate for red flags in patients with Glasgow Coma Scale (GCS) 13-15.

- ❑ Deteriorating level of consciousness
- ❑ Double vision
- ❑ Increased restlessness, combative or agitated behavior
- ❑ Repeat vomiting
- ❑ Results from a structural brain injury detection device (if available)
- ❑ Seizures
- ❑ Weakness or tingling in arms or legs
- ❑ Severe or worsening headache

Defer MACE 2 if any red flags are present. Immediately consult higher level of care and consider urgent evacuation according to evacuation precedence/Tactical Combat Casualty Care (TCCC).

- ❑ **Negative for all red flags**
  Continue MACE 2, and observe for red flags throughout evaluation.

MILITARY ACUTE CONCUSSION SCREENING

Complete this section to determine if there was an injury event AND an alteration of consciousness or memory.

1. Description of Incident

A. Record the event as described by the service member or witness.

Use open-ended questions to get as much detail as possible.

_____
_____
_____
_____

Key questions:
- ❑ Can you tell me what you remember?
- ❑ What happened?
- ❑ Who were you last with?

B. Observable Signs

At the time of injury were any of these observable signs witnessed?
Visual clues that suggest a possible concussion include:

- ❑ Lying motionless on the ground
- ❑ Slow to get up after a direct or indirect blow to the head
- ❑ Disorientation, confusion, or an inability to respond appropriately to questions
- ❑ Blank or vacant look
- ❑ Balance difficulties, stumbling, or slow labored movements
- ❑ Facial injury after head trauma
- ❑ Negative for all observable signs

C. Record the type of event.

Check all that apply:

☐ Blunt object	☐ Sports injury	☐ Gunshot wound
☐ Fall	☐ Assault	☐ Explosion/blast Estimated distance ____
☐ Fragment	☐ Motor vehicle crash	☐ Other _____

D. Was there a blow or jolt to the head?

- ❑ Did your head hit any objects?
- ❑ Did any objects strike your head?
- ❑ Did you feel a blast wave? (A blast wave that is felt striking the body or head is considered a blow to the head.)
- ❑ Did you have a head acceleration or deceleration?

☐ **YES** ☐ **NO** ☐ **UNKNOWN**

2. Alteration of Consciousness or Memory

A. Was there alteration of consciousness (AOC)?
AOC is temporary confusion or "having your bell rung."

☐ YES ☐ NO

If yes, for how long? _____ seconds _____ minutes

☐ UNKNOWN

Key questions:
- ❑ Were you dazed, confused, or did you "see stars" immediately after the event?
- ❑ Did you feel like you were in a fog, slowed down, or "something was not right"?

B. Was there loss of consciousness (LOC)?
LOC is temporarily passing out or blacking out.

☐ YES ☐ NO

If yes, for how long? _____ seconds _____ minutes

☐ UNKNOWN

Key questions:
- ❑ Did you pass out or black out?
- ❑ Is there a period of time you cannot account for?

C. Was there any post traumatic amnesia (PTA)?
PTA is a problem remembering part or all of the injury events.

☐ YES ☐ NO

If yes, for how long? _____ seconds _____ minutes

☐ UNKNOWN

Key questions:
- ❑ Is there a period of time you cannot account for?
- ❑ What is the last thing you remember before the event?
- ❑ What is the first thing you remember after the event?

D. Was the AOC, LOC or PTA witnessed?

☐ YES ☐ NO

If yes, for how long? _____ seconds _____ minutes

☐ UNKNOWN

Tips for assessment:
- ❑ Ask witness to verify AOC, LOC or PTA and estimate duration.

3. Symptoms

Common symptoms after a concussion are listed below. For this event, check all that apply.

- ❑ Headache
- ❑ Dizziness
- ❑ Memory problems
- ❑ Balance problems
- ❑ Nausea/vomiting
- ❑ Difficulty concentrating
- ❑ Irritability
- ❑ Visual disturbances
- ❑ Ringing in the ears
- ❑ Other _____
- ❑ **Negative for all symptoms**

4. History

A. During the past 12 months, were you diagnosed with a concussion, not counting this event?

☐ YES ☐ NO

If yes, how many? ____

☐ UNKNOWN

B. History of diagnosed/treated headache disorder or migraine.

☐ YES ☐ NO

C. History of depression, anxiety, or other behavioral health concerns.

☐ YES ☐ NO

CONCUSSION SCREENING RESULTS (Possible Concussion?)

Was there a blow or jolt to the head (1D)
AND
ANY alteration of consciousness or memory? (2A, 2B, 2C, or 2D)

YES (to both) ⬇

POSITIVE CONCUSSION SCREEN:

1. **Continue** MACE 2.
2. Complete evaluation before prescribing rest.
3. Communicate findings to line leadership.
4. Document and code findings in electronic health record (EHR).

NO (to either or both) ⬇

NEGATIVE CONCUSSION SCREEN:

1. **Stop** MACE 2.
2. Initiate 24 hour-rest period, if deployed. During rest, avoid activities that worsen symptoms. Follow up with the service member after rest period per concussion management tool (CMT).
3. Communicate findings to line leadership.
4. Document and code findings in electronic health record (EHR).

COGNITIVE EXAM

5. Orientation

Score one point for each correct response.

Ask This Question	Incorrect	Correct
"What month is this?"	0	1
"What is the date or day of the month?"	0	1
"What day of the week is it?"	0	1
"What year is it?"	0	1
"What time do you think it is?"	0	1
Correct response must be within one hour of actual time.		

ORIENTATION TOTAL SCORE ____/5

6. Immediate Memory

Choose one list (A-F below) and use that list for the remainder of the MACE 2.

Read the script for each trial and then read all five words. Circle the response for each word for each trial. Repeat the trial three times, even if the service member scores perfectly on any of the trials.

Trial 1 script: Read the script exactly as written.

- *"I am going to test your memory. I will read you a list of words and when I am done, repeat back to me as many words as you can remember, in any order."*

Trials 2 and 3 script: Read the script exactly as written.

- *"I am going to repeat that list again. Repeat back to me as many words as you can remember, in any order, even if you said them before."*

	Trial 1		Trial 2		Trial 3	
List A	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct
Jacket	0	1	0	1	0	1
Arrow	0	1	0	1	0	1
Pepper	0	1	0	1	0	1
Cotton	0	1	0	1	0	1
Movie	0	1	0	1	0	1

IMMEDIATE MEMORY TOTAL SCORE ____/15

Immediate Memory Alternate Word Lists

List B	List C	List D	List E	List F
Dollar	Finger	Baby	Candle	Elbow
Honey	Penny	Monkey	Paper	Apple
Mirror	Blanket	Perfume	Sugar	Carpet
Saddle	Lemon	Sunset	Sandwich	Saddle
Anchor	Insect	Iron	Wagon	Bubble

NEUROLOGICAL EXAM

7. Speech Fluency

☐ Normal
☐ Abnormal

- Speech should be fluid and effortless
  – no pauses or unnatural breaks.
  – Stuttering or struggling to speak is abnormal.

8. Word Finding

☐ Normal
☐ Abnormal

- Assess difficulties with word finding:
  – Difficulty in coming up with the name of an object or grasping to find words is abnormal.

9. Grip Strength

☐ Normal
☐ Abnormal

- Assess grip strength. Grip strength should be strong and equal bilaterally.
  – Unequal or weak grip strength is abnormal.

10. Pronator Drift

☐ Normal
☐ Abnormal

- Direct service member to stand with eyes closed and arms extended forward, parallel to the ground with palms up. Assess for five to 10 seconds:
  – Any arm or palm drift is abnormal.

11. Single Leg Stance

☐ Normal
☐ Abnormal

- Remove shoes if possible. Have service member stand on one leg, arms across chest, hands touching shoulders, eyes open initially. Once service member is balanced, have them close their eyes and time for 15 seconds how long they can maintain their balance. Repeat test with opposite leg.
  – Loss of balance on either leg before eight seconds is abnormal.

NEUROLOGICAL EXAM - Continued

12. Tandem Gait

☐ Normal
☐ Abnormal

- Remove shoes if possible. Have service member take six steps one foot in front of the other, heel-to-toe, with arms at side
  - Stumbling or shifting feet is abnormal.

13. Pupil Response

☐ Normal
☐ Abnormal

- Pupils should be round, equal in size and briskly constrict to a direct, bright light.
  - Unequal pupil size, dilation or constriction delay is abnormal.

14. Eye Tracking

☐ Normal
☐ Abnormal

- Both eyes should smoothly track your finger side-to-side and up and down.
  - Unequal, irregular or delayed eye tracking is abnormal.

NEUROLOGICAL EXAM RESULTS (Questions 7-14)

☐ All Normal ☐ Any Abnormal

COGNITIVE EXAM

15. Concentration

A. Reverse Digits

Read the script and begin the trial by reading the first string of numbers in Trial 1.

Circle the response for each string.

- If correct on string length of Trial 1, proceed to the next longer string length in the same column.
- If incorrect on string length of Trial 1, move to the same string length of Trial 2.
- If incorrect on both string lengths in Trials 1 and 2, **STOP** and record score as zero for that string length. Record total score as sum of previous correct trials.

COGNITIVE EXAM - Continued

15. Concentration - Continued

A. Reverse Digits

Script: Read the script exactly as written.

- *"I am going to read you a string of numbers. When I am finished, repeat them back to me backward. That is, in reverse order of how I read them to you. For example, if I said 7 - 1 - 9, then you would say 9 - 1 - 7."*

List A			
Trial 1	Trial 2 (if Trial 1 is incorrect)	Incorrect	Correct
4-9-3	6-2-9	0	1
3-8-1-4	3-2-7-9	0	1
6-2-9-7-1	1-5-2-8-5	0	1
7-1-8-4-6-3	5-3-9-1-4-8	0	1

REVERSE DIGITS SCORE (16A) ____/4

Concentration Alternate Number Lists

Note: Use the same list (A-F) that was used in Question 6.

List B	
Trial 1	Trial 2
5-2-6	4-1-5
1-7-9-5	4-9-6-8
4-8-5-2-7	6-1-8-4-3
8-3-1-9-6-4	7-2-7-8-5-6

List C	
Trial 1	Trial 2
1-4-2	6-5-8
6-8-3-1	3-4-8-1
4-9-1-5-3	6-8-2-5-1
3-7-6-5-1-9	9-2-6-5-1-4

List D	
Trial 1	Trial 2
7-8-2	9-2-6
4-1-8-3	9-7-2-3
1-7-9-2-6	4-1-7-5-2
2-6-4-8-1-7	8-4-1-9-3-5

List E	
Trial 1	Trial 2
3-8-2	5-1-8
2-7-9-3	2-1-6-9
4-1-8-6-9	9-4-1-7-5
6-9-7-3-8-2	4-2-7-9-3-8

List F	
Trial 1	Trial 2
2-7-1	4-7-9
1-6-8-3	3-9-2-4
2-4-7-5-8	8-3-9-6-4
5-8-6-2-4-9	3-1-7-8-2-6

COGNITIVE EXAM - Continued

15. Concentration - Continued

B. Months in Reverse Order

Script: Read the script exactly as written.

- *"Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say: December, November…Go ahead."*

Correct Response:

Dec – Nov – Oct – Sep – Aug – Jul – Jun – May – Apr – Mar – Feb – Jan

	Incorrect	Correct
ALL months in reverse order	0	1

MONTHS IN REVERSE ORDER (16B) ____/1

CONCENTRATION TOTAL SCORE ____/5

Sum of scores:
15A (0-4 points) and 15B (0 or 1 point)

16. Delayed Recall

Read the script and circle the response for each word.
Do NOT repeat the word list.
Note: Use the same list (A-F) that was used in Question 6.

Script: Read the script exactly as written.

- *"Do you remember that list of words I read a few minutes earlier? I want you to tell me as many words from that list as you can remember. You can say them in any order."*

List A	Incorrect	Correct
Jacket	0	1
Arrow	0	1
Pepper	0	1
Cotton	0	1
Movie	0	1

DELAYED RECALL TOTAL SCORE ____/5

Delayed Recall Alternate Word Lists

List B	List C	List D	List E	List F
Dollar	Finger	Baby	Candle	Elbow
Honey	Penny	Monkey	Paper	Apple
Mirror	Blanket	Perfume	Sugar	Carpet
Saddle	Lemon	Sunset	Sandwich	Saddle
Anchor	Insect	Iron	Wagon	Bubble

17. Vestibular/Ocular-Motor Screening (VOMS) for Concussion Instructions

VOMS Contraindication: Unstable Cervical Spine.

Consider defering VOMS if patient is overtly symptomatic or a trained provider unavailable. VOMS should be completed before return to duty. Use comment section for any provider-observed difficulty with specific VOMS tasks.

A. **Baseline symptoms.** Record headache, dizziness, nausea and fogginess (HDNF), on zero to 10 scale prior to screening.

B. **Smooth pursuits**. Service member and examiner are seated. Hold fingertip three feet from patient. Service member focuses on fingertip target as examiner moves fingertip smoothly horizontally one and a half feet right and left of midline at rate requiring two seconds to go fully from left to right and right to left. Perform twice. Repeat in vertical direction one and a half feet above and one and a half feet below midline up and down, moving eyes two seconds fully up and two seconds down. Perform twice. Record HDNF on a zero to 10 scale.

C. **Saccades**. Service member and examiner are seated.

1) **Horizontal saccades:** Hold two fingertips horizontally at a distance of three feet from service member, and one and a half feet left and right of midline so service member gazes 30 degrees left and right. Service member moves eyes as quickly as possible from point to point. Perform 10 times. Record HDNF on a zero to 10 scale.

2) **Vertical saccades:** Repeat with two fingertips vertically three feet from service member, and one and a half feet above and below midline so service member gazes 30 degrees upward and downward. Service member moves eyes as quickly as possible from point to point. Perform 10 times. Record HDNF on a zero to 10 scale.

D. **Convergence**. Service member and provider are seated facing each other. Service member focuses on font target (page 14) at arm's length and slowly brings toward tip of nose. Service member stops target when two distinct images seen or when outward deviation of eye observed. Repeat and measure three times. Record centimeters between target and tip of nose for each trial. A near point of convergence ≥ five centimeters from the tip of the nose is considered abnormal. Record HDNF on a zero to 10 scale.

17. Vestibular/Ocular-Motor Screening (VOMS) for Concussion Instructions (Continued)

E. Vestibular-ocular reflex (VOR) test. Service member and examiner are seated. Examiner holds font target (page 14) in front of service member in midline at three feet, rotation speed set with metronome.

1) Horizontal VOR test: Service member rotates head horizontally focusing on target at 20 degrees to each side. Rotation = 180 beats per minute (bpm). Perform 10 times. Record: HDNF 10 seconds after test.

2) Vertical VOR test: Repeat test moving head vertically 20 degrees up and down at 180 bpm. Perform 10 times. Record HDNF 10 seconds after test.

F .Visual motion sensitivity (VMS) test. Service member stands with feet shoulder width apart, facing a busy area. Examiner stands next to and slightly behind service member. Service member outstretches arm. Focusing on their thumb, the service member rotates head,eyes and trunk as unit 80 degrees right and left. Rotation = 50 bpm. Perform five times. Record HDNF on a zero to 10 scale.

17. VOMS Score Card

Vestibular/Ocular Motor Test:	Not Tested	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Comments
BASELINE SYMPTOMS:	N/A					
Smooth Pursuits						
Saccades – Horizontal						
Saccades – Vertical						
Convergence (Near Point)						(Near Point in cm): Measure 1: _____ Measure 2: _____ Measure 3: _____
VOR – Horizontal						
VOR – Vertical						
Visual Motion Sensitivity Test						
Total						

Any score above baseline is considered abnormal

VOMS RESULTS

☐ All Normal ☐ Any Abnormal

MACE 2 - Military Acute Concussion Evaluation

EXAM SUMMARY

Record the data for correct MACE 2 documentation.

Cognitive Summary

Orientation Total Score - Q5	/5
Immediate Memory Total Score (all 3 trials) **- Q6**	/15
Concentration Total Score (Sections A and B) **- Q15**	/5
Delayed Recall Total Score - Q16	/5
COGNITIVE RESULTS ≤ 25 is abnormal	/30

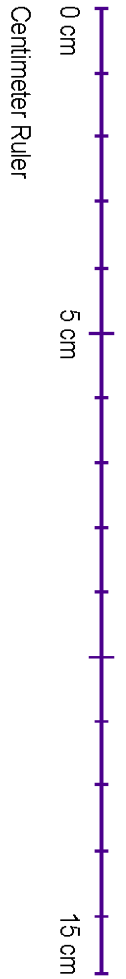
NEUROLOGICAL RESULTS (Q 7-14)	☐ Abnormal (+)	☐ Normal (-)
SYMPTOM RESULTS (Q 3)	☐ 1 or more symptoms (+)	☐ No symptoms (-)
HISTORY RESULTS (Q 4A-4C)	☐ Positive (+)	☐ Negative (-)
VOMS RESULTS (Q 17)	☐ Abnormal (+) ☐ Normal (-)	☐ Deferred
MACE 2 RESULTS	☐ Positive (+)	☐ Negative (-)

AFTER COMPLETING MACE 2:

- ☐ Document MACE 2 results in the EHR with coding instructions.
- ☐ Initiate 24-hour rest.
- ☐ Refer to concussion management tool for the management recommendations based on MACE 2 results.
- ☐ After 24-hour rest period, evaluate for initiation into the Progressive Return to Activity (PRA) following the guidance of the PRA Clinical Recommendation.

  Refer to Progressive Return to Activity Clinical Tool at dvbic.dcoe.mil/files/resources/2013_PRA_PCM_CST_FINAL.pdf

VOMS Equipment Sample 14 point font: **A**



TBI CODING INSTRUCTIONS

Initial TBI screening code*: Z13.850
TBI coding sequence:

1. **Primary TBI diagnostic code: S06. E L S E****
2. **Primary symptom code,** if applicable: (e.g., H53.2 - diplopia)
3. **Deployment status code,** if applicable:*** (e.g., Z56.82 for deployed or Z91.82 for history of military deployment)
4. **TBI external cause of morbidity code:** (For example, Y36.290A (A- use for initial visit) for war operations involving other explosions and fragments, military personnel, initial encounter)
5. Place of occurrence code, if applicable
6. **Activity code,** if applicable
7. **Personal History of TBI code:** if applicable Z87.820

* MACE 2
** Etiology, Location, Severity, Encounter
*** Deployment code must fall within the first four codes when applicable

For more information, see DVBIC ICD-10 Coding Guidance Tool.

References available at https://dvbic.dcoe.mil/material/military-acute-concussion-evaluation-2-mace-2-reference-list.

We are authorized to collect the information on this form and any supporting documentation, including social security numbers, under the Patient Protection and Affordable Care Act (Public Law No. 111-148), as amended by the Health Care and Education Reconciliation Act of 2010 (Public Law No. 111-152), and the Social Security Act.

PUID 4901
Released: February 2012 | Revised October 2018
by Defense and Veterans Brain Injury Center.
This product is reviewed annually and is current until superseded.

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 1L 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 2L of IV fluid (or 1L 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:
   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. Repeat as necessary every 3–5 minutes to maximum dose of 3mg.
   b. Atropine doses <0.5mg may cause a paradoxical bradycardia.
9. Manage hypothermia.

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 q5min 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.

Disposition

Determine disposition based on the underlying etiology that necessitated the procedure performed.

2017 USSOCOM Tactical Trauma Protocols
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NOTES

SECTION 2
Tactical Medical Emergency Protocols (TMEPs)

Preface

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 nontraumatic 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:

1. 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.
2. 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.
3. The SOCM will contact a consulting physician as soon as feasible.
4. SOCM treatment will be done under the appropriate Protocol.
5. 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.
6. Appropriate documentation of diagnosis and treatment rendered in the patient's medical record will be accomplished when the unit returns to forward operating base.
7. Note these Protocols are not designed to allow SOCM medics to conduct Medical/Civic Action (MEDCAP) missions independently.
8. Evacuation recommendations are based on the appropriate therapy per Protocol being initiated on diagnosis.
9. 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.
10. For any infection, limit contact and use universal precautions.

Changes in 2007:

- The changes in the combat pill pack moxifloxacin (Avelox®) and meloxicam (Mobic®), as recommended by the Committee on Tactical Combat Casualty Care (CoTCCC), have been changed in the TMEP Protocols.
- The fentanyl oral dosage of 800mcg, as recommended by the CoTCCC has been incorporated into the Pain Protocol.
- The change in the IV antibiotics has also been changed to reflect medication availability.
- When possible, alternate antibiotics or anti-emetics have been listed.

Changes in 2008:

- The Cellulitis and Cutaneous Abscess Protocols were combined.
- An Altitude Illness Protocol was created, combining AMS, HACE, and HAPE.
- The Chest Pain was expanded to provide more guidance.
- The following new protocols were added: Determination of Death and Envenomation.
- The following medication changes were made: the use of azithromycin (Zithromax®) was decreased; cefalexin (Keflex®), quinine, doxycycline, and corticosporin otic were removed.
- The following medications were added: amoxicillin/clavulanic acid (Augmentin®), rabeprazole (Aciphex®), trimethoprim and sulfamethoxazole (Septra®) DS, salmeterol (Serevent®), rifampin (Rifadin®), ketolorac (Toradol®), and diphenhydramine (Benadryl®) quick dissolve strips.
- The Meningitis Disposition typo error from 2007 was corrected.
- Modifications were made to most of the TMEPS with respect to further refinement in recommendations.
- The "Clinical Pearls" section was added.

Changes in 2009:

- Crush Protocol added
- Blast Protocol added
- MACE charts added
- Traumatic Brain Injury – Mild (mTBI) Protocol added
- Bronchitis/Pneumonia: Disposition changed
- Flank Pain: antibiotics modified (order of preference)
- Joint Infection: antibiotics modified (order of preference)
- Spontaneous Pneumothorax: indications for tube thoracostomy added
- Urinary Tract Infections: antibiotics modified
- Drugs added: calcium chloride, calcium gluconate, sodium bicarbonate, mannitol (Osmitrol®)

- HIV PEP Protocol updated with new medications added: Atripla®, Truvada®, Viread®, Kaletra®
- Behavioral Changes Protocol changed and midazolam (Versed®) added
- Seizure Protocol changed and midazolam (Versed®) added

Changes in 2010:

- K9 Protocols added
- Drugs added: tadalafi (Cialis®), sildenafil (Viagra®)
- Altitude Illness changed to add tadalafi (Cialis®) and sildenafil (Viagra®)

Changes in 2011:

- Trauma Protocols added
- TMEP Seizure Protocol updated to match Trauma Seizure Protocol
- Drugs added: fosphenytoin (Cerebyx®), tranexamic acid (TXA) (Cyklokapron®)
- Blast TMEP deleted and recommendations incorporated into the Tactical Trauma Protocols
- Crush Syndrome TMEP moved to Tactical Trauma Protocols
- Rewrite of majority of Tactical Medical Emergency Protocols
- Expansion of Envenomation Protocols
- Revision of Cold Injury Protocol
- Revision of Heat Illness Protocol
- Revision of K9 Protocol
- Administration of Blood Products Protocol added to Tactical Trauma Protocols
- Neurogenic/Spinal Shock Protocol added to Tactical Trauma Protocols
- IV push dose epinephrine authorized for Neurogenic/Spinal Shock Protocol and Septic Shock Protocol

Changes in 2013:

- Added e-mail address for suggested changes.
- Added Abdominal Aortic & Junctional Tourniquet – AAJT™ and SAM® Junctional Tourniquet
- Added additional characteristic recommendation for supraglottic airways.
- Revised the administration of blood and blood components protocol to allow for routine transfusion of low titer type O whole blood as a functional "universal donor" and untitered type O fresh whole blood *in extremis*.
- Removed recommendation for premedication with Epinephrine and/or Diphenhydramine from the administration of blood and blood components protocol.
- Added Albuterol to the crush syndrome protocol and changed order of preference for drugs to increase calcium.
- Added example crush syndrome treatment kit.

- Changed photos in the canine protocols and revised wording.
- Revised antibiotic recommendations and advised to remove contacts in the corneal abrasion protocol.
- Added open globe injury protocol.

Changes in 2016/2017:

- Removed acetaminophen for injection (Ofirmev®) to keep the overall drug list shorter and because it was unwieldy.
- Added K9 Anaphylactic Reactions and Envenomation Protocols
- Added K9 Gastric Dilatation Volvulus (GDV)/Bloat Protocol
- Modified guidance for use of LR in the Crush Injury Protocol
- Added ketamine for chemical restraint of a combative patient to the Behavioral Changes Protocol
- Removed diphenhydramine (Benadryl®) quick dissolve strips from clinical pearls list of medications due to discontinuation
- Updated Cold Injury Protocol to ensure adherence to the 2014 Alaska state guidelines and added more detailed guidance for hypothermia management.
- Added CBRN: Nerve Agent Poisoning Protocol
- Changed Smoke Inhalation Protocol to Smoke Inhalation/Choking Agent/TICs Protocol
- Added CBRN treatments to the Asthma (Reactive Airway Disease) Protocol, Smoke Inhalation/Choking Agent/TICs Protocol And Corneal Abrasions/Corneal Ulcers/Conjunctivitis Protocols.
- Updated the Pain Management Protocol with Ketamine (Ketalar®) and other minor changes in order to reflect the Pain Management Guidelines in the USSOCM Tactical Trauma Protocol more closely
- Added a Disposition to all of the K9 Protocols
- Removed doxycycline (Vibra-Tabs®) from the Testicular Torsion Protocol and Replaced with azithromycin (Zithromax®) for Presumptive Treatment of STD
- Removed warning in the Crush Syndrome and Rhabdomyolysis Protocols stating "Ringer's lactate is not recommended due to the potassium content, but may be used if nothing else is available".
- Removed "If crystalloids (normal saline or lactated Ringer's) are recommended, but not available, substitute Hextend® or Hespan® if available" from Clinical Pearls.
- Adjusted the dosage and units of measure for fosphentoin (Cerebyx®) in the Seizures Protocol
- Modified Pain Management Protocol to match the USSOOCM Tactical Trauma Protocols
- Corrected various misspellings and grammatical and formatting errors.
- Modified the Constipation/Fecal Impaction 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: Phenylephrine (Sudafed PE®) orally disintegrating strips, and Ondansetron (Zofran®) orally disintegrating tablet.
  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 PROTOCOL

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), 1L bolus, followed by NS 150mL/hr. Keep NPO except for medications or PO hydration.
2. Ertapenem (Invanz®) 1g IV daily
3. **OR** ceftriaxone (Rocephin®) 1g IV daily, plus metronidazole (Flagyl®) 500mg PO q8hr
4. Treat per ***Pain Management 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 Observations

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. Rx Antacid of choice
2. Rx Ranitidine (Zantac®) 150mg PO bid **OR** rabeprazole (Aciphex®) 20mg PO daily
3. PO hydration

Disposition

1. Observation and re-evaluation
2. *Priority* evacuation if symptoms not controlled by this management within 12 hours.

ALLERGIC RHINITIS / HAY FEVER / COLD-LIKE SYMPTOMS PROTOCOL

SPECIAL CONSIDERATIONS

History of allergies to cedar, mold, pollen, etc.

Signs 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 q4–6hr
2. Diphenhydramine (Benadryl®) 25–50mg PO q6hr if tactically feasible. (Drowsiness is a side-effect.)
3. Increase oral fluid intake.

Disposition

None applicable

ALTITUDE ILLNESS PROTOCOL

SPECIAL CONSIDERATIONS

ACUTE MOUNTAIN SICKNESS (AMS)

1. Usually occurs at altitudes of 8,000 ft. and higher
2. Consider pretreatment when rapid ascent to altitudes above 8,000 ft. 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 11,500 ft. occurs (as with airlifts):
   a.  Dexamethasone (Decadron®) 4mg PO q6hr 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 8,000 ft. then 1,000 ft. per day thereafter. The key to prevention is slow, gradual ascent.

HIGH ALTITUDE CEREBRAL EDEMA (HACE)

1. Rare below 11,500 ft.
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 8,000 ft. 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 (Procardia®) 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 3,000 ft. for HACE, HAPE, or refractory AMS if tactically feasible.
2. **IF AMS SYMPTOMS PRESENT**
   a. Rx Acetazolamide (Diamox®) 250mg PO bid **UNLESS PATIENT IS ALLERGIC TO SULFA**
   b. Rx Dexamethasone (Decadron®) 4mg PO q6hr if patient is allergic to sulfa

   If Dexamethasone (Decadron®) is administered, no further ascent until asymptomatic for 24 hours after last Dexamethasone (Decadron®) dose.
3. **IF HACE SYMPTOMS PRESENT: ATAXIA OR ALTERED MENTAL STATUS**
   a. Administer supplemental oxygen to bring SaO_2 above 90% (if available).
   b. Rx Dexamethasone (Decadron®) 8mg IV/IM STAT, then 4mg IV/IM q6hr
   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 SaO_2 above 90% (if available)
   b. Rx Nifedipine (Procardia®) 30mg SR q12hr or 20mg SR q8hr if blood pressure is stable
      i. **IF NIFEDIPINE IS NOT AVAILABLE:** sildenafil (Viagra®) 50mg q8hr, or tadalifil (Cialis®) 10mg q12hr
      ii. Do not use nifedipine (Procardia®) in HACE; the drop in blood pressure may worsen the symptoms of this condition.

c.  Considers salmeterol (Serevent®) 2 inhalations q12hr or albuterol (Ventolin®) 2 inhalations q6hr 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.
6. Treat per ***Nausea and Vomiting Protocol***.
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 PROTOCOL

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 EpiPen®.
   b. **OR** epinephrine 0.5mg (0.5mL of 1:1000 IM). **DO NOT USE INTRAVENOUSLY.**
   c. Repeat epinephrine q5min prn.
2. Oxygen with pulse oximetry monitoring
3. 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.

4. IV normal saline TKO (saline lock)
   a. Administer 1–2L normal saline bolus for hypotension;
   b. Titrate to establish systolic blood pressure >90mmHg or palpable radial pulse if BP cuff not available.
5.  Diphenhydramine (Benadryl®) 50mg IV/IM/PO/SL
6.  Dexamethasone (Decadron®) 10mg IV/IM/PO
7.  If wheezing is present after epinephrine administration, consider albuterol (Ventolin®), 2–3 puffs q5min, 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.).
8.  Ranitidine (Zantac®) 150mg PO bid

Disposition

Urgent evacuation

ASTHMA PROTOCOL
(REACTIVE AIRWAY DISEASE)

SPECIAL CONSIDERATIONS

1. Other disorders to consider: anaphylactic reaction, spontaneous pneumothorax, HAPE, and pulmonary embolism.
2. Exposure to nerve agents, vesicants, and Toxic Industrial Chemicals (TICs) can cause Reactive Airway disease (RAD) (bronchoconstriction).

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 q5min, 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 minutes.
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***.
7. If bronchospasm due to nerve agent, primary treatment should be with atropine to reverse bronchospasm and bronchorrhea. Atropine should be given in 2–4mg doses until airway distress resolves. See ***CBRN: Nerve Agent Poisoning 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 q6hr) and re-evaluate in 24 hours. Continue dexamethasone (Decadron®) 10mg IM daily for 4 days.
   b. *Urgent* evacuation if symptoms persist.

BACK PAIN PROTOCOL

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

1. Rx Treat per ***Pain Management Protocol***.
2. Apply cold compress to painful area for 20–25 minutes tid.
3. Rx Trigger point injections with local anesthetic (**IF TRAINED**). Lidocaine 1–2mL per trigger point. May repeat daily for 2 days.
4. Rx 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 PROTOCOL

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, and/or 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.

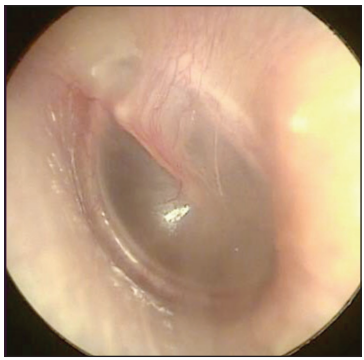
Management

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. Rx Moxifloxacin (Avelox®) 400mg PO daily if contamination is suspected
   c. Rx Pseudoephedrine (Sudafed®) 60mg PO q4–6hr prn
   d. **DO NOT** use ear drops. If TM is not ruptured, use oxymetazoline (Afrin®) nasal spray.
   e. Refer to higher level of care when feasible.
3. Paranasal Sinus barotraumas
   a. Rx Pseudoephedrine (Sudafed®) 60mg PO q4–6hr prn

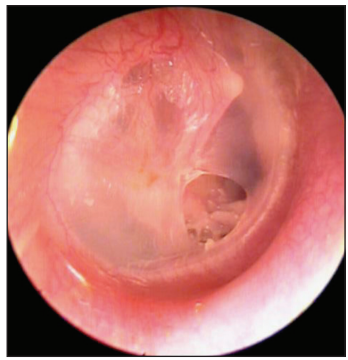
4. Pulmonary barotraumas (to include subcutaneous emphysema):
   a. If no respiratory distress, monitor patient closely. Use pulse oximetry if available.
   b. If respiratory distress occurs – Treat per ***Pneumothorax, Acute (Atraumtic) Protocol***.
5. If POIS is suspected, administer 100% oxygen and 1L normal saline IV 150cc/hr. *Urgent* evacuation to recompression chamber.
6. If an unpressurized airframe is used, avoid altitude exposure greater than 1000 ft.
7. Treat per ***Pain Management Protocol***. (Avoid narcotics if recompression is anticipated.)

Disposition

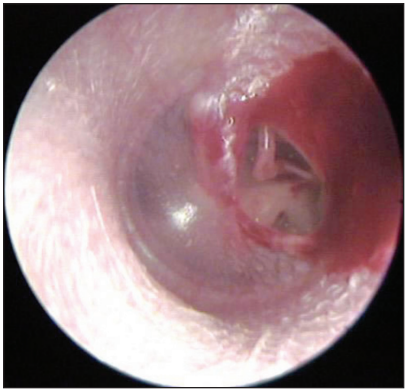
1. *Urgent* Evacuation for cerebral arterial gas embolus, POIS, or pneumothorax with respiratory distress.
2. Mild to moderate middle ear, sinus, or pulmonary barotraumas without respiratory distress, observation, and *Routine* evacuation.
3. *Routine* evacuation for consultation for tympanic membrane rupture.



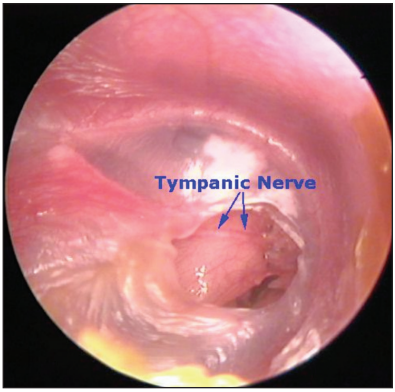
Normal Tympanic Membrane



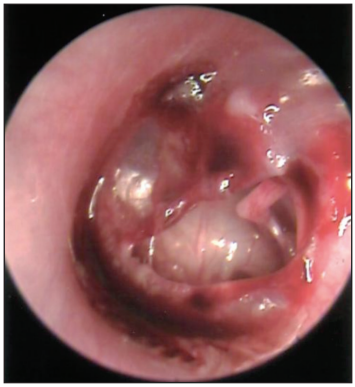
Perforated Tympanic Membrane



Traumatic Perforated Tympanic Membrane



Perforated Tympanic Membrane Exposing Tympanic Nerve



Traumatic Perforation of Tympanic Membrane

BEHAVIORAL CHANGES PROTOCOL
(INCLUDES PSYCHOSIS, DEPRESSION, 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 (e.g., mefloquine [Lariam®]) 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 oral glucose gel containing 40% dextrose (d-glucose), (Glutose45™) or contents of one packet of sugar in the buccal mucosal region for possible hypoglycemia.
5. Take Temperature
   a. If temperature is below 95° F (35° C), treat per ***Cold Injury Protocol***.
   b. If temperature is above 101° F (38.3° C), treat per ***Meningitis Protocol***.
   c. If temperature is above 103° F (39.4° C), treat per ***Meningitis & Heat Illness Protocols***.

d. **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 ketamine (Ketalar®) 4–5mg/kg for a max dose of 500mg IM.
7. Apply physical restraints once patient is chemically restrained with ketamine, then establish IV access. If emergence reaction occurs in the form of combativeness, give midazolam 1–2mg IV **OR** diazepam (Valium®) 2mg IV. Repeat after 3–5min prn for a max dose of 4mg of midazolam or 5mg of diazepam (Valium®).
8. If sedated or restrained, maintain constant vigilance for a change in the hemodynamic status or loss of airway reflexes.

Disposition

Urgent evacuation

USSOCOM Suicide Prevention Policy Enclosure 2
Counseling Areas And Leader Actions

USSOCOM Counseling Risk Reduction Tool	
INSTRUCTIONS FOR LEADERS	
This tool is designed to help leaders identify potential risks among their Servicemembers (SM). If an SM has a concern or problem, provide him/her with options (suggestions are provided under "Leader Action" for each issue of concern), ensure that you follow up with him/her, and continue to address the plan of action as necessary. Document any pertinent issues of concern and the associated action plan on applicable counseling forms.	
Issue of Concern	**Leader Actions**
1. Has the SM been command referred for any assistance (e.g., legal, financial, spiritual, alcohol, family/relationship, behavioral, health, other)? Does the Subordinate wish to disclose receiving any assistance for which he/she was not command referred?	Refer SM to appropriate resources. Reserve Component (RC) ensure referral is with appropriate local resource.
2. Is the SM experiencing any difficulties getting the assistance he/she needs either on-post or off-post?	Refer SM to appropriate resources. RC ensure referral is with appropriate local resource. Flow-up with SM within 14 days to ensure that any difficulties have been overcome or resolved.
3. Has the SM been unsuccessful in meeting requirements or standards (e.g., duty performance, PT, Battle Assembly participation (RC only), weight control, weapons qualification, MOS training)?	Develop and implement a plan of action to meet the requirements/standards. Closely monitor the SM's progress.
4. Has the SM received negative counseling or evaluations since arriving at the current unit or organization?	Determine if this is a current condition. Develop and implement a plan of action to meet the requirements/standards. Closely monitor the SM's progress.
5. Has the SM been denied promotion or attendance to schools, or barred from reenlistment for any reason?	Determine if this is a current condition. Develop and implement a plan of action to meet the requirements/standards. Closely monitor the SM's progress.
6. Is the SM currently undergoing a UCMJ action?	Ensure Subordinate has adequate support, to include legal.

(continues)

USSOCOM Suicide Prevention Policy Enclosure 2 (cont.)

Issue of Concern	Leader Actions
7. Does the SM have financial or employment concerns, such as inability to cover basic monthly expenses, home foreclosure, difficulty meeting child support payments, or inability to repay loans?	Refer SM to unit or installation financial representative or Community Service Financial Readiness Program. RC ensure referral is with appropriate local resource.
8. Has the SM experienced an accident, injury, illness, or medical condition that resulted in current fitness for duty limitations?	Ensure SM has appropriate medical follow-up. Ensure medical profile in e-Profile.
9. Does the SM have a current medical profile (temporary or permanent)?	Ensure SM has appropriate medical follow-up. Ensure medical profile in e-Profile.
10. Does the SM have any concerns about medical care, medications or supplement he/she is taking?	Refer to Primary Care Manager (PCM) or Military Treatment Facility (MTF). RC ensure referral is with appropriate local resource.
11. Is the SM currently experiencing problems related to sleep (e.g., trouble falling asleep, trouble staying asleep, performance problems related to sleep, consistently getting less than 7–9 hours of sleep, using alcohol or other substances to get to sleep)?	Refer to PCM or MTF. RC ensure referral is with appropriate local resource.
12. Does the SM tend to withdraw or socially isolate himself/herself from others?	Refer to Unit Ministry Team (UMT), PCM, MTF, or Unit Behavioral Health Team, as appropriate. RC ensure referral is with appropriate local resource.
13. Has the SM exhibited excessive anger or aggression in the past three months?	Refer to UMT, PCM, MTF, or Unit Behavioral Health Team, Anger Management, or other appropriate support. RC ensure referral is with appropriate local resource.
14. Is the SM experiencing serious marital/ relationship issues, or immediate family concerns, such as a serious illness in a family member?	Refer to Community Services, Military Family Life Counselor (MFLC), Military OneSource, UMT, Unit Behavioral Health Team, or other appropriate support. RC ensure referral is with appropriate local resource.
15. Has the SM been involved in any accidents of domestic violence or child abuse/neglect?	Refer to Family Advocacy Program. RC ensure referral is with appropriate local resource.

(continues)

USSOCOM Suicide Prevention Policy Enclosure 2 (cont.)

Issue of Concern	Leader Actions
16. Has the SM experienced any condition that may be considered cruel, abusive, oppressive, or harmful, to include hazing or assault?	Connect Subordinate with appropriate support (e.g., SHARP, EO, Family Advocacy, UMT, PCM, MTF). RC ensure referral is with appropriate local resource.
17. Has the SM experienced any condition that may be considered cruel, abusive, oppressive, or harmful, to include hazing or assault?	Refer to unit Substance Abuse Program at time of incident and closely monitor SM's progress. RC ensure referral is with appropriate service.
18. Has the SM deployed to a location where there was hostile fire or the received hazardous duty pay?	Does the SM have any current deployment related concerns? Refer to PCM, MTF, or other appropriate support. RC ensure referral is with appropriate service.
19. Has the SM experienced difficulty coping with a loss (e.g., death of a close friend, family member or team member, loss of social support)?	Refer to UTM, PCM, MTF, Unit Behavioral Health Team, or other appropriate support. RC ensure referral is with appropriate service.
20. Has anyone (e.g., spouse, other family member, friends, fellow SM) expressed concern about the SM'sbehavior?	Obtain additional information as appropriate. Refer to local unit Community Health Services, MFLC, Military OneSource, UMT, Unit Behavioral Health Team, or other appropriate support. RC ensure referral is with appropriate service.
21. Has the SM expressed any suicidal thoughts or actions, or expressed a desire to harm others?	Escort SM to Installation Behavioral Health or MTF Emergency Room, as appropriate, and notify leadership. Do not leave SM alone, Order SMs who possess privately owned weapons on post to store them in the unit arms room; ask SMs who possess privately owned weapons off post to voluntarily surrender them to the unit arms room. Consider ordering SM to reside in barracks for an evaluation period (3 days) if they choose not to voluntarily surrender weapons stored off post.

BRONCHITIS / PNEUMONIA PROTOCOL

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 daily for 4 days **OR** moxifloxacin (Avelox®) 400mg PO daily for 7 days.
2. If unable to tolerate PO intake, ertapenem (Invanz®) 1g IV/IM **OR** ceftriaxone (Rocephin®) 1g IV daily.
3. Albuterol (Ventolin®) by metered dose inhaler 2–4 puffs q4–6hr
4. Treat per ***Pain Management Protocol***.
5. If febrile, acetaminophen 1g PO q6hr.
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.

CBRN: NERVE AGENT POISONING PROTOCOL

SPECIAL CONSIDERATIONS

1. Vapor inhalation is typically more severe than liquid cutaneous exposure.
2. Medic must ensure scene safety, if in the area of exposure, leave!
3. Remove all patient clothing and decontaminate with a total body soap and water scrub.
4. Identification of specific agent is unnecessary. **DO NOT DELAY THERAPY!**
5. Atropine treats only muscarinic symptoms. Pralidoxime is needed to treat nicotinic symptoms.
6. Pralidoxime reactivates acetylcholinesterase; however, it is only useful if given before agent ages.
7. If agent "ages" on acetylcholinesterase, it will be bound permanently.
8. Each nerve agent ages at a different rate (from 2 minutes to days).
9. Common reasons for exposure: insecticides, agricultural professions, and weaponized.

Signs and Symptoms

1. Muscarinic = **DUMBELS**
   - **D –** Diarrhea
   - **U –** Urination
   - **M –** Miosis (pinpoint pupils)
   - **B –** Bronchospasm, bronchorrhea, bradycardia
   - **E –** Emesis
   - **L –** Lacrimation
   - **S –** Salivation, secretions, sweating
2. Nicotinic = **MTWHF**
   - **M –** Mydriasis (dilated pupils)
   - **T –** Tachycardia
   - **W –**Weakness
   - **H –** Hypertension
   - **F –** Fasiculations (involuntary twitches)

Triage Categories (single/few patients)

Category I

a. Miosis
b. Rhinorrhea
c. Salivation

Category II

a. Tightness in chest
b. Dyspnea
c. Localized or generalized fasciculations

Category III

a. Life threatening dyspnea
b. Seizures

Triage Categories (MASCAL)

No Treatment

a. Miosis
b. Rhinorrhea
c. Absence of any other symptoms

Category I

a. Sweating
b. Fasiculations
c. Nausea & vomiting
d. Weakness
e. Dyspnea

Category II

a. Unconsciousness
b. Convulsions
c. Apnea
d. Flaccid paralysis

Management

1. Airway management is paramount!

2. Antidote Treatment Nerve Agent, Auto-Injector (ATNAA)

a. Given intramuscularly
b. Each auto-injector contains atropine 2.1mg and pralidoxime (2PAM-Cl) 600mg
c. Number of auto-injectors given depends on symptoms

3. Convulsant Antidote for Nerve Agent (CANA)

a. Given intramuscularly
b. Each auto-injector contains 10mg of diazepam (Valium®)
c. Number of auto-injectors given depends on symptoms

4. Dosages

a. Category I – 1 ATTNA auto injector
b. Category II – 2 ATTNA kits and 1 CANA if fasiculations are present
c. Category III – 3 ATTNA kits and 1 CANA

5. Although additional doses of pralidoxime are contraindicated, additional 2–4mg doses of atropine can be administered until secretion related dyspnea subsides
6. Additional diazepam (Valium®) can be administered as indicated for seizures
7. Ensure adequate oxygenation
8. Pulse oximetry is essential!
9. Be prepared to intubate and ventilate the patient!
10. If available cardiac monitoring is beneficial for the identification of possible dysrhythmias

Disposition

1. *Urgent* evacuation even if the patient appears stable.
2. They must be evaluated for permanent neurological effects.
3. Sustained atropine and pralidoxime will be given as indicated at higher care echelon.

CELLULITIS / CUTANEOUS ABSCESS PROTOCOL

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 6–8 hours 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 daily 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®) 1g IV/IM daily 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:
      i. Establish sterile incision site with Betadine®.
      ii. Local anesthesia using lidocaine
      iii. Incise the length of the abscess cavity, but no further.
      iv. Incision should be parallel to skin tension lines if possible.

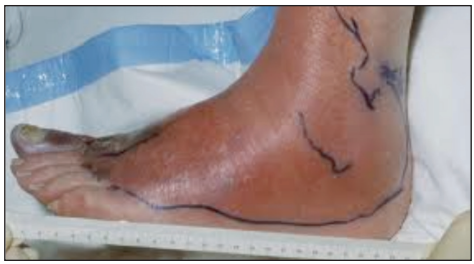
v. On initial treatment, leave wound open and pack with iodoform or dry sterile gauze, if available. On subsequent dressings, loosely pack the wound and leave gauze protruding to facilitate drainage (wick the wound). **DO NOT SUTURE THE SITE**.

b. Bandage site and perform wound checks daily.

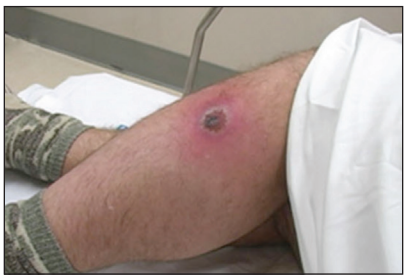
8. Treat per ***Pain Management Protocol***.

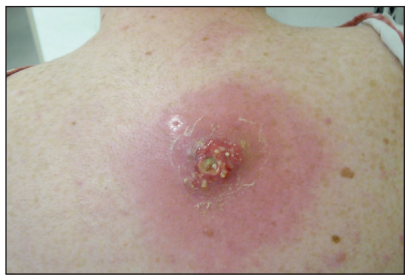
Disposition

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 PROTOCOL

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. Rx Aspirin (ASA) 325mg PO (nonenteric coated) – chew to speed absorption.
2. IV access with saline lock. Administer 250–500mL normal saline boluses as needed to correct hypotension with frequent reassessment.
3. Rx Morphine sulfate 5mg IV initially, then 2mg q10–15min 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 lying 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 150mL/hr and ertapenem (Invanz®) 1g 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 (ASA) 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, noncentral 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 noncardiac etiology to ensure stability and accuracy of the diagnosis.

COLD INJURY PROTOCOL

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.

Signs and Symptoms

1. Hypothermia (Decreased core temperature)
   a. Mild – Shivering, poor coordination
   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, gray-appearing skin. Skin is hard, white, gray, 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 (NFCI);
   a. Gently dry and massage involved area. Elevate feet, warm torso, hydrate orally, dry socks. NSAIDs may help. Evacuation depends on ambulatory ability.
   b. Active rewarming is contraindicated in the treatment of pernio or chilblains, however mixed frostbite and NFCI injuries require rapid rewarming for the frostbite injury, if it has not already thawed.
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 (Motrin®), 800mg PO tid (consider other NSAIDs if ibuprofen (Motrin®) 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:
   i. Do not attempt to thaw frostbitten tissue.
   ii. Protect tissue from further injury by wrapping with dry Kerlix®.
      (a) Separate digits with dressing.

i. Refreezing not likely:
   i. 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.
   ii. Deep
      (a) Warm water immersion 104–108° F (40–42° C) 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 replace it with dry coverings that will reducing further heat loss from evaporation, radiation, conduction, or convection (e.g., HPMK™, Blizzard Blanket™, sleeping blanket with Mylar™ blanket, etc.).

b. Do not put a cold patient in a shower or bath. A warm bath increases afterdrop. Vasodilation and increased afterdrop could provoke cardiovascular collapse or ventricular fibrillation.

c. Shield from wind.

c. If able to tolerate PO, provide food and hydrate patient.

d. Mild: exercise in place.

e. Moderate/Severe:
   i. Do not exercise patient. Maintain supine position on insulation.
   ii. Do not give patients food or oral fluids.
   iii. If IV fluids are indicated, administer glucose-containing IV fluids warmed to 104° F (40° C) or 1 amp of D50.
   iv. Begin active rewarming (e.g., with heat source (e.g., Ready-Heat™ blanket, hot water bottles, chemical packs, etc.)
   v. 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.

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 nonfreezing cold injury which are nonambulatory.
4. Evacuation not necessary for cases of nonfreezing ambulatory cold injuries.

References

State of Alaska Cold Injury Guidelines, 2014, https://health.alaska.gov/dph/Emergency/Documents/ems/documents/Alaska%20DHSS%20EMS%20Cold%20Injuries%20Guidelines%20June%202014.pdf

SOF Medical Handbook, 2009

CONSTIPATION / FECAL IMPACTION PROTOCOL

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. Perform digital rectal examination to check for fecal impaction. Often times this is the only intervention necessary.
2. Rx Bisacodyl (Dulcolax®) 10mg PO tid prn
3. Avoid narcotics as this will exacerbate the constipation.
4. For impacted stool or no relief with above measures, give normal saline enema 500mL via lubricated IV tubing (patient should retain solution for 2 minutes before evacuating contents).
5. If fecal impaction is still present, perform digital disimpaction, if trained.
6. Increase PO fluid intake.
7. Increase fiber (fruits, bran, and vegetables) in diet if possible.
8. 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 PROTOCOL

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, nonpruritic, 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 daily 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 q6hr prn itching, if tactically feasible. (Sedation may occur.)

Disposition

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

CORNEAL ABRASIONS / CORNEAL ULCERS / CONJUNCTIVITIS PROTOCOL

SPECIAL CONSIDERATIONS

1. Contact lens corneal abrasions are at a high risk for development of a corneal ulcer. They should not be patched and require more intensive antibiotic therapy.
2. Consider LASIK flap dislocation for anyone that sustains eye trauma after LASIK surgery.
3. If vesicant (sulfur mustard) exposure, onset of symptoms <12 hours from exposure indicates moderate to severe exposure.

Signs and Symptoms

1. History of eye trauma, contact lens wear, or chemical exposure.
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

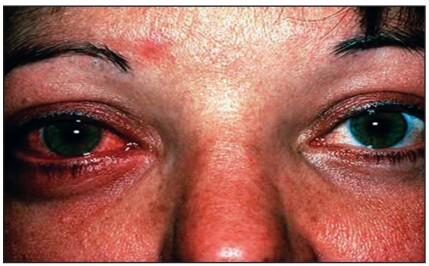
1. If chemical exposure, immediately irrigate with large volume of water.
2. Remove contact lens(es) if worn.
3.  Tetracaine 0.5%, 2 drops in the affected eye for pain relief. Do not dispense to patient.
4. Check for foreign body to include eyelid eversion. Irrigate with normal saline prn.
5.  Gatifloxacin (Zymar®) 0.3% drops – Corneal Abrasion: 1 drop in the affected eye qid while awake for corneal abrasion. Corneal Ulcer: culture if possible prior to treatment then start gatifloxacin 1 drop q15min × 2hr, then q1hr during the day and q2hr through the night.
6. Treat per ***Pain Management Protocol***.
7. Reduce light exposure, stay indoors if possible – sunglasses if not possible.

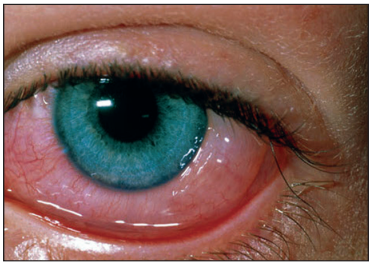
8. For corneal abrasions: monitor daily for worsening signs and symptoms of a corneal ulcer (increasing pain and development of a white or gray spot at abrasion site). **DO NOT PATCH.**
9. Assess using fluorescein drops daily – abrasions should get progressively smaller. Continue antibiotic drops until 24 hours after cornea becomes fluorescein negative (no bright yellow spot).
10. **IF CORNEAL ULCER PRESENTS**: Increase gatifloxacin (Zymar®) drops to q2hr and *Priority* evacuation.

Disposition

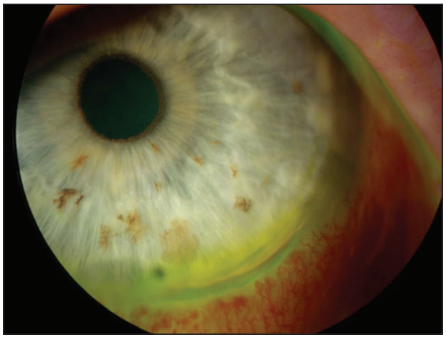
1. Evacuation may not be needed for corneal abrasion if improving with treatment.
2. *Urgent* evacuation for LASIK flap dislocation
3. *Priority* evacuation for Corneal Ulcer, conjunctivitis onset <12hours after vesicant exposure.

Eye Pathology



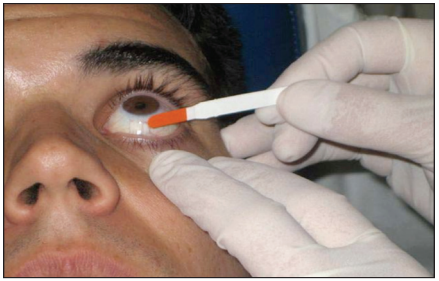


Conjunctivitis

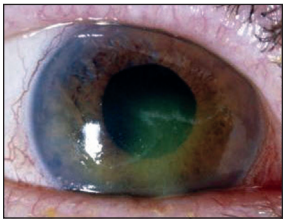


Partially Dislocated LASIK Flap

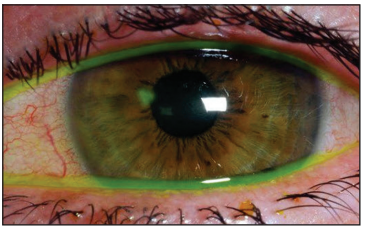
(Notice smooth semicircular dye stained cut at the 4–6 o'clock position on the corneal margin. This represents the surgical incision that has failed to completely heal).



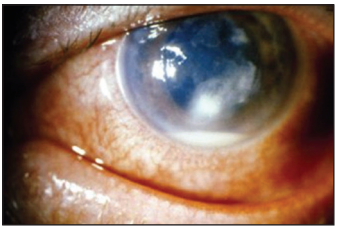
Instillation of fluorescein dye into the eye.



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 fluorescein.



Corneal Ulcer

(White area on cornea that is visible WITHOUT fluorescein dye)

COUGH PROTOCOL

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 benzocaine (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 q4hr 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/Hay Fever/Cold-Like Symptoms 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) PROTOCOL

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 PROTOCOL

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 1L normal saline IV, followed by repeat attempt at PO hydration. If still unable to tolerate PO hydration, repeat 1L bolus of normal saline IV. If normal saline is not available, use available IV fluids.

Disposition

1. Monitor closely for recurrence of dehydration.
2. *Priority* evacuation if dehydration persists after treatment.

DENTAL PAIN PROTOCOL

SPECIAL CONSIDERATIONS

1. Most common causes are deep decay, fractures of tooth crown/root, acute periapical (root end) abscesses, or pericornitis (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 (Zithromax®) Z-PAK® 500mg PO initially followed by 250mg PO daily × 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 PROTOCOL

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:
   a. Decapitation
   b. Massive crushing and/or penetrating injury with evisceration of the heart, lung or brain
   c. Incineration
   d. Decomposition of body tissue
   e. 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:
   a. 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:
      i. There is persistent absence of pulse and respirations despite assuring airway patency and effective ventilation as well as administration of resuscitative fluids and medications.

ii. 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.
iii. No response to deep pain above or below the clavicles
iv. Absence of end-tidal CO_2 (either colorimetric or wave form) from a correctly placed endotracheal tube or alternative airway.
v. 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 PROTOCOL
(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**

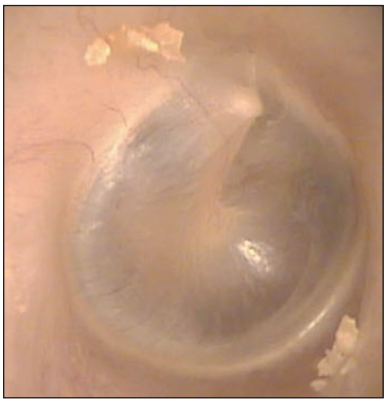
   Moxifloxacin (Avelox®) 400mg PO daily for 10 days **OR** azithromycin (Zythromax®) Z-PAK® 500mg PO initially followed by 250mg PO daily × 4 days
2. **Otitis Externa**

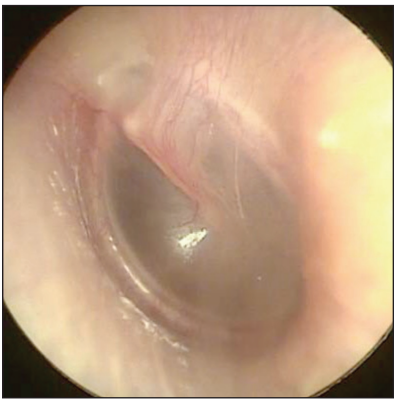
   Gatifloxacin (Zymar®) drops, 5 drops tid – qid until symptoms remain resolved for 48 hours
3. Treat per ***Pain Management Protocol***.
4. If water immersion is anticipated, use earplugs to prevent cold water entry which will cause vertigo.

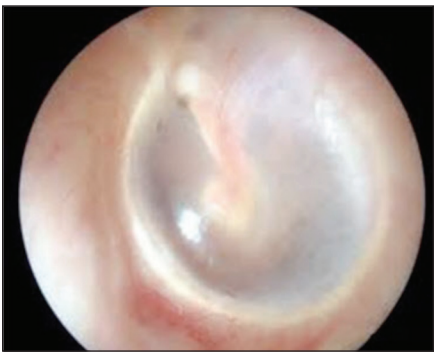
Disposition

1. For uncomplicated cases, no evacuation is necessary.
2. *Routine* evacuation for complicated cases not responding to therapy.

Tympanic Membranes



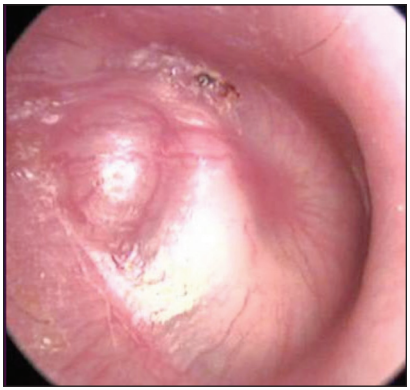


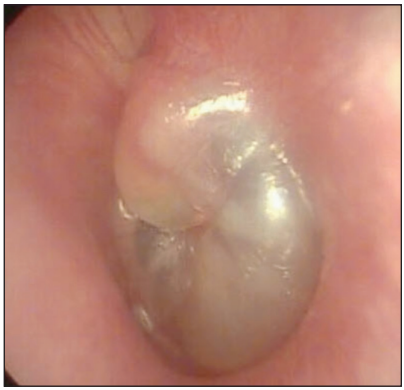


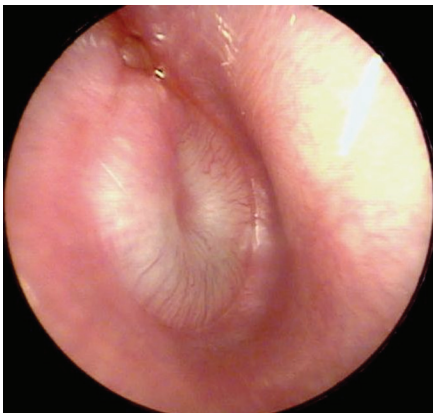
Normal Tympanic Membrane

(No fluid levels, no bulging)

Tympanic Membranes (cont.)



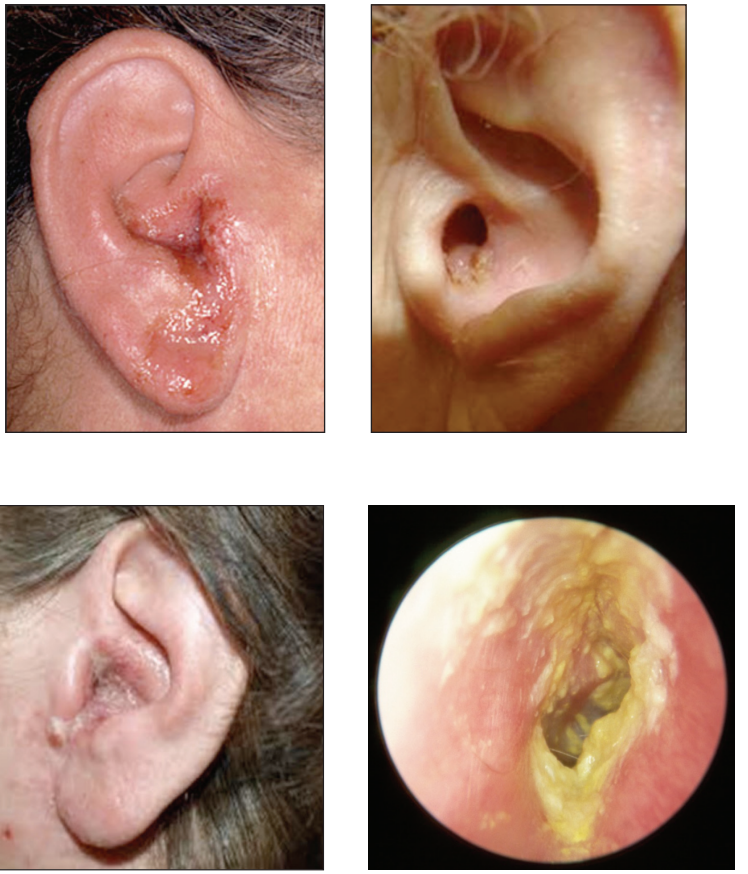




Otitis Media

(Notice erythematous, inflamed, bulging tympanic membrane)

Tympanic Membranes (cont.)



Otitis Externa

Crusty weeping drainage from external auditory canal

ENVENOMATION PROTOCOL

Snake Envenomations Protocol

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 ***Anaphylactic Reaction Protocol***.

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, bushmaster)
   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 15–30min.
   e. Give 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. The need for a fasciotomy is difficult to determine in a snake bite unless compartment pressures have been taken.
   i. Cold therapy and suction therapy is contraindicated in snakebites.

Disposition

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

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 30–60min 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 [43.3–46.1° C]) for 30–90 minutes to inactivate toxins.
   d. Ultrasound or x-ray (if available for retained foreign body)
   e. Antibiotics for deep puncture wounds: moxifloxacin (Avelox®)
   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 Protocol

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

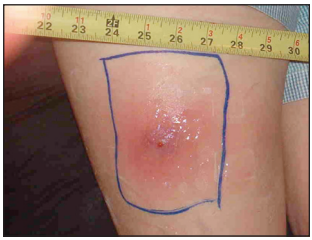
Management

1. If signs and symptoms of anaphylaxis present, treat per ***Anaphylactic Reaction 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 (Motrin®) 800mg PO tid × 7 days
7. Diphenhydramine (Benadryl®) 25–50mg q6hr prn PO/IV

Arthropod (Spider)

1. Black Widow (Red hour glass on back)
   a. **SIGNS AND SYMPTOMS**
      i. Pinching bite followed by local swelling and burning
      ii. Large muscle group spasms/tremors
      iii. Abdominal pain and/or rigidity within 60min
      iv. Nausea and vomiting
      v. Diaphoresis
      vi. Hypertension
      vii. Tachycardia
   b. **MANAGEMENT**
      i. Treat per ***Pain Management Protocol*** *(narcotic analgesia).*
      ii. ℞ Diazepam (Valium®) 2–10mg PO q6–8hr or 5–10mg IV/IM for relief of muscle spasm
      iii. ℞ Diphenhydramine (Benadryl®) 25–50mg q6hr prn PO/IV
2. Brown Recluse (notice violin shape on back)

   a. **SIGNS AND SYMPTOMS**
      i. Local pain and ulceration at site within 2–8 hours with surrounding erythema
      ii. Hemorrhagic vesicle progressing to slowly enlarging eschar
      iii. Fever, chills, nausea, joint pain
   b. **MANAGEMENT**
      i. Elevate bite site.



ii. Avoid strenuous activity.
iii. Treat per ***Pain Management Protocol*** *(narcotic analgesia).*
iv. Diphenhydramine (Benadryl®) 25–50mg q6hr prn PO/IV
v. Use an antibiotic appropriate for MRSA if cellulitis exists.

Scorpion Envenomations Protocol

Signs and Symptoms

1. Local pain, swelling, and erythema
2. Nausea and vomiting
3. Paresthesias
4. Tongue fasciculations
5. Sympathetic (tachycardia, hypertension, hyperthermia) or parasympathetic (hypotension, bradycardia, hypersalivation, incontinence) overdrive at develop
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. Provide supportive care as necessary.
5. Diphenhydramine (Benadryl®) 25–50mg q6hr 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 PROTOCOL

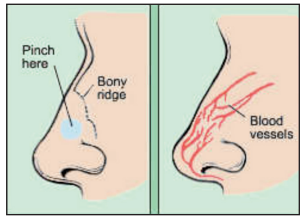
SPECIAL CONSIDERATIONS

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
3. Usually anterior

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. Rx Oxymetazoline (Afrin®) nasal spray 2 squirts in each nostril then pinch anterior area of nose firmly for full 10 minutes **WITHOUT RELEASING PRESSURE.**
   b. Rx **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** (likely posterior):
   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 5mL of normal saline.
   d. Retract catheter until well opposed to posterior nasopharynx.
   e. Add an additional 5mL of normal saline to balloon.
   f. Clamp in place without using excessive anterior pressure.
   g.  Moxifloxacin (Avelox®) 400mg PO daily 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 PROTOCOL
(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

1. Treat per ***Pain Management Protocol***.
2. Treat per ***Nausea and Vomiting Protocol***.
3. Treat per ***Dehydration Protocol***.
4. If fever present:
   a. Moxifloxacin (Avelox®) 400mg PO daily **OR** amoxicillin/clavulanic acid (Augmentin®) 875mg PO bid
   b. Ceftriaxone (Rocephin®) 1g bid IV/IM **OR** ertapenem (Invanz®) 1g IV/IM if unable to tolerate PO or unresponsive to oral treatment.

Disposition

1. *Priority* evacuation for persistent flank pain and/or fever.

FUNGAL SKIN INFECTION PROTOCOL

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 erythemas
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).

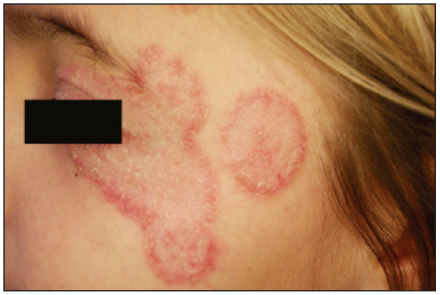
Management

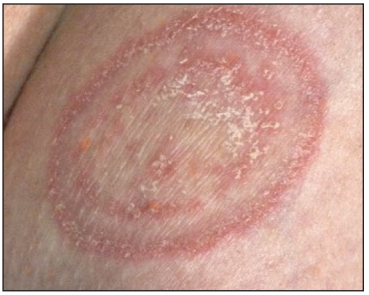
1. ℞ Fluconazole (Diflucan®) 150mg PO once per week for 4 weeks (total of 4 doses in the absence of a cure, or 1 dose after clinically clear). If not resolved after 4 weeks, refer to physician.
2. Clean rigorously with mild soap without injuring the skin.

Disposition

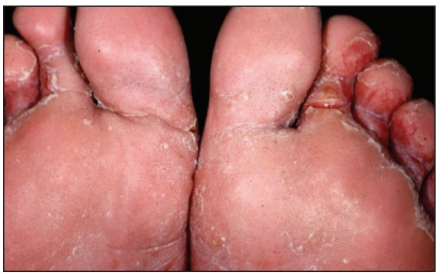
Evacuation is usually not required for this condition.

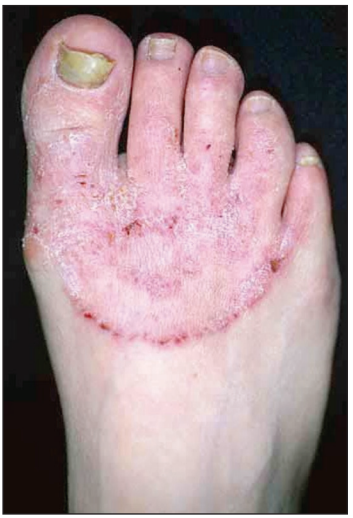
Fungal Skin Infections





Athlete's Foot
(Fungal Infection – Tinea Pedis)





GASTROENTERITIS PROTOCOL

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.
2. Do not use loperamide (Imodium®) in the presence of fever or bloody stools.
3. Azithromycin (Zithromax®) 500mg PO daily for 3 days **OR** moxifloxacin (Avelox®) 400mg PO daily for 3 days
4. Treat per ***Nausea and Vomiting Protocol***.
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 PROTOCOL

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 PROTOCOL
(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. Rx Amoxicillin/clavulanic acid (Augmentin®) 875mg PO bid for 7 days **OR** ceftriaxone (Rocephin®) 1g IV/IM daily for 7 days
7. Treat per ***Pain Management Protocol***.
8. Rx 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 PROTOCOL

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
3. Heat Stroke: Temp generally >104° F, above symptoms and altered mental status (delirium, stupor, coma)

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.
   a. For Heat Stroke:
      i. The best option for rapid cooling is full body ice water immersion (keeping head elevated out of water).
      ii. 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.
      iii. A less ideal option is to spray the patient with water plus rapid air movement provided by a fan.
   b. Apply these active cooling measures until the core temperature reaches 102° F.
3. Place either 1 tube oral glucose gel (Glutose™) or 1 packet of sugar in buccal mucosal region.

4. Treat per ***Dehydration Protocol***.
   a. Heat stroke and heat exhaustion with associated severe muscle pain and/or cola-colored urine, will typically require 2–3L of crystalloid and continued IV hydration to obtain a urine output of 200mL/hr.
   b. If the patient is unconscious after exercising on a hot day, and you do not have a core temperature available, limit fluid resuscitation to 1000mL 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 PROTOCOL

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:
      i. OraQuick Advance Rapid HIV 1/2 Antibody Test
   b. whole blood or serum/plasma:
      i. Uni-Gold™ Recombigen® HIV Test
      ii. Clearview® HIV 1/2 STAT-PAK®
      iii. 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. Initiate antiretroviral triple therapy according to the following priority of drugs. Choose only 1 of the following drug treatment options.
   a. Atripla® (emtricitabine/tenofovir/efavirenz), 1 PO daily
      i. 52% incidence of CNS side-effects
      ii. Known to cause birth defects. Category D drug. Be sure that a female patient has a negative pregnancy test prior to administration of emtricitabine/tenofovir/efavirenz (Atripla®).
   b. **OR** Combivir® (lamivudine and zidovudine) 1 tablet PO bid **AND** tenofovir (Viread®) 300mg PO daily
   c. **OR** Truvada® (emtricitabine/tenofovir) 1 PO daily **AND** Kaletra® (lopinavir/ritonavir) 4 pills PO daily, taken simultaneously
   d. **OR** Truvada® (emtricitibine/tenofovir) 1 PO daily **AND** AZT zidovudine (Retrovir®) 300mg PO bid
      i. Possible antagonism with decreased effectiveness.
   e. **OR** lamivudine and zidovudine (Combivir®) 1 tablet PO bid **AND** nelfinavir (Viracept®) 1250mg PO bid
      i. Older regimen. Replaced by options 4a and 4b.
5. Do not use alcoholic beverages after lamivudine and zidovudine (Combivir®) administration.
6. For GI side-effects of medication, treat per ***Nausea and Vomiting Protocol***.
7. Maintain hydration and nutrition status.

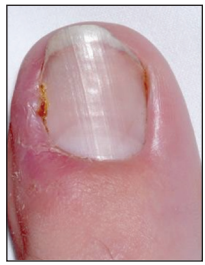
Disposition

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 PROTOCOL

SPECIAL CONSIDERATIONS

1. Consider toenail removal only if close follow-up is possible.
2. **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.
   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.

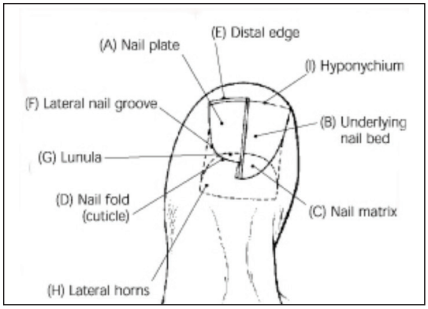


Figure 1

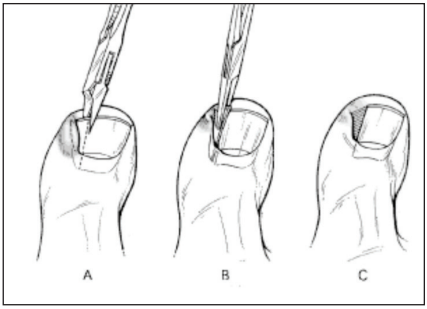


Figure 2

Figure 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.*

2. Rx Mupirocin (Bactroban®) 2% ointment to exposed nail bed
3. Dress with a nonadherent 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. Rx Systemic antibiotics are typically not needed in these procedures; however, consider using moxifloxacin (Avelox®) 400mg PO daily 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 PROTOCOL

SPECIAL CONSIDERATIONS

1. May result from penetrating trauma (especially animal or human bites), gonorrhea, or iatrogenic causes (i.e., attempted aspiration of joint effusion).
2. Consider also an acute joint effusion due to blunt trauma or overuse (usually less red and no fever).

Signs and Symptoms

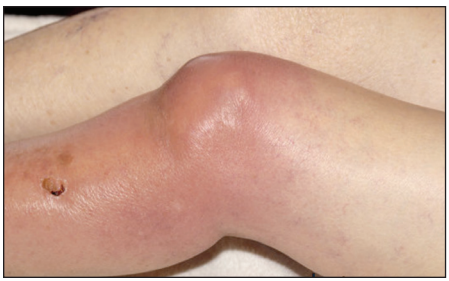
1. History of adjacent penetrating trauma or infection
2. Single red, swollen joint
3. Fever
4. Pain
5. Joint is swollen, with a tense effusion, and overlying erythema extending beyond the joint. Exam will most likely also have tender, swollen groin nodes in this patient with an infected knee joint.

Management

1. IV access
2. Ceftriaxone (Rocephin®) 2g IV/IM bid **OR** ertapenem (Invanz®) 1g IV/IM daily
3. Treat per ***Pain Management Protocol***.
4. If evacuation is prolonged and pain is unresponsive to analgesia, consider draining joint (if properly trained)
5. **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.

K9 ANAPHYLACTIC REACTIONS AND ENVENOMATION PROTOCOL

SPECIAL CONSIDERATIONS

1. Anaphylactic reactions in dogs most commonly occur in response to medications, insect bites or stings, and envenomation. Signs may range from mild to life threatening and can involve multiple organ systems including skin, eyes, respiratory tract, cardiovascular system, and gastrointestinal tract.
2. Envenomation from snake bites can cause multiple symptoms depending on the species of snake, size and age of the snake, and the location of the bite. Even though approximately 50% of bites are dry bites in which no venom is injected, all bites should be presumed to venomous as signs of envenomation may take hours to manifest. Delaying treatment could result in severe clinical signs and potentially death.

Allergic Reactions

Signs and Symptoms

1. Mild Allergic Reactions
   a. Swelling of the muzzle and eyelid
   b. Redness around eyes and face
   c. Hives
   d. May see vomiting or diarrhea
2. Severe Allergic Reactions
   a. Same signs and symptoms as mild reactions
   b. Weakness, lethargy
   c. Respiratory distress due to bronchoconstriction
   d. Signs of shock
   e. Cardiovascular collapse as reaction progresses

Management

1. Mild Allergic Reactions
   a. Remove all collars and choke chains from around the dog's neck if swelling is extensive.
   b. Diphenhydramine (Benadryl®) – Administer 1–2mg/kg SC, IM.
   c. Consider dexamethasone (Decadron®) – 0.1mg/kg IV, IM, or SC – Not used in many cases; use judiciously.
   d. Antiemetics if indicated such as ondansetran (Zofran®) – 0.1–0.2mg/kg IV or PO.

2. Severe Allergic Reactions
   a. Remove all collars and choke chains from around the dog's neck if swelling is extensive.
   b. Rx Diphenhydramine (Benadryl®) – Administer 1–2mg/kg SC, IM.
   c. Rx Epinephrine – 2.5–5mcg/kg IV or 10mcg/kg IM (EpiPen® can be used in typical 30kg dog)
   d. Rx Consider dexamethasone (Decadron®) – 1–2mg/kg IV or IM – Not used in many cases, use judiciously
   e. Treat for shock. See ***K9 Gastric Dilatation Volvulus (GDV) / Bloat Protocol***.

Envenomation

Signs and Symptoms

1. Signs and symptoms include those described above for allergic reactions. Signs and symptoms will also depend on the type of venom. Those discussed below are a general rule, but there are some species of each that mimic the other species' venom.
   a. Viperidea (rattlesnakes, water moccasins, pit vipers, etc.): marked pain, swelling, and necrosis at the injury site as well as coagulopathies and cardiovascular collapse.
   b. Elapidea (cobra, coral snake, etc.): Venomous bites may result in progressive paralysis with death usually occurring from paralysis of the respiratory muscles.

Management

1. Treat for anaphylaxis if necessary. Treat for shock. See ***K9 Gastric Dilatation Volvulus (GDV) / Bloat Protocol***
2. Rx Treat pain with appropriate opioids (morphine, hydromorphone [Dilaudid®], or fentanyl), or NSAIDs as appropriate.
3. Immobilize affected limb (if extremity bite)
4. Evacuate for more definitive treatment and supportive care.
5. Antivenin may be given in a hospital setting; monitor for hypersensitivity reaction.
6. Plasma may be used if coagulopathies develop.

Disposition

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

K9 EVALUATION AND TREATMENT PROTOCOL

VITAL SIGNS OF CANINES

Parameter	Value	Parameter	Value
Pulse	60–120bpm	HCT/PCV	37–55%
Respiration	8–24bpm	SpO_2	95–100%
Temp	100–102.5° F	$EtCO_2$	35–45mmHg
CRT	<2sec	Total Protein	5–7.5g/dl

1. Temperature:
   a. Normal Rectal Temp: 100–102.5° F
   b. Temperature after exercise: 103–106° F. Temperature should return to normal within 15min after completion of work.
2. Pulse
   a. Normal pulse rate will vary from 60–120bpm. Can beat up to 150 with exercise.
   b. The pulse rate and respiratory 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 front of their thigh with your fingers inside the thigh, and palpate the artery.
3. Normal respiratory rate for an adult dog will vary between 8–24 respirations per minute.
4. Capillary refill time: less than 2 seconds
5. Mucous membrane color: generally pink

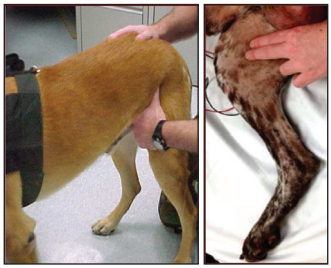
SPECIFIC WEIGHT-RELATED DRUG DOSES ARE AT THE END OF THIS PROTOCOL. MOST DOG HANDLERS WILL CARRY A DRUG CARD FOR THE DOG.

Monitoring

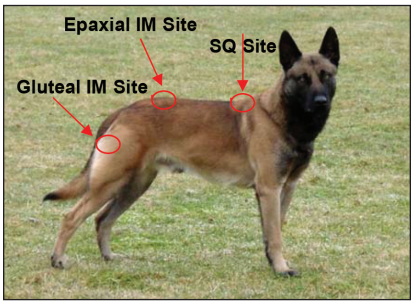
1. Pulse Ox – Placed on tongue, ear, or other nonpigmented highly vascular area such as the lip, vulva, or prepuce.
2. EKG – Alligator clips behind each elbow and above left knee. If you do not have alligator clips place the buttons or leads behind the largest pad on the foot. Sticky pads can also be placed on the largest pad on the foot of the left and right forelimbs and the left hind limb.

3. Animals do not have palpable carotid pulses. You can obtain a femoral pulse in the inguinal crease.
4. End Tidal CO_2 – Measure the same way you do in human patients. Normal value 35–45mmHg.

Femoral Pulse Location



IM and SQ Injection Sites



IM Injections

1. Gluteal Site: palpate muscle belly between fingers. Insert needle into muscle; pull back on plunger to ensure no blood is present. Inject if no blood and reposition needle if blood is present.
2. Epaxial Site: Place hand on back with middle finger located on spine and thumb just in front of the pelvis. Muscle belly will be where your index finger naturally falls.

Subcutaneous Injections

1. Lift skin between the shoulder blades, insert needle at 45° angle.

IV Sites

Usually the easiest/best vein to use for a K9 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.

An 18 gauge 1½" catheter can be used in both the cephalic and the saphenous veins.

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.

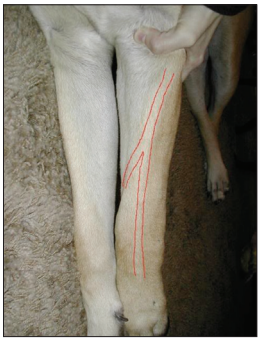


Figure 1 *Cephalic Vein*

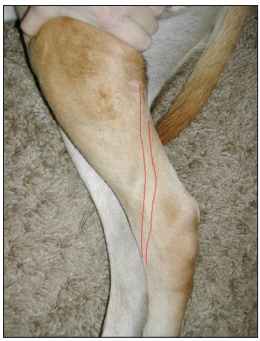


Figure 2 *Saphenous Vein*

Hydration Status

1. Normal Hydration: Pick up skin and release. It should return to the original position that it was, within 1 second.
   a. Capillary Refill Time (CRT) is measured by pressing on the gums over the canine tooth. Using 1 finger, press down firmly until the gums turn white under your finger and release. Anything over 2 seconds is considered too long. 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 those 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. **Consider a 10–12% dehydration an emergency.**
3. Dehydration Fluid Replacement
   a. Estimate dehydration
      i. 5% give 1000mL bolus IV
      ii. 10% give 1500mL bolus IV
   b. Fluid choice is normal saline or lactated Ringer's Solution. Oral fluid consumption is the best way to prevent dehydration and it is important to offer water when rehydrating a dog.

Restraint (SOF medical personnel should work with handler to learn muzzling techniques)

1. Always muzzle a dog when working on them.
2. Physical restraints with muzzles or improvised muzzles
   a. Field expedient muzzle:
      i. Kerlix® is wrapped around the snout several times and then tied behind the head.

      ii. The leash is wrapped around the snout and held tightly.

3. Chemical restraint if needed to protect handler and medic
   a. Dexmedetomidine (Dexdomitor®) (only use if nontraumatic injury) reversed with atipamezole (Antisedan®). After onset, dexmedetomidine (Dexdomitor®) gives 20–30 minutes of good sedation when administered with labeled dose.
   b. For mild sedation, a combination of midazolam (0.3mg/kg) plus ketamine (Ketalar®) (5mg/kg) can be administered IM or IV.
   c. For deep sedation, a combination of morphine (1mg/kg) plus midazolam (0.3mg/kg) plus ketamine (Ketalar®) (5mg/kg) can be administered IM.
      i. Hydromorphone (Dilaudid®) (0.1mg/kg) may be used in place of morphine.

Disposition

Evacuate as per applicable TMEP protocol.

K9 GASTRIC DILATATION VOLVULUS (GDV) / BLOAT PROTOCOL

SPECIAL CONSIDERATIONS

1. GDV is a rapidly life-threatening syndrome that is common in large-breed dogs. In this syndrome, the stomach rapidly dilates with air, food, or fluid, and then rotates/twists along the long axis. As the stomach dilates, there is compromised blood flow to the stomach and decreased venous return from the abdomen and pelvic limbs.
2. Most military working dogs have had a prophylactic gastropexy, which is a surgical adhesion of the stomach to the body wall, preventing volvulus from occurring. Some working dogs, including contractor, coalition, and other working dogs, may not have had a gastopexy and are at high risk for GDV.

Signs and Symptoms

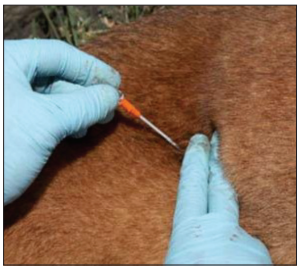
1. Trying to vomit but not producing much; nonproductive retching and gagging
2. Drooling
3. May or may not see distended abdomen depending on how early condition is identified
4. Dog is very painful, agitated, restless, painful on abdominal palpation
5. Shock – pale mucous membranes, poor pulse quality, shallow respirations

Prophylaxis

1. Prophylactic gastropexy may be performed prior to deployment by a military veterinarian.

Management

1. External needle decompression using a 14-gauge catheter.
   a. May need to decompress several times if MEDEVAC/CASEVAC is delayed.
   b. Point of insertion for catheter for decompression is on the right lateral abdominal wall approximately 2 inches caudal to the last rib.
2. Treat for shock.
   a. IV Fluid Therapy: Give ¼ of shock dose over 15–20 minutes and monitor dog's TPR and response



Site for decompression

to treatment. Continue to repeat ¼ dose every 15–20 minutes as needed while monitoring TPR and response to treatment. Shock dose is 90mL/kg/hr.

b. Oxygen: Provide supplemental oxygen if available and necessary.

3. Evacuate for definitive surgery and management.
4. **Early treatment is the key to survival.**

Disposition

Urgent evacuation for surgical treatment

K9 HEAT INJURIES PROTOCOL

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.
4. Panting is critical for body temperature maintenance. Consider removing the muzzle to facilitate respirations or panting.

Heat Exhaustion

Signs and Symptoms

1. Recent activity and history
2. Rectal temperature may be over 105° F (40.5° C)
3. Fast and shallow panting that does not slow in a couple of minutes or uncontrolled panting
4. Heart rate may be over 140 bpm
5. Brick red mucus 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. Rectal temp over 106° F (41.1° C)
3. Pale gums
4. Rapid and shallow breathing
5. Collapse
6. Weak
7. Uncoordinated
8. Seizures
9. Vomiting
10. Diarrhea

Management

1. Move dog to shade or AC.
2. Remove muzzle and vest if dog is wearing one.

   Do not put a wet dog in the kennel. This will create a sauna like effect upon the dog.
3. Alcohol on foot pads
4. Cool ice packs under groin and arm pits
5. IV fluid therapy: Give ¼ of shock dose over 15–20 minutes and monitor dog's TPR and response to treatment. Continue to repeat ¼ dose every 15–20 minutes as needed while monitoring TPR and response to treatment.
   a. Shock Dose is 90mL/kg/hr.
6. Discontinue interventions at a rectal temperature of 103 °F (39.4 °C) and continue monitoring.

Disposition

1. *Urgent* evacuation for heat stroke patients or heat exhaustion patients not responding to treatment
2. Mild heat stress and mild heat exhaustion patients can be treated on site, but should be evacuated if condition worsens.
3. Avoid working the dog and rigorous activity for 3 days to allow time for dog to recover.

K9 HIGH ALTITUDE SICKNESS AND PULMONARY EDEMA PROTOCOL

SPECIAL CONSIDERATIONS

Typically not seen in dogs, but may occur.

Signs and Symptoms

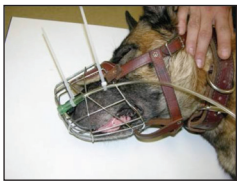
1. Reduced appetite
2. Listlessness
3. Reduced activity levels
4. "Mildly dusky" tongue color/pale gums
5. Brown or pink tinted fluids from mouth or nose
6. Lung sounds (fluid in lungs)

Prophylaxis

1. Rx Acetazolamide (Diamox®) 250mg PO bid 24 hours prior to ascent and continued for 48 hours after maximum altitude is reached
2. 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. Blow by oxygen administration – see example.
   b. Alternatively connect the O_2 line to the bars of a cage or kennel and cover the cage with a poncho, rain coat, etc.
3. Rx Dexamethasone (Decadron®), 4mg IV/IM/PO q6hr
4. Rx Albuterol (Ventolin®) 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 (Ventolin®) into the bag. Place the bag over the muzzle and let the dog breath a few breaths from the bag.



Blow by Oxygen Administration

Disposition

1. *Priority* evacuation for any K9 AMS
2. *Urgent* evacuation any K9 with suspected HACE or HAPE.
3. Any K9 that has recovered from HACE or HAPE should not re-ascend without veterinarian medical officer clearance.

K9 RDX (C-4) INGESTION PROTOCOL

SPECIAL CONSIDERATIONS

1. Very small (pea-sized) amounts of C4/RDX can be extremely toxic or lethal in dogs.
2. RDX is released from C4 slowly so clinical signs may not appear for 4–6 hours following 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 one of the following:
   a. Morphine: 10–30mg given IM or IV
   b. Hydrogen peroxide: 30mL orally. Repeat dose in 15 minutes if patient does not vomit. Be aware of possible oxidative concerns with this depending on training aid ingested.
   c. Apomorphine (Apokyn®) Place 0.25mg tablet in the conjunctival sac. Once patient vomits, remove any tablet that is left and flush eye with large amounts of saline.
2. Control seizures with one of the following:
   a. Diazepam (Valium®): 15–30mg IV or per rectum bolus for a standard 30kg dog (dose is 0.51mg/kg). Repeat as necessary to a maximum of 3 doses over 5–10 minute intervals.
   b. **OR** midazolam: Give 0.3mg/kg IV for a maximum of 2–3 doses over 5–10 minute intervals.
3. Ipecac syrup is contraindicated in the treatment of K9 toxic ingestion.
4. If you have time during evacuation, initiate IV fluids.

Disposition

Urgent evacuation to veterinarian immediately for follow up or supportive care.

K9 TRAUMA MANAGEMENT PROTOCOL

SPECIAL CONSIDERATIONS

1. Control bleeding first based on K9-TCCC standards and guidance for humans.
2. Follow K9 **M²ARCH²E** 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 poisoning 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 (panting may or may not be normal)
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 mucus membranes
5. Rectal temperature below 98° F (37° C)

Management

1. Treat per ***MARCHE Protocol***.
2. **M**uzzle, **M**assive hemorrhage: Control bleeding per TCCC standards, **M**orphine.
   a. Muzzle: Do not apply a muzzle if dog is in respiratory distress.
   b.  Massive hemorrhage: Control bleeding with direct pressure and pressure dressings. Tourniquets are not as effective in dogs due to anatomical differences. All hemostatic agents used in humans are safe for use in dogs.
   c.  Morphine: 10–30mg IM. May cause vomiting and respiratory depression. Use naloxone (Narcan®) (0.02mg/kg) for reversal if necessary.
3. **A**irway
   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 because they can easily aspirate. Get help, if possible from someone who can help hold the dog, so you can do an examination and/or treat the dog.

i. Carefully pull the tongue out of the animal's mouth.
ii. Even an unresponsive dog may bite by instinct!!
iii. Make sure that the neck is reasonably straight; try to bring the head in-line with the neck.
iv. Do not hyperextend in cases where neck trauma exists.

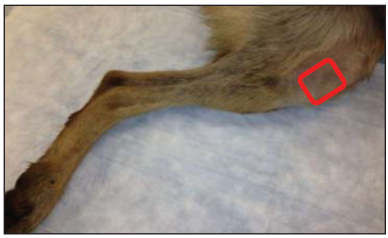
b. Intubation or tracheostomy if necessary to secure airway.
   i. Do not attempt to intubate or perform a tracheostomy on a conscious animal, personnel must have prior training. ET tube size can range from 7–10.
c. If intubation is not possible, then attempt tracheotomy.
d. After achieving a patent airway, one must determine whether the animal is breathing, and whether this breathing is effective.
e. **AIRWAY CONSIDERATIONS:**
   i. Size 7mm to 10mm cuffed endotracheal tube, secure with gauze or IV tubing. Tie over nose.
   ii. Blow by oxygen – secure airline to muzzle.
   iii. Field expedient O_2 masks
   iv. Nasal trumpets are ineffective in canines

4. Respiration

a. Look, Listen, and Feel
b. If not breathing, ventilate the animal by closing the mouth, and performing mouth-to-nose ventilations. If patient is intubated or has tracheostomy, ventilate the animal using a BVM.
c. Ventilate at 20 breaths per minute.
d. If available, use supplemental oxygen.
e. Chest seal: Human chest seals can be used in canines, but their haircoat makes achieving an airtight seal difficult. Additional bandaging may be necessary to hold chest seal in place. HALO chest seals or plastic wrapping material applied with sterile lube and tape are recommended.
f. Needle thoracentesis: Place the dog in the lateral recumbent position, go midway between sternum and spine between the 7th and 9th ribs. Use a 14G 3.25in needle. Perform needle decompression on both sides.

Figure 3 *IO Access Site – Proximomedial*

5. **C**irculation
   a. Be sure that there are no major (pooling/spurting blood) points of bleeding. Control as necessary.
   b. Hemorrhagic Shock Fluid Resuscitation (Administration Routes):
      i. Preferred route is IV
      ii. Secondary route is IO (Tibia or Humerus) on a sedate or unconscious dog only.
   c. Incorporate crystalloids and colloids as needed.
      i. Bolus of crystalloid, 10–20mL/kg, reassess and repeat a maximum of 2 times
      ii. Bolus of colloid, 5–10mL/kg given once over 20–30 minutes.
      iii. The targeted endpoint for resuscitation should be to achieve and maintain permissive hypotension.



IO Access Site Proximomedial

   d. Blood transfusion (dog-to-dog), if available.
      i. For the first transfusion in a trauma/field situation it is generally safe to give any type of blood without typing or cross-matching.
      ii. Collect no more than 20% blood volume (collect 1 unit/450mL from typical size working dog). Perform a sterile prep and use the jugular vein for collection.
      iii. In a trauma/field situation you will usually administer the whole unit. Human blood transfusion guidelines apply for rate and monitoring requirements.
6. **H**ypothermia/Head Injury:
   a. Hypothermia: Prevent loss of body heat. Dry the fur. Use a hypothermia blanket. Watch for overheating.
   b. Head Injury: Head trauma from blunt or penetrating injury can cause rises in intracranial pressure (ICP) in most patients with CNS trauma usually as a result of braid edema and intracranial hemorrhage. Signs of shock, hypoxia, seizures, and other neurologic signs (i.e. ataxia, altered mentation, loss of consciousness, pupil asymmetry) may also be seen.
      i. Elevate head 30° and avoid jugular occlusion, maintain head neutral neck position.
      ii. Supplemental oxygen, if available. Intubation and hyperventilation may be necessary in cases of hypoxia.
      iii. Mannitol 0.5–1.0g/kg IV over 20 minutes, repeat q4–8 hours based on neurologic status, limit to 3 doses in a 24 hour period
      iv. IV fluids: goal is to maintain cerebral perfusion by optimizing MAP without causing increased ICP

(a) Crystalloid: 10–20mL/kg IV bolus, reassess and repeat a maximum of 2 times, can be combined with colloids
(b) Colloid: 5–10mL/kg IV bolus over 10–15 minutes for acute trauma resuscitation

v. Control seizures with one of the following:
(a) Diazepam (Valium): 15–30mg IV or per rectum bolus for a standard 30kg dog (dose is 0.5–1mg/kg). Repeat as necessary to a maximum of 3 doses over 5–10 minute intervals.
(b) OR Midazolam: Give 0.3mg/kg IV for a maximum of 2–3 doses over 5–10 minute intervals

vi. Prevent and manage hypothermia

7. Evacuation and **E**verything **E**lse

a. Tranexamic acid (TXA) (Cyklokapron®): Administer 10–15mL/kg
b. Analgesia
i. Morphine: Administer 0.5–1mg/kg IM or IV, may cause vomiting
ii. Hydromorphone (Dilaudid®): Administer 0.1–0.2mg/kg IM or IV, may cause vomiting
iii. Fentanyl: Administer 3–4mcg/kg IV; Can also use an oral transmucosal fentanyl citrate (Actiq®) lozenge 800–1600mcg inserted in the rectum secured with tape to the tail base
iv. Naloxone (Narcan®): Opiod reversal, administer at 0.02–0.04mg/kg IV, IM, or SQ
c. Antibiotic Therapy for Penetrating Wounds
i. Ceftriaxone (Rocephin®) 1g IV/IM daily
ii. Ertapenem (Invanz®) 500mg IV/IM 2 times a day

Disposition

Urgent evacuation for treatment and supportive care.

LOSS OF CONSCIOUSNESS PROTOCOL
(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. Rx Place either 1 tube oral glucose gel (Glutose™) OR 1 packet of sugar in buccal mucosa.
6. Consider IV access.
7. Rx Naloxone (Narcan®) 0.8mg IV/IM. Repeat q2–3min 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 PROTOCOL

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 >105° F (40° C) 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. Rx Atovaquone 250mg/proguanil 100mg (Malarone®) 4 tabs qd for 3 days with food **PLUS** primaquine 30mg daily for 14 days (**MUST** rule out G6PD deficiency before giving primaquine)
2. Rx Acetaminophen (Tylenol®) 1000mg PO q6hr 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 PROTOCOL

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. Rx Dexamethasone (Decadron®) 10mg IV/IM q6hr
4. Rx Ceftriaxone (Rocephin®) 2g IV q12hr (IM route possible alternative but prefer IV route)
5. Treat per ***Pain Management Protocol***.
6. Treat per ***Nausea and Vomiting Protocol***.
7. If seizures occur, treat per ***Seizure Protocol***.
8. Rx Moxifloxacin (Avelox®) 400mg PO once **OR** ceftriaxone (Rocephin®) 250mg IM for prophylaxis of close contacts

Disposition

Urgent evacuation

NAUSEA AND VOMITING PROTOCOL

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

1. Nausea and Vomiting

Management

1. ℞ Ondansetron (Zofran®) 4–8mg IV/IM bid or 8mg PO q8hr prn
2. ℞ **OR** promethazine (Phenergan®) 25mg IV/IM/PO q6hr prn
3. ℞ **OR** diphenhydramine (Benadryl®) 25–50mg IV/IM/PO q6hr prn (may be useful for vertigo or motion sickness)
4. Treat per ***Dehydration Protocol***.

Disposition

Evacuate per Protocol for underlying condition.

OPEN GLOBE INJURY PROTOCOL

SPECIAL CONSIDERATIONS

1. High index of suspicion is essential for OGI.
2. Prognosis for visual acuity best if surgery performed within 24 hours of injury.

Signs and Symptoms

1. History of blunt or sharp trauma to ocular region
2. Risk increased with concurrent penetrating periocular or head trauma
3. Suspicious findings: Peaked pupil, abnormal anterior chamber depth, 360° subconjunctival hemorrhage
4. Definitive findings: obvious laceration/rupture, prolapsed intraocular contents
5. Visual acuity usually decreased, but may be close to normal with small lacerations
6. Afferent pupillary defect
7. Positive Seidel test (see below)

Management

1. Rigid eye shield (no gauze/padding) to prevent further injury; NO PRESSURE ON EYE.
2. Do not instill topical medications if suspicious for OGI.
3. Use of ultrasound **contraindicated** in suspected OGI.
4.  Ondansetron (Zofran®) 4mg IM or 4mg IV over 2–5 minutes.
5.  Moxifloxacin (Avelox®) 400mg PO/IV (repeat daily for delayed evacuation) for prevention of intraocular infection (endophthalmitis). Give ertapenem (Invanz®) 1g IV/IM once a day if IV moxifloxacin not available.
6. Treat per ***Pain Management Protocol***; ketamine cleared for use.
7. Maintain patient comfort and supine/head elevated positioning.
8. No altitude restrictions for suspected OGI.

Disposition

1. *Urgent* evacuation
2. Consider teleconsultation with photos if evacuation delayed.
3. Add clindamycin 300mg IV q8hr for delayed evacuation.

Seidel Test

CONSIDERATIONS

1. DO NOT PUT PRESSURE ON GLOBE; this may cause extrusion of intraocular contents and loss of salvageable vision.

Materials

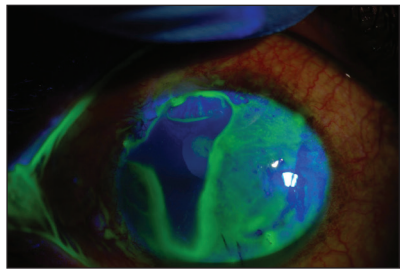
Fluorescein strip, cobalt blue light source

Limitations

Negative test DOES NOT rule out OGI; wound may be plugged with iris or vitreous.

Procedure

1. Moisten fluorescein strip with saline
2. Gently touch to suspicious area; concentrated fluorescein will remain orange
3. Using Cobalt light, observe for streaming of green/dilution of fluorescein
4. Note location on casualty card



Positive Seidel Test

PAIN MANAGEMENT PROTOCOL

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. Mild analgesic
      i. Rx Acetaminophen (Tylenol®) 1000mg PO q6hr prn (Mild to moderate pain-patient is still able to perform.)
      ii. **OR** acetaminophen (Tylenol®) 650mg bilayer caplet, 2 PO q8hr (found in the TCCC Combat Wound Medication Pack [CWMP])
   b. Nonsteroidal anti-inflammatory drugs (Mild to moderate pain-patient is still able to perform.)
      i. Rx Meloxicam (Mobic®) 15mg PO qd prn (found in the TCCC Combat Wound Medication Pack [CWMP])
      ii. Rx **OR** ibuprofen (Motrin®) 800mg PO q8hr prn
      iii. Rx **OR** ketorolac (Toradol®) 30mg IM q6hr prn, not to exceed 120mg/day
      iv. Rx **OR** ketorolac (Toradol®) 60mg IM single dose or 30mg q6hr prn; not to exceed 120mg/day
   c. Narcotic Medications (Moderate to severe pain. Consider disarming the patient.)
      i. Rx Oral transmucosal fentanyl citrate (Actiq®) lozenge 800mcg orally over 15min (may repeat dose once)

         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.

      ii. Rx **OR** morphine sulfate 5mg IV initial dose then 5mg IV q10min for max dose of 30mg. Repeat as necessary q30–60min.
   d. Disassociative anesthetic (Moderate to severe pain. Disarm the patient!)

STOP IV administration once pain control has been achieved or if dissociative effects or nystagmus (rhythmic back-and-forth movement of the eyes) noted.

i. Ketamine (Ketalar®) 50mg IM in large muscle site (1mL total if concentration 50mg/mL; ensure proper dilution). Repeat q30min unless dissociative effects or nystagmus noted, then discontinue.

IV/IO ketamine (Ketalar®) must be diluted to a concentration of 50mg/mL or lower. Barbiturates and diazepam should NOT be mixed in the same syringe with ketamine.

NOTE: If sedatives, opioids, or other adjuvant drugs (e.g., midazolam, fentanyl) have been given, ketamine will normally be effective at smaller doses.

ii. **OR** ketamine (Ketalar®) 20mg slow IV or IO once over 1 minute (0.4mL total if concentration equals 50mg/ml; ensure dilution).

iii. Consider midazolam 0.03mg/kg IN/IV/IO (2–3mg for adults) as adjunct to ketamine (Ketalar®) sedation.

2. Treat per ***Nausea and Vomiting Protocol*** prn.

Disposition

1. Consider underlying cause to determine evacuation priority.
2. Patients receiving IV/IM opiates or ketamine should most likely be evacuated.

PNEUMOTHORAX – ACUTE PROTOCOL
(ATRAUMATIC)

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.

Signs 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.
8. Treat per ***Pain Management Protocol***.

Disposition

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

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. Crystalloid 1–2L bolus IV/IO followed by 500mL–1L/hr
   a. Maintain urine output at greater than or equal to 200mL/hr. If possible, insert Foley catheter.
   b. Consider urinary alkalinization to achieve urine pH >6.5
      i. Mix sodium bicarbonate 40mEq (1 ampule/bristojet) in 500mL normal saline.
      ii. 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 1g calcium and 40mEq sodium bicarbonate (1 ampule) IV/IO.

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

      Calcium chloride should be given SLOW IV push to prevent vein necrosis.
   b. Persistent oliguria despite adequate fluid resuscitation
   c. Hypocalcemia (provoked by sodium bicarbonate) – perioral 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***.

Disposition

Urgent evacuation

References

Marx in Rosen (2002). *Emergency Medicine*. 1762–70.
Sauret (2002). *Am Fam Physician*. 65 (5): 907–12.
http://www.fpnotebook.com/renal/Failure/Rhbdmylys.htm.
http://emedicine.medscape.com/article/827738-treatment.

SEIZURE PROTOCOL

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 q5min or 10mg IM q15min to a maximum dose of 20mg.
   a. **OR** midazolam 5mg IV/IO q5min or 5–10mg IM q15min (no maximum dose)
3. Fosphenytoin (Cerebyx®) 20 phenytoin (Dilantin®) equivalents (PE) PER KILOGRAM (PE/kg) IV/IO at 100–150mgPE/min if available for seizures refractory to benzodiazepines.

   Fosphenytoin (Cerebyx®) is typically administered in phenytoin (Dilantin®) equivalents (PE) per kilogram, rather than mg/kg. Ensure you properly calculate the dosage. The normal concentration of phenytoin (Dilantin®) is 1.5mg of phenytoin (Dilantin®) per 1PE (e.g. 500mg PE in 10mL for a total of 750mg phenytoin).

   Do not administer fosphenytoin (Cerebyx®) faster than 150mg/min since it 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 SPO_2.
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***.
7. If nerve agent, both atropine (shortly after exposure) and diazepam/midazolam are critical for stopping the seizure. See ***CBRN: Nerve Agent Poisoning Protocol***.

Disposition

Urgent evacuation

SEPSIS / SEPTIC SHOCK PROTOCOL

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 (purpura or petechiae)

Management

1. Obtain IV/IO access.
2. Ertapenem (Invanz®) 1g IV/IO daily **OR** ceftriaxone (Rocephin®) 2g 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 / CHOKING AGENT / TOXIC INDUSTRIAL CHEMICALS (TICs) PROTOCOL

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 or edema is present.
4. Choking agents/TICs (ammonia, bromine, chlorine, hydrogen chloride, or phosgene) cause immediate and/or delayed symptoms.

Signs and Symptoms

1. History of smoke exposure
2. Burns
3. Eyes. See ***Corneal Abrasions/Ulcer/Conjunctivitis Protocol (2. and 3.)***, nose, throat, and skin irritation
4. Coughing
5. Respiratory distress to include wheezing and pulmonary edema (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. High PEEP may be required.
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 (worsens prognosis in chemical exposures).
6. Observe asymptomatic choking agent/TIC exposures for delayed onset of symptoms (12–24 hours).

Disposition

1. *Urgent* evacuation for respiratory distress, suspected inhalation burns.
2. *Priority* evacuation if not in distress but significant inhalation suspected.

SUBUNGUAL HEMATOMA PROTOCOL

SPECIAL CONSIDERATIONS

None

Signs and Symptoms

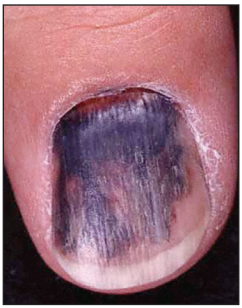
1. Pain from the affected nail
2. Purplish-black discoloration under the nail

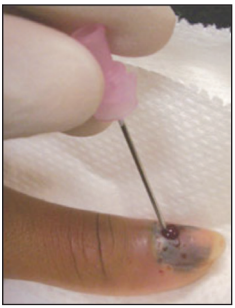
Management

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.
3. Treat per ***Pain Management Protocol***.
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

1. Evacuation should not be required for this injury if the subungual hematoma is successfully treated.





TESTICULAR PAIN PROTOCOL

SPECIAL CONSIDERATIONS

1. The primary concern in testicular pain is differentiating testicular torsion from other causes of testicular pain.
2. Testicular torsion is an 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.
      i. With torsion of the left testis, hold the testicle with the right thumb and forefinger and then rotate the testicle clockwise 180°. This manipulation may need to be repeated 2–3 times, because testicular torsion may involve rotations of 180–720°. These repeated attempts should be guided by resolution of pain and return to normal anatomy.

ii. 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***.

3. Treat per ***Pain Management Protocol***.

4. Treat per ***Nausea and Vomiting Protocol***.

5. If torsion is not present, treat as presumed STD.

a. Ceftraxone (Rocephin®) 250mg IM **OR** ciprofloxacin (Cipro®) 500mg PO

b. **PLUS** azithromycin (Zithromax®) single 1g dose PO

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 PROTOCOL

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®) 1g IV/IM **OR** trimethoprim-sulfamethoxazole (Septra®) 1 PO bid for 3 days
2. **AND**  azithromycin (Zithromax®) 1g PO once
3. Treat per ***Pain Management Protocol***, excluding narcotics.
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.

2017 Tactical Medical Emergency Protocol
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NOTES

NOTES

SECTION 3
Recommended Drug List (RDL)

Preface

1. 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.
2. 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.
3. For specific order of the recommended medications and specific TMEP application of the medications, **CHECK the specific TMEP Protocol.**
4. Antibiotics: Always check potential drug allergies. If allergic to one class of medications, use alternate class of medications (cephalosporins/penicillins, tetracyclines, quinolones, macrolides).
5. **Unless specifically noted, the drug dosages listed are for an adult.**

Changes in 2009:

- Calcium chloride added
- Calcium gluconate added
- Mannitol (Osmitrol®) added
- Sodium bicarbonate added
- Rifampin (Rifadin®) added
- Antiretroviral medication added (Kaletra®, Atripla®, 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 added.
- Pregnancy categories added according to FDA classification listed on page 221.

Changes in 2010:

- Tadalafil (Cialis®) added
- Sildenafil (Viagra®) added
- K9 doses added to: acetazolamide, ceftriaxone, dexamethasone, ertapenem

Changes in 2016/2107:

- Removed open globe injury and head injury from the list of contraindications for ketamine
- Added Master Drug List with NSNs from the 2008 Formulary
- Added color blindness to list of side effects for tranexamic acid (TXA) (Cyklokapron®)
- Added injectable fentanyl
- Added K9 dosages for multiple drugs
- Adjusted K9 dosage for Morphine
- Removed doxycycline from Master Drug List

PREGNANCY CATEGORY A

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).

PREGNANCY CATEGORY B

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.

PREGNANCY CATEGORY C

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.

PREGNANCY CATEGORY D

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.

PREGNANCY CATEGORY X

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.

- 

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 prior 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.

Acetaminophen – PO (Tylenol®)

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 q4–6hr; or 1g PO 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*
- *Administration of Blood and Blood Products Protocol*

Acetazolamide (Diamox®)

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, 24hr prior to ascent, continuing for 48hr after ascent. Prevention and/or amelioration benefits are nominal once ascent has commenced.
- If the 500mg sustained release tablet is used, dose is 500mg q24hr.


K9 Dose:
- 250mg bid 24hr prior to ascent, continuing for 48hr after ascent.
- If the 500mg sustained release tablet is used, dose is 500mg every q24hr.

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 with DC of drug)
- Urticaria
- Melena
- Hematuria
- Flaccid paralysis
- Photosensitivity
- Convulsions

TMEP use:
- *Altitude Illness Protocol*
- *K9 High Altitude Sickness* and *Pulmonary Edema Protocol*

Aciphex® – See Rabeprazole

Actiq oral transmucosal fentanyl citrate (OTFC) lozenge – See Fentanyl, Oral

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Adrenalin – See Epinephrine

Afrin Nasal Spray® – See Oxymetazoline HCl

Albuterol Inhaler (Ventolin®, Proventil®)

Aviation personnel are grounded until medical condition no longer interferes with safely performing 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 q4–6hr
- Spray 4 times into the air if using for the first time or after >4 weeks of storage

Pediatric dose: If >4 years old, 1 inhalation q4–6hr 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*
- *Crush Syndrome Protocol*
- *Smoke Inhalation Protocol*

Amoxicillin/Clavulanate Acid (Augmentin®)

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 q12hr.

Pediatric dose:

- 30mg/kg/day in divided doses (q8–12hr) 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.

K9 Dose:

- Skin infections 13.75–22mg/kg PO bid for 10–14 days. UTIs 12.5mg/kg PO bid for 7–10 days

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:

- Diarrhea/loose stools
- Nausea
- Skin rashes and urticaria
- Vomiting
- Vaginitis

Adverse reactions:

- Hypersensitivity reactions
- Hepatic dysfunction
- Blood and lymphatic dysfunction (likely hypersensitivity-related)

TMEP use:

- *Cellulitis/Cutaneous Abscess Protocol*
- *Dental Pain Protocol*
- *Flank Pain Protocol*
- *Head and Neck Infection Protocol*
- *Ingrown Toenail Protocol*

ASA – See Aspirin

Aspirin (ASA)

Description: Analgesic, antipyretic, anti-inflammatory, anti-platelet effect

Indications:

- For the temporary relief of:
  - Mild to moderate pain
  - Fever
- MI Prophylaxis: Reduces the risk of death and/or nonfatal myocardial infarction in patients with a previous infarction or unstable angina pectoris.
- MI/UA treatment
- 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:

- 325mg. One or two tablets/caplets with water. May be repeated every 4hr as necessary up to 12 tablets/caplets a day or as directed by a doctor.

Pediatric dose:

- >12 years and over: One or two tablets/caplets with water. May be repeated every 4hr as necessary up to 12 tablets/caplets a day or as directed by a doctor.
- <12 years old: Do not give to children under 12 unless directed by a doctor.

Contraindications:

- Hypersensitivity to aspirin
- Hypersensitivity to nonsteroidal anti-inflammatory drugs (NSAIDs)
- History of gastrointestinal bleeding
- Patients with bleeding disorders (e.g., hemophilia)
- Patient age <16 years old

Pregnancy Category D

Side-effects:

- Gastrointestinal symptoms
- Gastrointestinal bleeding
- Stomach pain
- Heartburn
- Nausea
- Vomiting

Adverse reactions: Interacts with NSAIDs, coumadin, heparin

TMEP use:

- *Chest Pain Protocol*
- *Deep Venous Thrombosis (DVT) Protocol*

Atovaquone 250mg/Proguanil 100mg (Malarone®)

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 1g/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

Contraindications:

- Hypersensitivity to atovaquone, proguanil
- Prophylaxis in patients with severe renal impairment (CrCL <30mL/min) unless potential benefits outweigh risks of non-treatment (proguanil 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*

Dosage of Atovaquone/Proguanil in Prevention of Malaria in Pediatric Patients

Weight (kg)	Total Daily Dose	Dosage Regimen
11 to 20	62.5mg/25mg	1 pediatric tablet daily
21 to 30	125mg/50mg	2 pediatric tablets as a single daily dose
31 to 40	187.5mg/75mg	3 pediatric tablets as a single daily dose
>40	250mg/100mg	1 tablet (adult strength) as a single daily dose

Dosage of Atovaquone/Proguanil in Treatment of Malaria in Pediatric Patients

Weight (kg)	Total Daily Dose	Dosage Regimen
5 to 8	125mg/50mg	2 tablets (pediatric strength) daily for 3 consecutive days
9 to 10	187.5mg/75mg	3 tablets (pediatric strength) daily for 3 consecutive days
11 to 20	250mg/100mg	1 tablet (adult strength) daily for 3 consecutive days
21 to 30	500mg/200mg	2 tablets (adult strength) as single daily dose for 3 consecutive days
31 to 40	750mg/300mg	3 tablets (adult strength) as single daily dose for 3 consecutive days
>40	1g/400mg	4 tablets (adult strength) as single daily dose for 3 consecutive days

Atripla® (Efavirenz/Emtricitabine/Tenofovir)

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
  - 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 77° F (25° C); excursions permitted to 59–86° F (15–30° C).
TMEP use: *HIV Post Exposure Prophylaxis Protocol*

Augmentin® – See Amoxicillin/Clavulanate Acid

Avelox® – See Moxifloxacin

Azithromycin (Zithromax®, Z-Pak®)

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: 2g PO as a single dose.

Pediatric dose: *(6 months of age or older)*

- Z-Pak® 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-Pak® in children
- Patients receiving:
  - Astemizole (Hismanal®) – antihistamine taken off of the US market
  - Cisapride (Propulsid®) – GI medication taken off of the US market

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*

AZT (Zidovudine, Retrovir®)

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:

- Body as a whole:
  - Back pain
  - Chest pain
  - Flu-like syndrome
  - Generalized pain
- Cardiovascular:
  - Cardiomyopathy
  - Syncope
- Endocrine:
  - Gynecomastia
- Eye:
  - Macular edema
- Gastrointestinal:
  - Dysphagia
  - Flatulence
  - Oral mucosa pigmentation
  - Mouth ulcer
  - Nausea
  - Vomiting
  - Diarrhea
- General:
  - Anaphylaxis
  - Angioedema
  - Vasculitis
- Heme and lymphatic:
  - Aplastic anemia
  - Hemolytic anemia
  - Leukopenia
  - Lymphadenopathy
  - Pancytopenia with marrow hypoplasia
  - Pure red cell aplasia
- Hepatobiliary tract and pancreas:
  - Hepatitis

- Hepatomegaly with steatosis
- Jaundice
- Lactic acidosis
- Pancreatitis

- Musculoskeletal:
  - Muscle spasm
  - Myopathy
  - Myositis
  - Rhabdomyolysis
  - Tremor
- Nervous:
  - Anxiety
  - Confusion
  - Depression
  - Dizziness
  - Loss of mental acuity
  - Mania
  - Paresthesia
  - Seizures
  - Somnolence
  - Vertigo
- Respiratory:
  - Dyspnea
  - 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*

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 6–10hr.

- 5–15mg

Pediatric dose:

- 6 to 12 years: 5mg, taken at bedtime or in the morning before breakfast to produce evacuation approximately 8hr 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:

- 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: *Constipation/Fecal Impaction Protocol*

Calcium Chloride (10% solution)

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: 0.5–1g (5–10mL of a 10% solution) slow IVP over 3–5min
Pediatric dose: 20mg/kg (0.15–3.0mL/kg of a 10% solution) slow IV push
Maximum dose = 1g 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:

- 1g (10mL of a 10% solution)
- 1.5–3g of a 10% calcium gluconate aqueous solution (1g in 10mL vial) over 2–5min SLOW IV push

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*

Ceftriaxone Sodium (Rocephin®)

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: 3rd generation cephalosporin

- Broad-spectrum bactericidal antibiotic for IV/IM use

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; and CNS infections

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

Pediatric dose: 50–75mg/kg given in divided doses q12hr; max dose 2g/day

K9 Dose: 1g IV/IM daily. May cause pain on IM injection. Give IV slowly over 30 minutes.

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 10mL NaCl from a 100mL bag. Inject 10mL NaCl into 1g ceftriaxone vial. Mix.
- Withdraw entire contents of vial and inject into original 100mL 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*
- *K9 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, cephalexin, 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

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: 1g PO × 1 then 500mg PO daily × 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.[1]

- 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*

Cialis® – See Tadalafil

Cyklokapron® – See Tranexamic Acid (TXA)

Combivir® (Lamivudine and Zidovudine [AZT, ZDV])

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*

Decadron® – See Dexamethasone

Dexamethasone (Decadron®)

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 dexamethasone ↓ symptoms of AMS, but does not speed acclimatization.
- Use of dexamethasone does not preclude the need for an emergency descent. (Administer dexamethasone every 6hr until descent is accomplished.)
- Inflammatory conditions
- Allergic conditions

Dose (Human): 4mg IV/IM/PO q6hr

 **K9 Dose:** 0.1mg/kg IV, IM, or SC – not used in many cases, use judiciously

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*
- *K9 Anaphylaxis Protocol*
- *K9 High Altitude Sickness and Pulmonary Edema Protocol*
- *Meningitis Protocol*

- *Sepsis/Septic Shock Protocol*
- *Smoke Inhalation Protocol*

Dextrose – See Glutose™

Diamox® – See Acetazolamide

Diazepam (Valium®)

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 with flumazenil (Romazicon®)

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


K9 Dose: 15–30mg (0.5–1mg/kg) IV or rectally per standard 30kg dog

Contraindications:
- ↓ BP
- Acute narrow angle glaucoma
- 
Has additive effect with other respiratory depressants (morphine, promethazine [Phenergan®] and alcohol). Be prepared to perform BLS.

Pregnancy Category D

Side-effects:
- ↓ BP
- ↓ Respirations
- Drowsiness
- Venous irritation

- Pain at injection site
- Nausea and vomiting

Adverse reactions:

- Bradycardia
- CV collapse
- Amnesia
- Abdominal discomfort

TMEP use:

- *Back Pain Protocol*
- *Behavioral Changes Protocol*
- *Heat Illness Protocol*
- *K9 RDX (C-4) Ingestion Protocol*
- *Seizure Protocol*

TTP use: *Head injury induced seizures*

Diflucan® – See Fluconazole

Diphenhydramine HCl (Benadryl®)

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 q6hr; max dose 400mg/day

Pediatric dose: Children <12 years: 5mg/kg/day in divided doses qid PO/IM/IV


K9 Dose: 1–2 mg/kg SC, IM, or PO (capsules)

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*
- *K9 Anaphylactic Reactions and 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®)

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

Indications: Anaphylaxis

- Allergic reactions (mild/moderate/severe)
- Asthma

Adult dose (Epinephrine):

- Anaphylaxis: 0.3–0.5mg (3–5mL of 1:10,000 dilution) IV or 0.3–0.5mg (0.3–0.5mL of 1:1,000 dilution) IM
- Allergic reaction: 0.3–0.5mg (0.3–0.5mL of 1:1,000 dilution) SQ/IM
- Asthma: 0.3–0.5mg (0.3–0.5mL of 1:1,000 dilution) SQ/IM

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

K9 Dose: 2.5–5mcg/kg IV **OR** 10mcg/kg IM (EpiPen® can be used in typical 30kg dog)

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
- Elevated BP
- Nausea
- Vomiting
- Vasoconstriction

Adverse reactions: Uncontrolled effects on myocardium and arterial system

TMEP use:

- *Anaphylactic Reaction Protocol*
- *Asthma (Reactive Airway Disease) Protocol*
- *K9 Anaphylactic Reactions and Envenomation 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:

- 1g daily

- May be administered IV up to 14 days or IM injection for up to 7 days
- For IV administration, infuse over 30min

Pediatric dose: Not approved in patients <18 years

K9 Dose: 15mg/kg IV/IM bid. Do not exceed 1g in a 24 hour period.

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 1g 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 6hr of reconstitution.
- IM administration – must be reconstituted prior to administration.
  - Reconstitute the contents of a 1g 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*
- *K9 Trauma Management Protocol*
- *Meningitis Protocol*
- *Sepsis/Septic Shock Protocol*

Fentanyl

GROUNDING medication for personnel on flight status

Description: Opioid analgesic; anesthesia adjunct.

Indications: Severe battlefield related trauma pain and hemorrhagic shock resuscitation

Dose: 25–50mcg IV/IO/IN/IM

Contraindications:

- Known allergy to medication
- Head injury

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/bradycardia
- Nausea/vomiting
- Chest wall and skeletal muscle rigidity (high or rapid IV dose)
- Hypotension
- Shock
- All patients should be followed for symptoms of respiratory depression.

TMEP use:

- *Pain Management Protocol*
- *TCCC/TTP*

Fentanyl (Actiq®) – See Oral Fentanyl

Flagyl® – See Metronidazole

Fluroquinolones – See Quinolones, Moxifloxacin, Gatifloxacin, Levofloxacin

Fluconazole (Diflucan®)

Aviation personnel are grounded for the initial 24hr 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 × 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®)

GROUNDING medication for personnel on flight status

Description: Parenteral phenytoin

Indications: Prevention and treatment of seizures

Dose: 18mg/kg IV/IO at 100–150mg/min 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 36° F to 46° F (2° C to 8° C). The product should not be stored at room temperature for more than 48hr.**
- **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 Protocols*

Gatifloxacin 0.3% Ophthalmic Liquid (Zymar®)

Aviation personnel are grounded for the initial 24hr 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 2hr 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 is 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™)

Description: Carbohydrate
Route: Oral
Indications: Altered mental status caused by hypoglycemia defined as:

- *Adults:*
  - Diabetics = fingerstick blood glucose analysis <110mg/dL
  - Nondiabetics = fingerstick blood glucose analysis <80mg/dL
- *Children:*
  - Diabetics = fingerstick blood glucose analysis <90mg/dL
  - Nondiabetics = fingerstick blood glucose analysis <60mg/dL

Adult dose: Full tube given in small doses (25–50g) – standing order
Pediatric dose: 0.5g/kg in small doses – standing order
Drug action: Increases blood glucose level
Onset: 1min
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*
- *Heat Illness Protocol*
- *Loss of Consciousness (without seizures) Protocol*
- *Seizure Protocol*

Glutose™ – See Glucose

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 500mL 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 500mL of Hespan®/Hextend®; start second 500mL bag and titrate to improvement.

K9 Dose: 500mL IV over 20–30min

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)

TMEP use:

- *TCCC/TTP*
- *K9 Trauma Management Protocol*

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 patients 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*

Imodium®– See Loperamide HCl

Invanz® – See Ertapenem IV

Kalcinate® – See Calcium Gluconate

Kaletra® (Lopinavir and Ritonavir)

GROUNDING medication for personnel on flight status

Class: Protease inhibitors

Action: This medication prevents human immunodeficiency virus (HIV) cells from multiplying in your body.

Indications: HIV treatment

Dose: 4 pills daily, taken together and with Truvada®

Contraindications:

- Do not take the following medicines with lopinavir and ritonavir (Kaletra®) because they can cause serious problems or death.
  - Triazolam (Halcion®)
  - Astemizole (Hismanal®)
  - Pimozide (Orap®)
  - Cisapride (Propulsid®)
  - Terfenadine (Seldane®) – withdrawn from the U.S. market
  - Midazolam
  - 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*

Ketalar® – See Ketamine

Ketamine (Ketalar®)

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.


K9 Dose: 5mg/kg IV (use with 0.3mg/kg midazolam)

Contraindications:
- Hypersensitivity to ketamine

Pregnancy Category B

Adverse effects:
- Hypertension
- Respiratory depression
- Emergence reactions (delirium, hallucinations, confusion)
- Increased intracranial pressure
- Increased intraocular 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*
- *K9 Trauma Management Protocol*

Ketorolac (Toradol®)

Description: Analgesic, nonsteroidal anti-inflammatory drug (NSAIDs). 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 q6hr. ***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 (NSAIDs)
- 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*

Lamivudine and Zidovudine (AZT, ZDV) – See Combivir®

Lariam® – See Mefloquine

Lidocaine HCl

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.

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 (15mL 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 mL. Diluting 2% lidocaine 1:1 with normal saline gives a 1% solution (10mg per mL) 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*

Loperamide HCl (Imodium®)

Aviation personnel are grounded until medical condition is not a factor and free of side-effects for 24 hours.

Description: Antidiarrheal (opioid)

Indications: Treatment of acute diarrhea. For use in acute, noninvasive 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 16mg (8 capsules) in 24 hours. Use only if control of diarrhea is critical for continued operations.

 **K9 Dose:** 0.1–0.2mg/kg PO q8hr (gastroenteritis)

Contraindications:
- Acute dysentery
- Not for use in children <12 years old.

Pregnancy Category B

Side-effects:
- Abdominal pain/distention
- Nausea
- Vomiting
- Severe constipation
- Drowsiness
- Dizziness

Adverse reactions: Hypersensitivity

TMEP use: *Gastroenteritis Protocol*

Lopinavir and Ritonavir – See Kaletra®

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

Malarone® – See Atovaquone 250mg/Proguanil 100mg

Mannitol (Osmotrol®)

GROUNDING medication for personnel on flight status

Description: Osmotic diuretic

Action: Increases osmolarity of the glomerular filtrate, which increases the reabsorption of water, increasing sodium and chloride.

Indications:

- Acute Hemolytic Transfusion Reaction (AHTR)
- K9 Head injury

Dose: 1–2g/kg at the rate of 5g/hr

Contraindications:

- Anuria
- Pulmonary edema
- Dehydration
- Congestive heart failure
- Hypovolemia
- Hypotension
- Hypersensitivity

Pregnancy Category C

Side-effects/precautions:

- Sodium depletion
- Transient volume overload
- Pulmonary edema
- Hypotension (excessive diuresis)
- Angina like chest pain
- Dizziness
- Headache
- Nausea and vomiting
- Chills
- Drug may crystallize at temperatures of 45° F (7.2° C) or lower.

Other notes:

- Use an inline filter.

Mefloquine (Lariam®)

GROUNDING medication for personnel on flight status

US Army Special Operations Command (USASOC) prohibits the use of mefloquine for all personnel.

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) to be given as a split dose taken 6–8hr 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 <5mg 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 30min 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 psychiatric 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.

 **K9 Dose:** Initially 0.2mg/kg PO once daily on day 1 of treatment, then 0.1mg/kg PO once daily.

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*

Metronidazole (Flagyl®)

Aviation personnel are grounded for the initial 24hr 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 × 5–10 days

- Trichomoniasis – 2g PO × 1 dose; OR 250mg PO tid × 7 days
- Giardia – 250mg PO tid × 5–7 days
- Severe anaerobic infections – 1g IV, then 500mg IV q6hr

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.

 **K9 Dose:** 15mg/kg

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 candicidal agent.

TMEP use:

- *Abdominal Pain Protocol*
- *Gastroenteritis Protocol*

Midazolam

 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)
- Adjunct to ketamine sedation
- 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 IN/IM/IV/IO for seizure control
- 1–2mg IV slowly q2–3min 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

K9 Dose: 0.3mg/kg plus 5mg/kg ketamine IV (for sedation) 0.3mg/kg IV (for seizures)

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
- Concurrent use of protease inhibitors (anti-HIV)

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 overadministration. 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 use:

- *Acute Behavioral Changes Protocol*
- *K9 Trauma Management Protocol*
- *K9 RDX (C-4) Ingestion Protocol*
- *Seizures Protocol*
- *TCCC/TTP*

Mobic® – See Meloxicam

Motrin® – See Ibuprofen

Morphine Sulfate (Opioid)

GROUNDING medication for personnel on flight status

Description: Narcotic analgesic – alters perception of pain and emotional response to pain.

- Have naloxone (Narcan®) available when using morphine.
- Alters perception and emotional response to pain.

Indications:

- Severe pain
- Pain from cardiac ischemia

Adult dose: 4–15mg IV/IM slow push. Titrate to response.

Pediatric dose: 0.1–0.2mg/kg IM/IV. Do not exceed 15mg.

Sedation: 1mg/kg morphine plus 0.3mg/kg midazolam plus 5mg/kg ketamine IM

Side-effects:

- Reduced RR
- Hypotension
- Bradycardia
- Nausea
- Vomiting
- Dizziness
- Pruritus
- Skin flushing

K9 Dose:

- Acute pain: 10–30mg IM
- Sedation: 1mg/kg morphine plus 0.3mg/kg midazolam plus 5mg/kg ketamine IM

Contraindications:

- Respiratory depression
- Hypotension
- Head injury

Pregnancy Category B

Adverse reactions:

- Seizures with large doses
- Constipation
- Ileus
- Urinary retention

TMEP use:

- *Chest Pain Protocol*

- *Pain Management Protocol*
- *K9 Evaluation and Treatment Protocol*
- *K9 Trauma Management Protocol*
- *K9 RDX (C-4) Ingestion Protocol*

Moxifloxacin (Avelox®)

Aviation personnel are grounded for the initial 24hr 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 multidrug-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 60min.
- Avoid use with antacids.
- Decrease dose in renal impairment.
- Avoid using with antiarrhythmics – may cause prolonged QT interval.

 **K9 Dose:** 400mg orally daily

Contraindications:

- Hypersensitivity to fluroquinolones
- 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
- Pseudomembranosus 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*
- *K9 Trauma Management Protocol/Canine TCCC*
- *Meningitis Protocol* (Prophylaxis)
- *Subungual Hematoma Protocol*

SECTION 3

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 years.
- Pediatric dosing is 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*

Narcan® – See Naloxone HCl

Naloxone HCl (Narcan®)

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 q2–3min/prn)

- Duration is 20 to 40 minutes (less than the duration of action of morphine). Repeat doses may be necessary after 20 to 30 minutes.

Pediatric dose: 0.01mg/kg dose IM/IV/SQ q2–3min

- 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.

 **K9 Dose:** 0.02–0.04mg/kg IV, IM, or SQ

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:

- *K9 Trauma Management Protocol*
- *Loss of Consciousness* (without seizures) *Protocol*

Nelfinavir (Viracept®)

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®)

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 q6hr

Side-effects: Primarily vasodilatory in nature (hypotension, peripheral edema)

Warning:

- 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: *Altitude Illness Protocol*

Ofirmev – See Acetaminophen

Ondansetron (Zofran®)

GROUNDING medication for personnel on flight status

Description: Antiemetic

Indications: Prevention of nausea and vomiting

Adult dose:

- *Oral dose:* 4–8mg PO tid up to 48hr
- *IV/IM dose:* 4mg IV over 2–5min or 4mg IM tid

Pediatric dose:

- *Oral dose:*
  - Little information available on dosing in children ≤3 years
  - 4–11 years of age: 4mg tid up to 48hr
  - >12 years of age: 4–8mg PO bid up to 48hr
- *IV dose:*
  - Little information available on dosing in children ≤2 yrs
  - 2–12 years old and <40kg: single 0.1mg/kg IV dose over 2–5min
  - 2–12 years and >40kg: 4mg IV over 2–5min

K9 Dose: 0.1–0.3mg/kg IV (slow push) q8–12hr **OR** 0.5–1.0mg/kg PO q12hr

Contraindications: Hypersensitivity to any component of product

Pregnancy Category B

Side-effects:
- Anxiety
- Dizziness
- Sedation/drowsiness
- Headache
- Malaise/fatigue
- Chills/shivering
- Constipation or diarrhea
- Fever
- Pruritis
- Urinary retention
- Musculoskeletal pain
- Extrapyramidal symptoms
- Arrhythmias
- Hypotension
- Chest pain

Adverse reactions:
- Elevated liver transaminases
- Rare cases of hypersensitivity, sometimes severe (anaphylaxis) have been reported.
- Syncope (rare)
- Grand mal seizures (rare)
- Bronchospasm (rare)
- Transient blurred vision (rare)
- Hypokalemia (rare)
- Rifampin may decrease ondansetron levels.

TMEP use:
- *K9 Anaphylactic Reactions and Envenomation Protocol*
- *Nausea and Vomiting Protocol*

Oral Transmucosal Fentanyl Citrate (OTFC) (Actiq®) Lozenge

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® lozenge 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.

K9 Dose: Place lozenge in rectum (can tape to tail) and monitor dog's response closely.

Contraindications: Known allergy to medication

Pregnancy Category C

Treatment of overdose:

- Ventilatory support
- Intravenous access
- Naloxone (Narcan®) 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:

- *K9 Trauma Management Protocol*
- *Pain Management Protocol*

Osmotrol® – See Mannitol

Oxymetazline HCl (Afrin® Nasal Spray)

Description: Vasoconstrictor (decongestant)

Indications: Use as an adjunct to valsalva 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 × 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®)

GROUNDING medication for personnel on flight status
Description: Phenothiazine class. An H_1 receptor blocking agent. Antihistamine, sedative, antimotion-sickness, antiemetic, and anticholinergic effects. The duration of action is generally from 4–6 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:
- *Oral dose*
  - Nausea/vomiting: The average adult dose is 25mg q4hr.
  - Motion sickness: The average adult dose is 25mg bid. The initial dose should be taken 30 minutes to 1 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.
- *Parenteral:* administered by deep IM injection
  - Nausea/vomiting: 12.5–25mg q4–6hr 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:
- *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
  - *Parenteral: administered by deep IM injection*
    - Nausea/vomiting:
    - 2 to 12 years old: 12.5–25mg q4–6hr PRN. If taking narcotics or barbiturates, reduce the dose to 1.1mg/kg.
    - Motion sickness: **Contraindicated** in children

Contraindications:
- Children <2 years old
- Comatose states
- Antiemetics should not be used in vomiting of unknown etiology in children.
- Asthma

Pregnancy Category C

Side-effects:
- Drowsiness, sedation, sleepiness
- Anticholinergic effects – dry mouth, urinary retention, dry eyes, constipation
- Photosensitivity

- Bradycardia
- Urticaria
- Sedation
- Respiratory depression
- Hypotension
- Chest pain

Adverse reactions:

- Lowers seizure threshold
- Extrapyramidal symptoms, dystonia
- May exacerbate glaucoma
- May exacerbate hypertension
- Cholestatic jaundice
- Arrhythmias

Warning:

- Intra-arterial injection may result in gangrene of the affected extremity.
- Because of the potential for promethazine (Phenergan®) to reverse epinephrine's vasopressors effect, epinephrine should **NOT** be used to treat hypotension associated with promethazine (Phenergan®) overdose.
- Subcutaneous injection or IV infiltration may result in tissue necrosis.

Other notes:

- Store at room temperature, between 59–77° F (15–25° C).
- 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 q4–6hr PO

Pediatric dose:

- 6–12 years old: 30mg/dose PO q4–6hr
- 2–5 years old: 15mg/dose PO q4–6hr

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, dysrhythmias
- 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 Protocol*
- *Barotrauma Protocol*

Quinolones – General Antimicrobial Spectrum

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 daily
Pediatric dose: Contraindicated
Side-effects:
- Headaches
- Nausea
- Vomiting
- Diarrhea
- Abdominal cramps
- Elevated 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®)

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; reduced secretion of stomach acid
Note: Drug Interactions: reduced 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 q6–8hr for ulcers, burns, steroid use, upper GI bleeds, urticaria, or anaphylaxis
- Oral dose: 150mg bid for ulcer, urticaria

Pediatric dose: 1.5mg/kg IV × 1, then 0.75mg/kg IV q12hr
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)

Retrovir® – See AZT (Zidovudine)

Rifadin® – See Rifampin

Rifampin (Rifadin®)

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: Bactericidal 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 q12hr (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:
- This medication **DOES NOT** give immediate relief in the event of asthma attack or bronchospasm.
- This medication **SHOULD NOT** be used in combination with other long-acting inhaled beta-agonists (e.g., formoterol, salmeterol/fluticasone).
- Milk allergy; milk protein in the inhalation powder formulation

TMEP use: *Altitude Illness Protocol*

Septra® – See Trimethoprim-Sulfamethoxazole

Serevent® – See Salmeterol

Sildenafil (Viagra®)

Class: PDE5 inhibitor.
Action: Vasodilator with potential blood pressure-lowering effects
Dose: 50mg
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.

TMEP use: *Altitude Illness Protocol*

Sodium Bicarbonate

WARNING GROUNDING medication for personnel on flight status

Description: Alkalinizing agent, electrolyte

Action:
- Sodium bicarbonate combines with hydrogen ions to form water and carbon dioxide.
- Buffers metabolic acidosis
- Forces an intracellular shift of excess potassium in hyperkalemia.
- Increased pH

Indications:
- Severe metabolic acidosis in cardiac arrest refractory to ventilation
- Tricyclic antidepressant overdose
- Hyperkalemia
- Alkalinization 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. Tadalifil 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®)

GROUNDING medication for personnel on flight status
Indications: Treatment of HIV infection
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*

Tenofovir and Emtricitabine – See Truvada®

Tenofovir and Emtricitabine and Efavirenz – See Atripla®

Tetracaine 0.5% Drops

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

Indications: As a topical optic anesthetic (may aid in ocular exam to relieve blepharospasm); removal of foreign bodies.

Dose:

- 1 or 2 drops – 2–3min 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*

Toradol® – See Ketorolac

Tranexamic Acid (TXA) (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 1g IV/IO for 2 doses

K9 Dose: 10–15 mg/kg IV

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, color blindness

Warnings:
- Rapid administration may result in hypotension.
- Do not co-administer with blood products or Hextend®.
- Do not administer more than 3 hours after injury.

TMEP use:
- *K9 Trauma Management Protocol*
- *Tactical Field Care and Tactical Evacuation Care Protocols*

Trimethoprim-Sulfamethoxazole (TMP-SMZ, Bactrim®, Septra®)

WARNING Aviation personnel are grounded for the initial 24hr 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* pneumonitis, *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

K9 Dose: 15–30mg/kg PO q12–24hr (Skin Infection/UTI)

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*

Truvada® (Emtricitabine and Tenofovir)

GROUNDING medication for personnel on flight status.

Indications: Treatment of HIV infection

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 77° F (25° C), excursions permitted to 59–86° F (15–30° C).
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 HCI

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

MASTER DRUG LIST

Common Name	Nomenclature	AHFS Category	NSN	Recommended NDC	Controlled	JDF Status
acetaminophen (Tylenol) 325mg tablets 100s	acetaminophen 325mg tablet 100s	analgesics and antipyretics, misc	6505015302679	51111048878	No	Yes
acetaminophen (Tylenol) 500mg tablets USP 100s	acetaminophen tablets USP 500mg 100s	analgesics and antipyretics, misc	6505014367129	51079039620	No	Yes
acetazolamide (Diamox) 250mg 100 tablets per bottle	acetazolamide tablets USP 250mg 100 tablets per bottle	carbonic anhydrase inhibitors	6505006640857	51672402301	No	Yes
albuterol sulfate (CFC-F) inhalation 90mcg aer w/adap 6.7g 200 actuations	albuterol sulfate (CFC-F) inhalation 90mcg aer w/adap 6.7g 200 actuations	sympathomimetic (adrenergic) agents	6505015382871	00085113201	No	Yes
aspirin (St Joseph's Children's Aspirin) 81mg tab chew 36s	aspirin 81mg tab chew 36s	salicylates	6505010339866	00904404073	No	Yes
aspirin tablets USP 0.324g 100s	aspirin tablets USP 0.324g 100s	salicylates	6505001009985	00904200960	No	Yes
atovaquone 250mg and proguanil 100mg tablets (Malarone) 100s	atovaquone 250mg and proguanil 100mg tablets 100s	antiprotozoals, misc	6505014919430	00173067501	No	Yes
azithromycin tablets 250mg 18s (3 Z-Paks 6s)	azithromycin tablets 250mg 18s (3 Z-Paks 6s)	other macrolides	6505014491618	00781149668	No	Yes
bisacodyl (Dulcolax) tablets USP 5mg film enteric I.S. 100s	bisacodyl tablets USP 5mg film enteric I.S. 100s	cathartics and laxatives	6505001182759	00574000411	No	Yes

ceftriaxone sodium (Rocephin) 1g vial 10s	ceftriaxone sodium 1g vial 10s	3rd generation cephalosporins	6505012192760	00004196401	No	Yes
ceftriaxone sodium sterile (Rocephin) USP 2g vial 10 vials per package	ceftriaxone sodium sterile USP 2g vial 10 vials per package	cephalosporins	6505012293149	00781320995	No	Yes
cephalexin (Keflex) 250mg capsules 100s	cephalexin 250mg capsules 100s	1st generation cephalosporins	6505001656545	00093314501	No	Yes
chloroquine phosphate tablets USP 500mg 25 tablets per bottle	chloroquine phosphate tablets USP 500mg 25 tablets per bottle	antimalarials	6505012679662	00143212522	No	Yes
ciprofloxacin (Cipro) 400mg in 200mL D5W piggyback bags 24s	ciprofloxacin 400mg in 200mL D5W piggyback bags 24s	quinolones	6505013366179	00085174102	No	Yes
ciprofloxacin concentrate (Cipro) for injection 10mg/mL, 40mL vial	ciprofloxacin concentrate for injection 10mg/mL, 40mL vial 10s	quinolones	6505014866591	00085173101	No	Yes
ciprofloxacin (Cipro) tablets USP 500mg I.S. 100s	ciprofloxacin tablets USP 500mg I.S. 100s	quinolones	6505012738650	00172531210	No	Yes
ciprofloxacin (Cipro) tablets USP 500mg I.S. 30 tablets per pack	ciprofloxacin tablets USP 500mg I.S. 30 tablets per package	quinolones	6505014912834		No	Yes
dexamethasone sodium phosphate injection (Decadron) 4g/mL 30mL	dexamethasone sodium phosphate injection 4g/mL 30mL	adrenals	6505015225164	63323016530	No	Yes

(continues)

MASTER DRUG LIST (cont.)

Common Name	Nomenclature	AHFS Category	NSN	Recommended NDC	Controlled	JDF Status
dextrose tablets 45g multi-use squeeze tube 12 tablets	dextrose tablets 45g multi-use squeze tube 12 tablets	caloric agents	6505014253165	08290328230	No	No
diazepam (Valium) 5mg tablets I.S. 100s	diazepam 5mg tablets I.S. 100s	benzodiazepines	6505010985802	51079028521	Yes	Yes
diazepam (Valium) 5mg/mL, 2mL autoinjector (cana)	diazepam 5mg/mL, 2mL autoinjector (cana)	benzodiazepines	6505012740951		Yes	Yes
diazepam (Valium) injection 5mg/mL MDV 5s	diazepam injection 5mg/mL MDV 5s	benzodiazepines	6505015138434	00409321302	Yes	Yes
diazepam (Valium) injection 5mg/mL 2mL syringe luer-lok, w/o needle	diazepam injection USP 5mg/mL 2mL unit 10 per package	benzodiazepines	6505015053476	00409127332	Yes	Yes
diphenhydramine hydrochloride (Benadryl) capsules USP 50mg 100s	diphenhydramine hydrochloride capsules USP 50mg 100s	ethanolamine derivatives	6505001168350	00555005902	No	Yes
diphenhydramine hydrochloride (Benadryl) injection USP 50mg/mL 1mL carpuject 10s	diphenhydramine hydrochloride injection USP 50mg/mL 1mL carpuject 10s	ethanolamine derivatives	6505015182962	00409229031	No	Yes

diphenhydramine hydrochloride (Benadryl) injection USP 50mg/mL 1mL vial	diphenhydramine hydrochloride injection USP 50mg/mL 1mL vial 25s	ethanolamine derivatives	6505010917538	00641037625	No	Yes
epinephrine injection (Adrenaline) USP 0.1mg/mL 10mL Lifeshield syringe 10s	epinephrine injection USP 0.1mg/mL 10mL Lifeshield syringe 10s	sympathomimetic (adrenergic) agents	6505015273957	00074492134	No	Yes
epinephrine injection (Adrenaline) USP 0.1mg/mL syringe-needle unit 10mL 10s	epinephrine injection USP 0.1mg/mL syringe-needle unit 10mL 10s	sympathomimetic (adrenergic) agents	6505010932384	00074490118	No	Yes
ertapenem sodium (Invanz) 1g vial 10s	ertapenem sodium 1g vial 10s	carbapenems	6505015035374	00006384371	No	Yes
fentanyl citrate injection, USP, equivalent to 50mcg (0.05mg) fentanyl base per mL	fentanyl citrate injection, USP	opiate agonists	6505011210705	10019003574	No	No
fluconazole (Diflucan) tablets 100mg 100 tablets per package	fluconazole tablets 100mg 100 tablets per package	azoles	6505013198233	00049342041	No	No
fluconazole tablets (Diflucan) 100mg 30 tablets per bottle	fluconazole tablets 100mg 30 tablets per bottle	azoles	6505013198248	00049342030	No	No
gatifloxacin (Zymar) ophthalmic solution 0.3% 2.5mL	gatifloxacin ophthalmic solution 0.3% 2.5mL	antibacterials	6505015090735	00023921803	No	No

(continues)

MASTER DRUG LIST (cont.)

Common Name	Nomenclature	AHFS Category	NSN	Recommended NDC	Controlled	JDF Status
hetastarch 6% in lactated electrolytes (Hextend) 500mL plastic bag	hetastarch 6% in lactated electrolytes 500mL plastic bag 12s	replacement preparations	6505014988636	00409155554	No	Yes
hetastarch 6% in sodium chloride (Hespan) 500mL plastic bag 12s	hetastarch 6% in sodium chloride 500mL plastic bag (Hespan) 12s	replacement preparations	6505012811247	00264196510	No	Yes
ibuprofen tablets (Motrin) USP 400mg 500s	ibuprofen tablets USP 400mg 500s	other nonsteroidal anti-inflammatory agents	6505001288035	53746013105	No	Yes
ibuprofen tablets (Motrin) USP 800mg 500 tablets per bottle	ibuprofen tablets USP 800mg 500 tablets per bottle	other nonsteroidal anti-inflammatory agents	6505012149062	53746013705	No	Yes
lamivudine 150mg and zidovudine 300mg (Combivir) capsules 60s	lamivudine 150mg and zidovudine 300mg (Combivir) capsules 60s	nucleoside and nucleotide reverse transcriptase inhibitors	6505014629945	00173059500	No	Yes
levofloxacin (Levaquin) in dextrose 5mg/mL 100mL	levofloxacin in dextrose 5mg/mL 100mL	quinolones	6505014974346	00045006801	No	Yes
levofloxacin (Levaquin) injection 25mg/mL 20mL single-dose vial	levofloxacin injection 25mg/mL 20mL single-dose vial	quinolones	6505014448356	00045006951	No	Yes

levofloxacin (Levaquin) tablets 500mg I.S. 100s	levofloxacin tablets 500mg I.S. 100s	quinolones	6505014446635	00045152510	No	Yes
lidocaine hydrochloride (Xylocaine) 2% injection USP 20mL vial	lidocaine hydrochloride 2% injection USP 20mL vial	local anesthetics	6505005986117	00186012001	No	Yes
loperamide hydrochloride (Imodium) capsules 2mg I.S. 100 capsules	loperamide hydrochloride capsules 2mg I.S. 100 capsules per package	antidiarrhea agents	6505012385632	51079069020	No	Yes
mefloquine hydrochloride (Lariam) tablets 250mg I.S. 25s	mefloquine hydrochloride tablets 250mg I.S. 25s	antimalarials	6505013151275	00004017202	No	Yes
meloxicam (Mobic) 15mg tablets 100s	meloxicam 15mg tablets 100s	nonsteroidal anti-inflammatory agents	6505015413243	00597003001	No	Yes
metronidazole HCL (Flagyl IV RTU) 500mg in 100mL sodium chloride	metronidazole HCL 500mg in 100mL sodium chloride piggyback bags 24s	antiprotozoals, misc	6505014626450	00338105548	No	Yes
metronidazole (Flagyl) tablets USP 250mg I.S. 100s	Metronidazole tablets USP 250mg I.S. 100s	antiprotozoals, misc	6505011424914	00182133089	No	Yes
morphine sulfate 15 mg/mL injection 20mL	morphine sulfate 15 mg/mL injection 20mL	opiate agonists	6505011533284	10019017963	Yes	Yes

(continues)

MASTER DRUG LIST (cont.)

Common Name	Nomenclature	AHFS Category	NSN	Recommended NDC	Controlled	JDF Status
morphine sulfate injection 10mg automatic injector	morphine sulfate injection 10mg automatic injector	opiate agonists	6505013025530		Yes	Yes
morphine sulfate injection 10mg/mL 1mL vial 25 per package	morphine sulfate injection 10mg/mL 1mL vial 25 per package	opiate agonists	6505014830274	10019017844	Yes	Yes
morphine sulfate injection 10mg/mL 1mL cartridge unit, luer-lock, needleless	morphine sulfate injection 10mg/mL 1mL cartridge unit, luer-lock, needleless 10s	opiate agonists	6505015055813	00409126130	Yes	Yes
moxifloxacin hydrochloride (Avelox)	moxifloxacin hydrochloride	quinolones	6505015034772	00026858169	No	No
moxifloxacin hydrochloride (Avelox) tablets 50s	moxifloxacin hydrochloride tablets 50s	quinolones	6505015163194	00026858188	No	No
moxifloxacin hydrochloride (Avelox) hydrochloride tablets 5s	moxifloxacin hydrochloride tablets 5s	quinolones	6505015163201	00026858141	No	No
mupirocin (Bactroban) 2% ointment 22g	mupirocin 2% ointment 22g	antibacterials	6505014805678	00029152544	No	Yes
naloxone HCL (Narcan) 1mg/mL injection 2mL syringe 10s	naloxone HCL 1mg/mL injection 2mL syringe 10s	opiate antagonists	6505014070213	00548146900	No	Yes

naloxone HCL injection (Narcan) 0.4mg/mL 1mL vial 10s	naloxone hydrochloride injection 0.4mg/mL 1mL vial 10s	opiate antagonists	6505015334126	00409121501	No	Yes
naloxone hydrochloride (Narcan) injection USP 0.4mg/mL 1mL ampul	naloxone hydrochloride injection USP 0.4mg/mL 1mL ampul 10 per box	opiate antagonists	6505000797867	63481035810	No	Yes
nelfinavir mesylate (Viracept) tablets 300 tablets per bottle	nelfinavir mesylate tablets 300 tablets per bottle	antivirals	6505014876694	63010001030	No	No
neomycin, polymyxin B sulfate and hydrocortisone (Cortisporin) otic	neomycin, polymyxin B sulfate and hydrocortisone otic susp USP 10mL	antibacterials	6505010430230	24208063562	No	Yes
nifedipine (Procardia) capsules USP 10mg 100 capsules per bottle	nifedipine capsules USP 10mg 100 capsules per bottle	dihydropyridines	6505011263842	00069260066	No	No
norfloxacin tablets 400mg 100 tablets per bottle	norfloxacin tablets 400mg 100 tablets per bottle	quinolones	6505012589542	00006070568	No	No
ofloxacin (Floxin) in dextrose injection 4mg/mL 100ml bottle 12 per package	ofloxacin in dextrose injection 4mg/mL 100mL bottle 12 per package	quinolones	6505013644123	00062155201	No	No

(continues)

MASTER DRUG LIST (cont.)

Common Name	Nomenclature	AHFS Category	NSN	Recommended NDC	Controlled	JDF Status
ofloxacin (Floxin) otic solution 0.3% 0.25mL single dose dropperette 20s	ofloxacin otic solution 0.3% 0.25mL single dose dropperette 20s	antibiotics	6505015424952	63395010111	No	No
ofloxacin (Floxin) tablets 200mg 50 tablets per bottle	ofloxacin tablets 200mg 50 tablets per bottle	quinolones	6505013464882	00062154002	No	No
ofloxacin (Floxin) tablets 200mg I.S. 100 tablets per package	ofloxacin tablets 200mg I.S. 100 tablets per package	quinolones	6505013462056	00062154005	No	No
ofloxacin (Floxin) tablets 300mg 50 tablets per bottle	ofloxacin tablets 300mg 50 tablets per bottle	quinolones	6505013462053	00062154102	No	No
ondansetron hydrochloride (Zofran) injection 2mg/mL 20mL vial	ondansetron hydrochloride injection 2mg/mL 20mL vial	5-ht3 receptor antogonists	6505013366184	00173044200	No	Yes
ondansetron (Zofran) hydrochloride injection 2mg/mL 2mL vial 5 per package	ondansetron hydrochloride injection 2mg/mL 2mL vial 5 per package	5-ht3 receptor antogonists	6505013945963	00173044202	No	Yes
oxymetazoline hydrochloride (Afrin) nasal solution 15mL spray	oxymetazoline hydrochloride nasal solution 15mL spray	vasoconstrictors	6505008694177	00182144464	No	Yes

primaquine phosphate tablets USP 15mg 100s	primaquine phosphate tablets USP 15mg 100s	antimalarials	6505013482465	00024159601	No	Yes
promethazine hydrochloride (Phenergan) injection USP 25mg/mL 10mL	promethazine hydrochloride injection USP 25mg/mL 10mL MDV 10s	antihistamine drugs	6505015401933	66758060119	No	Yes
promethazine hydrochloride (Phenergan) tablets USP 25mg 100s	promethazine hydrochloride tablets USP 25mg 100s	phenothiazine derivatives	6505013648557	00591530701	No	Yes
pseudoephedrine hydrochloride (Sudafed) tablets USP 30mg 24s	pseudoephedrine hydrochloride tablets USP 30mg 24s	sympathomimetic (adrenergic) agents	6505001490098	00904505324	Yes	Yes
quinine sulfate capsules USP 325mg 100 capsules per bottle	quinine sulfate capsules USP 325mg 100 capsules per bottle	antimalarials	6505009579532	00172417260	No	No
quinine sulfate capsules USP 325mg 1000 capsules per bottle	quinine sulfate capsules USP 325mg 1000 capsules per bottle	antimalarials	6505010428040	52544071610	No	No
quinine sulfate tablets 260mg 100 tablets per bottle	quinine sulfate tablets 260mg 100 tablets per bottle	antimalarials	6505011137514	00172300160	No	No

(continues)

MASTER DRUG LIST (cont.)

Common Name	Nomenclature	AHFS Category	NSN	Recommended NDC	Controlled	JDF Status
quinine sulfate tablets USP 260mg I.S. 100 tablets per package	quinine sulfate tablets USP 260mg I.S. 100 tablets per package	antimalarials	6505012399803	47679050735	No	No
ranitidine (Zantac) injection USP 25mg/mL 2mL single-dose vial	ranitidine injection USP 25mg/mL 2mL single dose vial 10 per package	histamine H2-antagonists	6505012085955	00173036238	No	Yes
ranitidine (Zantac) tablets USP 150mg 60 tablets per bottle	ranitidine tablets USP 150mg 60 tablets per bottle	histamine H2-antagonists	6505011607702	00781188360	No	Yes
tetracaine hydrochloride (Pontocaine) ophthalmic solution 0.5% 15mL	tetracaine hydrochloride ophthalmic solution 0.5% 15mL	local anesthetics	6505005824737	24208092064	No	Yes
transmucosal fentanyl (Actiq) 400mcg 30s	transmucosal fentanyl 400mcg, 30s	opiate agonists	6505NCM060544	63459050430	Yes	No

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NOTES

NOTES

SECTION 4
Canine/K9 Tactical Combat Casualty Care (C-TCCC) Guidelines

K9 Combat Casualty Care Committee
1 October 2019

Red Text indicates recommendations that are significantly different from human TCCC

Basic Management Plan for Care Under Fire

1. Return fire and take cover.
2. Apply a muzzle to protect care providers unless respiratory distress precludes its use.
   NOTE: Injured MWDs can be unpredictable and harm other team members providing assistance.
3. Recall the canine to a safe location if able and maintain positive control. Keep collars and tactical vests on to aid restraint and movement unless causing obvious harm (i.e., choking).
4. Try to keep the MWD from sustaining additional wounds.
5. Injured MWDs should be extricated from burning vehicles or buildings and moved to places of relative safety. Do what is necessary to stop the burning process. Remove all burning or smoldering harnesses, collars, vest, booties, goggles, and other gear. Avoid pulling away any items that are melted into the canine's skin or hair coat; cut hair coat to free melted object.
6. Stop life-threatening extremity hemorrhage via placement of a quick application circumferential pressure bandage with hemostatic dressings, if tactically feasible.
   NOTE: CoTCCC recommended human-designed windlass limb tourniquets are generally ineffective in canines due to conformational differences. Limb tourniquets are, generally, not warranted to abate extremity hemorrhage in canines.
7. Airway management is generally best deferred until the Tactical Field Care phase.
8. *Priority* for casualty care is always given to human combatant casualties before canine casualties. The handler and canine should travel together as a single unit, when appropriate and logistically feasible.

Basic Management Plan for Tactical Field Care

Tactical Field Care (TFC) is the care rendered by the first responder or combatant once no longer under effective hostile fire. Tactical Field Care allows more time and a little more safety, to provide further medical care.

1. **Establish a Security Perimeter**
   Establish a security perimeter in accordance with unit tactical standard operating procedures and/or battle drills. Maintain tactical situational awareness.

2. **Triage**
   Triage casualties as required. Human casualties should always be given priority over MWD casualties.
3. **Massive Hemorrhage**
   a. Assess for unrecognized hemorrhage and control all sources of external bleeding with manual or direct pressure via application of hemostatic agents, pressure bandages and/or wound packing as first line intervention.
   b. Apply CoTCCC-recommended hemostatic dressings with at least 3 minutes of direct pressure (optional for XStat). Each dressing works differently, so if one fails to control bleeding, it may be removed and a fresh dressing of the same type or a different type applied. (Note: XStat is not to be removed in the field, but additional XStat, other hemostatic adjuncts, or trauma dressings may be applied over it.)
   c. Junctional wounds should be treated with aggressive application and packing with hemostatic, pressure dressings and direct pressure to control bleeding.
      i. CoTCCC recommended windlass, limb tourniquets designed for humans (e.g., C-A-T, SOFTT-W) tend to slip distally and generally fail on MWDs due to conformational differences and should not be used as first line therapy for hemorrhage control in MWDs.
      ii. The only tourniquet that should be considered for use on a massive extremity hemorrhage in a MWD is a stretchable and elastic tourniquet such as the SWAT-T. This type of material allows it to mold to nearly any limb size and conformation in conjunction with its wide design, allowing it to serve as an effective circumferential pressure bandage on an MWD's limb.
      iii. Junctional tourniquets have not been evaluated in dogs and are not recommended at this time.
4. **Airway Management**
   a. Conscious MWD with no airway problems identified:
      i. No airway interventions needed.
   b. **Unconscious** casualty *without* airway obstruction:
      i. Place unconscious MWD in a recovery position (sternal recumbency/ prone if possible or allow MWD to remain in lateral recumbency).
      ii. Perform basic airway maneuvers:
      iii. Extend the head and neck into a straight in-line position.
      iv. Grasp the tongue, gently extend out of the mouth, and pull it down over the lower jaw.
      v. *Consider* endotracheal intubation to achieve/maintain patent airway.
      vi. *Consider* using a mouth gag to keep the MWD's mouth open and prevent trauma to endotracheal tube. Examples of a field expedient mouth gag may include:
         (a) 1–2-inch roll of medical tape;
         (b) 2-inch-wide roll of self-adherent bandage (Coban®/Vetrap®); or

(c) Cutting the end off of a 3–5mL syringe tube casing and securing over the upper and lower canine teeth.
(d) Placing a portion of a kong between the MWD's teeth to open the mouth

c. **Conscious** MWD *with airway obstruction* or impending airway obstruction:
   i. Clinical Signs:
      (a) Pawing at mouth, gagging,
      (b) Excessive drooling,
      (c) Frequent swallowing motions,
      (d) Extended head and neck,
      (e) Elbows and upper legs held out from the chest (e.g., "tripod position"),
      (f) Reluctant to lie down,
      (g) Noisy breathing (stertor or stridor),
      (h) Cyanosis (bluish gums); late sign.
   ii. Allow the MWD to assume the '*position of comfort*' or the position that best allows the MWD to breath with minimal restriction of air flow and that protects the airway, to include sitting or standing.
   iii. Palpate throat (pharyngeal area, larynx, and trachea to identify any abnormal mass or foreign material.
   iv. Open mouth to examine oropharyngeal area:
      (a) Avoid placing hands or fingers directly in MWD's mouth.
      (b) *Consider* using a leash, rope or roll gauze looped behind the upper and lower canine teeth in attempts to pry and hold the MWD's mouth open.
      (c) Consider sedating the MWD (see number 10 below).
   v. Use suction if available, appropriate and feasible based upon MWD disposition/mental status.
d. If attempts to clear or remove the airway obstruction have failed or the MWD collapses or becomes unconscious *consider* one of the following techniques:
   i. Orotracheal Intubation (OTI)/Endotracheal Intubation (ETI):
      (a) Preferred first-line technique for gaining airway access in MWDs and with training this can be accomplished in field conditions.
      (b) Use of a laryngoscope, although helpful, is not often required for MWD ETI; if available, a #4–5 Miller (straight) blade is recommended for MWD >25 kg (55 lb).
      (c) Use a 8.0–10.0mm internal diameter ET tube (ETT) for MWD weighing > 25 kg (55 lb).
      (d) ETI is considered the first-line option for advanced airway management in an unconscious or anesthetized MWDs. Canines possess a proportionally larger tracheal lumen diameter as compared to people. In order to achieve an airtight seal, it is recommended to select an ETT that is 70% of the canine's internal tracheal lumen diameter. Digital palpation of the trachea

in the cervical neck region is the most reliable method for estimating the canine's tracheal diameter. In most MWDs, a size 8.0–10.0 endotracheal tube is appropriate. To avoid the risk of one-lung intubation, determine the appropriate ET/CTT/TT length by measuring from the front or the canine incisors to the thoracic inlet or point of shoulder.

NOTE: intubation of the MWD is most easily performed with the dog in sternal or prone position (but can be performed in lateral), head and neck extended, and tongue pulled forward. Capnometer reading >10mmHg also verifies correct placement.

ii. If necessary assisted ventilation via an Ambu-bag can be performed at a rate of 8–10 breaths per minute.

Figure 1. *Measure how far to advance the endotracheal tube*.

Hold the tracheal tube to the side of the dog and measure from the front of the canine incisors to the thoracic inlet or point of the shoulder.

Mark the tube with tape.

Figure 2. *Position MWD for intubation.*

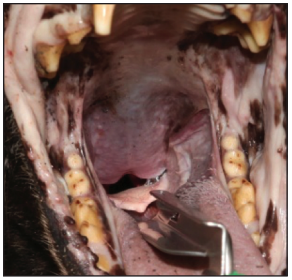


Figure 3. *Place tip of laryngoscope blade on back of tongue.*

DO NOT TOUCH THE EPIGLOTTIS (triangular tissue guarding the opening of the trachea).

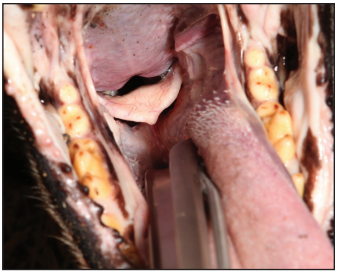


Figure 4. *Push downward with the laryngoscope blade to move the epiglottis and visualize the trachea.*

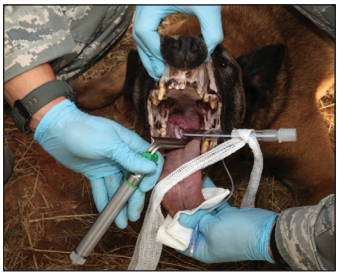


Figure 5. *Using a slight side-to-side motion, guide the endotracheal tube over the epiglottis between the vocal cords.*

Figure 6. *Advance and secure endotracheal tube.*

Advance the endotracheal tube into the trachea until your marked spot is even with the canine teeth.

Secure tube by placing attached roll gauze behind canine teeth and tying the loose ends in a bow around the upper or lower jaw.

Figure 7. *Check for proper placement.*

One tube = In the trachea

Two tubes = In the esophagus

Figure 8. *Inflate the cuff with a syringe until back pressure is noted.*

a. Surgical airways are not warranted in an unconscious or anesthetized MWD that has no direct upper airway trauma unless the performance of basic airway positioning maneuvers is unsuccessful in opening the airway and/or the provider is unable to successfully perform ETI.
b. Surgical Cricothyrotomy (CTT)
    i. Use techniques recommended for humans.
        (a) Bougie-aided open surgical, flanged and cuffed airway cannula, 6–9mm internal diameter, 5–8cm intratracheal length.
        (b) Standard open surgical, flanged and cuffed airway cannula, 6 – 9mm internal diameter, 5–8cm intratracheal length.
c. Surgical Tube Tracheostomy (TT)
    i. Use the largest internal diameter tube that fits into the MWD's trachea; aim for a TT that is at least 70% of the estimated internal tracheal lumen diameter.
    ii. Select a TT length of 5–8cm or one that does not extend beyond the thoracic inlet/point of shoulder.
    iii. Blind Insertion Airway Device/Nasopharyngeal Airways/Extraglottic Airway Devices have not been evaluated in canines and should not be utilized in MWDs.

Figure 9. *Position MWD on its back.*

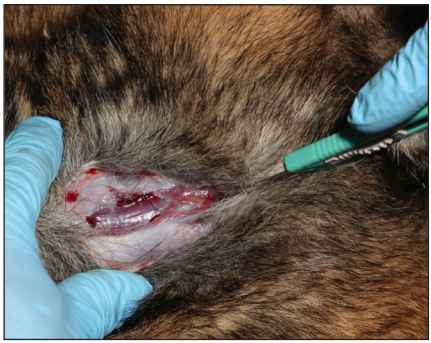


Figure 10. *Make a full thickness skin incision along the center of the neck 2–3 finger widths below the larynx (voice box) using a scalpel blade.*

If obstruction is in the trachea, you must use a lower spot; otherwise use landmarks given.

Do NOT make a transverse skin incision (perpendicular to the long axis of the trachea), as this increases the risk of injury to adjacent vessels and nerves.

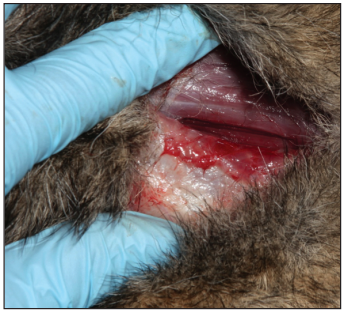


Figure 11. *Use a scalpel to carefully separate the muscles the run parallel to the incision.*

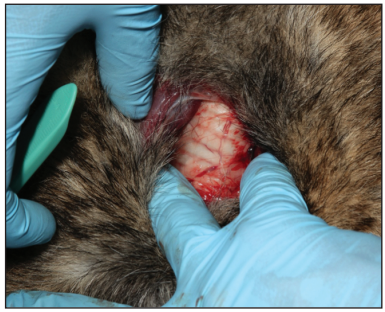


Figure 12. *Hold the muscles apart to visualize the trachea.*

Figure 13. *Make an incision in the trachea.*

Stabilize the trachea with non-dominant hand.

Make an incision between two rings of the trachea (between the 3rd and 4th or 4th and 5th tracheal cartilages). Do NOT extend the incision more than one-half (50%) of the diameter of the trachea. Do NOT incise at the cricothyroid ligament, as is done in people.

Remove blood or mucus if present.

Figure 14. *Insert the tracheal retractor into the trachea*

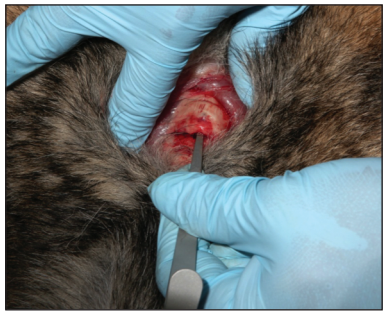


Figure 15. *Hook a lower tracheal ring and lift up so you can visualize the tracheal opening.*

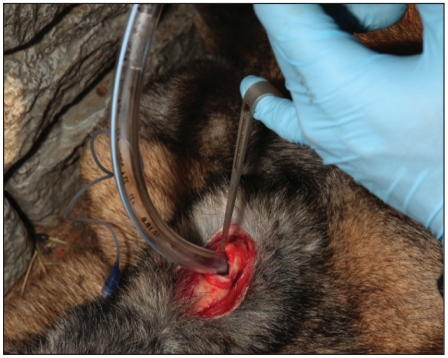


Figure 16. *Insert tracheostomy tube (ideal) or endotracheal tube through the incision and direct the distal opening down the trachea.*

Use the largest tube that will fit in the trachea; (7–11mm internal diameter tubes are typical).

Figure 17. *Immediately provide supplemental oxygen.*

Breathe in the tube or use a hand-operated resuscitator.

Figure 18. *Secure the tracheal tube.*

Secure the tracheal tube by attaching gauze bandage to the tube and tying it around the dog's neck in a bow knot. Inflate the cuff until you get back pressure.

If using a tracheostomy tube, secure the tracheostomy tube to the patient using umbilical tape, roll gauze, or similar material tied to the wings of the tube and passed around the neck and tied with a quick release knot. Insert the inner cannula (if provided) in the tracheostomy tube (if used) and inflate the cuff of the tracheostomy tube.

d. Cervical Spinal stabilization is not necessary for MWDs suffering only penetrating trauma.

e. Monitor hemoglobin saturation (SpO_2) and capnography when available, to help assess airway patency.

   i. Normal SpO_2 values in MWDs are similar to those in people (> *94%* on room/atmospheric air). Pulse oximetry probe placement for MWDs in order of

preference: tongue, non-pigmented area of lip, ear pinna, prepuce (male) or vulva (female). Recent data demonstrated the use of a human-designed neonatal pulse oximetry adhesive sensor attached to the base of a canine's tail may provide an alternative site for accurate and feasible pulse oximetry measurement in canines.

NOTE: Accurate pulse oximetry measurement is often only achievable in an unconscious or adequately sedated/anesthetized MWD.

ii. Capnography for MWDs is the same as for humans. An $ETCO_2$ monitor can be attached to an intubated MWD. $ETCO_2$ levels should be the same as for humans (35–45mmHg).

f. Always remember that the MWD's airway status may change over time and requires frequent reassessment.

NOTES:

i. Similar to a human casualty that can speak clearly without any respiratory distress, consider a MWD that is barking, growling, or whining without any clinical signs of respiratory distress has a patent airway.

ii. Consider monitoring the MWD's rectal temperature. Canines rely on panting to dissipate body heat, therefore any upper airway obstruction increases their risk for potential of a heat-related illness.

iii. Due to anatomical/conformational differences, the tongue is not a major source of upper airway obstructions in canines as it is in human casualties.

iv. In MWDs experiencing respiratory fatigue from prolonged or strenuous increased work of breathing, even mild sedation may increase the risk of imminent respiratory failure/arrest. Therefore, have resources prepared to perform rapid ETI or CTT/TT before administering any sedative or analgesia.

v. ETI is considered the first-line option for advanced airway management in an unconscious or anesthetized MWDs. Canines possess a proportionally larger tracheal lumen diameter as compared to people. In order to achieve an airtight seal, it is recommended to select an ETT that is 70% of the canine's internal tracheal lumen diameter. Digital palpation of the trachea in the cervical neck region is the most reliable method for estimating the canine's tracheal diameter. In most MWDs a size 8.0-10.0 endotracheal tube is appropriate. To avoid the risk of one-lung intubation, determine the appropriate ET/CTT/TT length by measuring from the front or the canine incisors to the thoracic inlet or point of shoulder.

vi. Surgical airways are not warranted in an unconscious or anesthetized MWD that has no direct upper airway trauma unless the performance of basic airway positioning maneuvers is unsuccessful in opening the airway and/or the provider is unable to successfully perform ETI.

5. **Respiration/Breathing:**
   a. All **Open and/or Sucking chest wounds** should be treated by immediately applying gloved hand over the wound/defect, followed by placement of a vented or non-vented occlusive seal to cover the defect.
      i. If hair clippers are not available, consider placing petroleum impregnated gauze on the underside of the chest seal to facilitate forming an occlusive seal between the skin and the chest seal.
      ii. Secure in-place on all four-sides with adhesive tape or with a snug, not overly tight, circumferential chest wrap.
   b. Monitor/assess the MWD for development of tension pneumothorax and treat as necessary (see section d below).

Figure 19. *Apply occlusive seal to wound.*

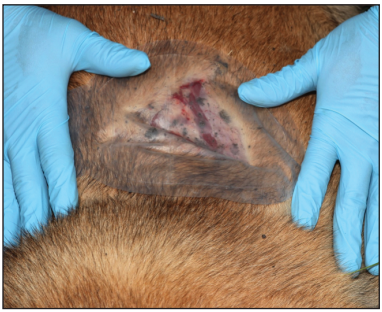


Figure 20. *Seal the occlusive dressing by applying pressure.*

Figure 21. *Dress the wound.*
Maintain pressure on occlusive seal.
With free hand, place dressing over occlusive seal.
Use free ends of dressing to bandage around chest.
If the airtight seal is lost at any time during this process, start over.

Figure 22. *Apply bandage of non-adherent conforming material over the field dressing to add security.*

c. Suspect a tension pneumothorax in the setting of known or suspected torso trauma or primary blast injury and one or more of the following:
   i. Severe or progressive respiratory distress
   ii. Severe or progressive tachypnea
   iii. Rapid, shallow, restrictive and open-mouth breathing
   iv. Absent or markedly decreased sounds on one or both sides of chest
   v. Circulatory shock [weak to absent femoral pulses, pale mucous membranes, prolonged capillary refill time (> 3–4 seconds), decreased mental status, cold extremities, tachycardia to bradycardia).
   vi. Traumatic cardiac arrest without obviously fatal wounds.
   vii. Hemoglobin oxygen saturation < 90% on pulse oximetry.

NOTES:

   i. Signs of respiratory distress in MWDs may include:
      (a) Acting agitated, unable to get comfortable, or reluctance to lie down,
      (b) Head and neck extended with elbows held out away from body (e.g., tripod position),
      (c) Dyssynchronous breathing pattern (*e.g., abdomen and chest move in opposite directions during inspiration*),
      (d) Minimal chest excursion with increased abdominal breathing,
      (e) Lack of drive and response to even basic commands, unwillingness to move,
      (f) Cyanotic (blue) gums (late finding).
   ii. If not treated promptly, tension pneumothorax may progress from respiratory distress to circulatory shock and traumatic cardiac arrest.

d. Initial treatment of suspected tension pneumothorax consider:
   i. "Burping" or removing the occlusive chest seal (if present); if this does not relieve the MWDs clinical signs, prepare to perform a chest needle decompression.
   ii. **Perform a chest needle decompression** (NDC)

iii. Allow a conscious MWD to assume the '*position of comfort*' (often the canine will elect to sit or stand). If unconscious, place in the recovery (sternal) position or lateral recumbency, placing the injured/affected side facing up.
iv. Use a 10 to 14-gauge, 2 to 3.25 inch (5–8cm) over-the- needle/catheter unit.
v. Insert in the **7th to 9th intercostal space** midway up the lateral thoracic wall or at the junctions of the upper 1/3rd and lower 2/3rd of the thoracic wall.
vi. Drawing a line from the point of the shoulder (greater tubercle of the proximal humerus) to the distal tip of the last rib, defines the appropriate landmark for a chest-NDC in a MWD.

NOTE: Canines have 13 ribs, the first 12 ribs are attached to the sternum via cartilaginous extensions and the 13th rib "floats" free of sternal attachment. In comparison, humans have 12 ribs.

Ensure that the needle enters **cranially (towards the head)** of the rib.

i. The intercostal artery, vein, and nerve run on the caudal aspect (behind or towards the tail) of each rib. Therefore, similar to the technique in human casualties, the best approach for inserting chest-NDC device is in the center of the intercostal space or at the cranial aspect (towards the head) of the rib to avoid damaging the nerve and vascular structures.
ii. Insert the needle/catheter unit **perpendicular** to the chest wall.
iii. Insert the needle/catheter unit together until the needle can be felt entering the pleural space. Two distinct "pops" will be felt through the needle–the first will be felt as the needle/catheter unit passes through the skin and the second will be felt when the needle penetrates the pleural cavity (this occurs when the catheter is inserted to ½-¾ of its length). As the needle enters the pleural space, direct the needle/catheter unit ventral (towards the sternum) to allow the needle/catheter unit to lie parallel along the long axis of the internal thoracic wall as it is inserted to the hub; this mitigates any risk of inducing lung or cardiovascular trauma when inserting the needle/catheter unit to the hub.

NOTE: Because of conformational differences, MWDs will have a shorter distance between their skin and the lateral thoracic wall (similar to the anterior axillary chest NDC site in humans); therefore, "hubbing" a 3.25 inch or longer catheter is typically not necessary in an MWD and may cause damage to intrathoracic structures if performed incorrectly.

iv. Ensure the bevel of the needle faces away from the inner thoracic wall and towards to the lungs.
v. Hold the needle/catheter unit in placed for at least 5–10 seconds to allow full decompression to occur.
vi. Once air is evacuated, remove the needle stylet. Consider leaving the catheter in place to alert subsequent care providers that the MWD has received treatment for a suspected tension pneumothorax.

vii. DO NOT assume that the catheter will reliably continue to decompress the pleural space; it may become occluded with clotted blood, or quickly kink or migrate out of the pleural space due to the highly extensible nature of the canine skin.

viii. Consider decompressing **Both Sides (Left & Right)** of the chest, particularly, if decompression of the initial side fails to fully relieve signs consistent with a tension pneumothorax or in the presence of a traumatic cardiac arrest and concurrent torso trauma or primary blast injury;

ix. Canines often have a fenestrated/communicating mediastinum that allows air to migrate to both sides of the thoracic cavity.

x. Consider the NDC successful if a combination of any of the following is identified:
   (a) Respiratory distress improves, or
   (b) An obvious hissing sound is heard as air escapes from the chest (most likely difficult to hear in high-noise environments), or
   (c) Hemoglobin oxygen saturation increases to 90% or greater (may take several minutes to reflect change and may not happen at altitude), or
   (d) A MWD with no vital signs has return of consciousness and/or femoral pulse.
   (e) If initial NDC fails to improve MWDs clinical signs from the suspected tension pneumothorax: Reposition MWD, if needed, and perform a second NDC on the opposite chest wall using a new needle/catheter unit.
   (f) If the MWD was initially in sternal recumbency, you may consider re-attempting the NDC on the same side by repositioning the MWD into lateral recumbency with the desired side to decompress (injured side) facing up. Perform a second NDC on the same side using a new needle/catheter unit. **Note**: Re-positioning the canine into lateral may allow air to redistribute, rise and accumulate to the highest point on the affected side.

xi. If initial NDC is successful, but clinical signs re-develop:
   (a) Perform a another NDC on the same side; use a new needle/catheter unit:
      • Continually reassess–reassess!
   (b) If the second needle decompression is also unsuccessful:
   (c) Continue on to the Circulation section of the Canine-TCCC guidelines.

e. When available, initiate pulse oximetry and monitor pulse oximetry in all MWDs suffering moderate to severe TBI. The presence of circulatory shock or marked hypothermia (< 95°/35°C) may adversely influence readings.

f. Consider administering oxygen supplementation when SpO_2 < 94% on room/atmospheric and when available.

NOTES:

i. Due to the extensible nature of the canine's skin and their vast subcutaneous space (SC), placing a chest seal that occludes only the external skin wound, and not the defect in the chest wall, may allow air from chest cavity to leak and become trapped into the SC space, resulting in significant amount of subcutaneous emphysema. With that in mind, if a tension pneumothorax develops after placement of an occlusive chest seal, ***burping*** or **removing** the chest seal may not completely resolve a tension pneumothorax in canines, particularly, if the occlusion is occurring at the level of the defect in the chest wall (due pieces of tissue, bone, etc.).

ii. Always consider decompressing both sides of the chest when treating a tension pneumothorax in a MWD, even with trauma isolated to one side of the MWDs thorax. Since, the canine mediastinum is fenestrated (like a cheesecloth) in a large proportion canine it is common for air to migrate to both sides of the thoracic cavity.

iii. The intercostal artery, vein, and nerve run on the caudal aspect (behind or towards the tail) of each rib; therefore, similar to the technique in human casualties, the best approach for inserting chest-NDC device is in the center of the intercostal space or at the cranial aspect (towards the head) of the rib to avoid damaging the nerve and vascular structures.

iv. Pulse oximetry probes used for people (typically finger probes) are best placed on the tongue for optimal reliability in unconscious, sedated or anesthetized dogs. In conscious dogs, use the ear pinna, lip fold, or inguinal skin fold; while not optimal for oximetry, these alternate sites generally yield reliable results in most instances. Alternatively, a neonatal pulse oximetry adhesive sensor attached to the base of a canine's tail may be used as alternative site in MWDs.

6. Circulation

a. Bleeding

i. Reassess sites of major hemorrhage and associated hemostatic interventions. Ensure that bleeding is stopped. If bleeding persists, consider changing or adding additional hemostatic adjuncts (e.g., Combat gauze, chitosan-based dressings, or X-Stat) and/or re-applying circumferential pressure bandages and wound packing, where applicable.

ii. iTClamp should be considered to close bleeding open wounds or can be used concurrently with hemostatic agents.

iii. If major bleeding cannot be stopped with dressings, consider application of a tourniquet if:

(a) Extremity hemorrhage appears life threatening (*e.g., MWD has suffered a complete traumatic limb or tail amputation*), AND

(b) Bleeding remains **refractory** to other methods of hemostasis (*e.g., direct pressure, pressure dressing, etc.*), AND

(c) The anatomical site is **amenable** to tourniquet application (*e.g., limbs and tail wounds*)

(d) When a tourniquet is warranted (as per above), consider applying a wide, elastic, non-windlass, moldable tourniquet (e.g., SWAT-T®), if available.

(e) Immobilize and **Elevate** the area when practical and feasible. Keep the MWD as calm as possible to avoid inadvertent elevations in arterial blood pressure

(f) Expose and clearly mark all tourniquets with the time of tourniquet application. Note tourniquets applied and time of application; time of reapplication; time of conversion; and time of removal on the canine TCCC Casualty Card. Use a permanent marker to mark on the tourniquet and the casualty card.

NOTE: Pelvic binders have not been evaluated in dogs. However, because pelvic fractures in dogs are very unlikely to result in life threatening hemorrhage, pelvic binders are not recommended in MWDs at this time.

b. IV/IO Access

i. Intravenous (IV) or intraosseous (IO) access is indicated if the MWD is in hemorrhagic shock or at significant risk of shock (and may therefore need fluid resuscitation), or if the MWD needs medications, but cannot take them by mouth.

ii. An 18-gauge IV or saline lock is preferred. Place in the cephalic (dorsal/anterior aspect over the radius) or lateral saphenous (hind limb over the lateral distal tibia) vein. The external jugular vein can be considered as an alternative option. For external jugular vein access, due to the increased length and flexibility of the MWD's neck as compared to a person, a longer catheter (eg.14 or 16-gauge × 3.25 inch) is preferred over an 18-gauge × 1.25 to 1.5 inch catheter commonly used for peripheral vein access.

(a) If vascular access is needed but not quickly obtainable via the IV route, use the IO route,

(b) Recommended sites for IO placement in a canine include the:

- Proximal, lateral humerus at the caudal aspect of the greater tubercle, or
- Proximal, medial tibia caudal to the distal aspect of the tibial tuberosity
- Recommended IO catheter size is 25mm × 15-gauge (BLUE) for MWDs over 40 lb

Figure 23. *Position the dog*

Figure 24. *Occlude the cephalic vein*

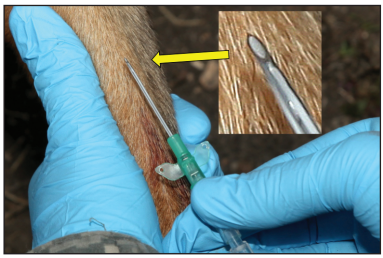


Figure 25. *Placing your thumb directly besides the vein and wrapping your remaining fingers underneath the leg, pierce the skin with the catheter needle.*

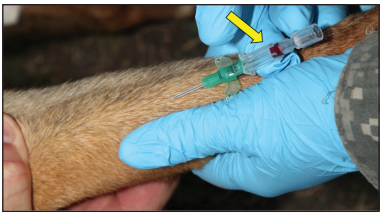


Figure 26. *Pierce the vein by advancing the catheter and then decrease the angle of the catheter until almost parallel to the skin surface.*

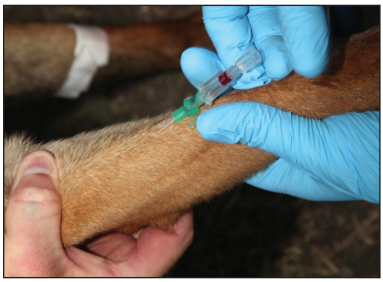


Figure 27. *Advance the catheter needle approximately 1/4 inch into the vein using a gentle forward motion.*

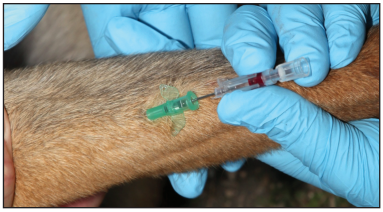


Figure 28. *Advance the catheter into the vein as far as possible while holding the catheter needle hub with one hand.*

Figure 29. *Remove the needle from the catheter by pulling it out while stabilizing the catheter.*

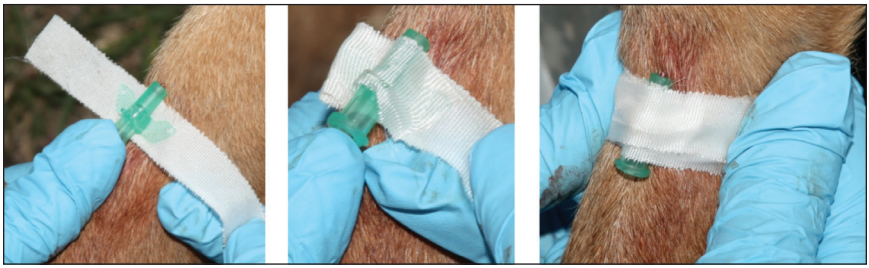


Figure 30. *Secure the catheter to the limb with tape.*

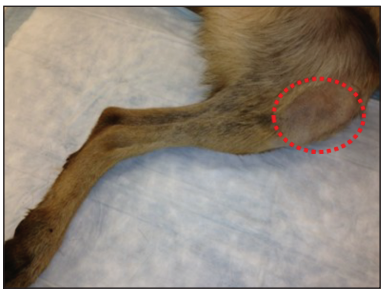


Figure 31. *Location for IO catheter placement on proximal medial tibia.*

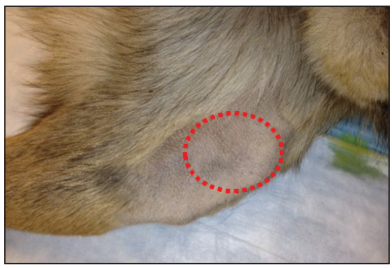


Figure 32. *Intended insertion site (red oval) on proximal medial tibial crest, just distal to the knee joint.*

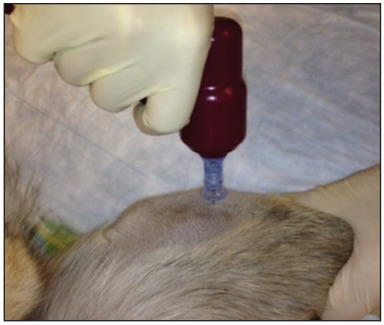


Figure 33. *Insertion of pediatric IO catheter in proximomedial tibia using EZ-IO device.*

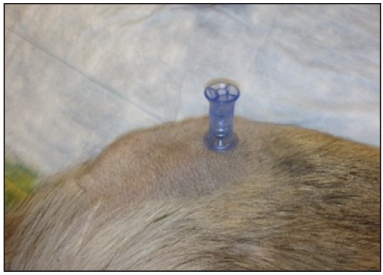


Figure 34. *Full insertion of IO catheter after removal of stylet*

Figure 35. *Apply 1" medical adhesive tape stirrups to the inside and outside (or top and bottom) of the foot.*

The ends of the tape should extend 4–6 inches beyond the toes.

Place a tongue depressor between the sticky sides of the tape so that the tape doesn't stick to other bandaging material.

Figure 36. *Wrap cast padding around the limb, starting at the toes and past the joint above the fracture.*

Figure 37. *Mold universal splint to outside portion of the fractured limb.*

Figure 38. *Wrap gauze bandage tape around splint.*

Figure 39. *Remove the tape stirrups from the tongue depressor, twist 1/2 turn, and stick to the bandage material on each side of the paw.*

Figure 40. *Wrap Elastikon/Coban tape around the gauze bandage.*

Figure 41. *Write the date and time of the bandage on a piece of white medical adhesive tape.*

c. Tranexamic Acid (TXA)
   i. If a MWD is anticipated to need significant blood transfusion (for example: presents with hemorrhagic shock, one or more major amputations, penetrating torso or abdominal trauma, or evidence of severe bleeding):
   ii. Administer 10mg/kg of tranexamic acid as a slow IV push or in 100mL Normal Saline or Lactated Ringer's as soon as possible but NOT later than 3 hours after injury. When given, TXA should be administered over 10 minutes by IV/IO infusion.
   iii. Begin a second infusion of 10mg/kg of TXA as a continuous infusion over 8 hours after initial fluid resuscitation has been completed.

d. Fluid resuscitation
   i. Assess for hemorrhagic shock (pale mucus membranes, inappropriate mentation in the absence of head trauma, weak or absent femoral pulse).
   ii. The resuscitation fluids of choice for MWDs in hemorrhagic shock, listed from most to least preferred, are: canine chilled or fresh whole blood; canine plasma and RBCs in a 1:1 ratio; canine plasma or RBCs alone; crystalloid (Lactated Ringer's, Normosol R or Plasma-Lyte A) Hextend/Hespan.

NOTE: Hypothermia prevention measures [number 7] should be initiated while fluid resuscitation is being accomplished.

   iii. If not in shock:
      (a) No IV fluids are immediately necessary.
      (b) Fluids by mouth are permissible if the MWD is conscious and can swallow.
   iv. If in shock and canine blood products are available:
      (a) Resuscitate with canine whole blood [initial dose is one 500mL unit as a bolus or titrated depending on situation], or, if not available
      (b) Canine plasma and canine RBCs in a 1:1 ratio [initial dose is one 250mL unit of plasma plus one 250mL unit of pRBC bolused or titrated depending on situation], or, if not available
      (c) Reconstituted dried canine plasma, canine liquid plasma or thawed canine fresh frozen plasma [initial dose is one 250mL unit of any of the above mentioned plasma products bolused or titrated depending on situation] alone or canine pRBCs alone [initial dose is one 250mL unit of pRBC bolused or titrated depending on situation]

      NOTE: DO NOT administer human blood products to a canine. Human blood products have a high probability of causing a hemolytic reaction when transfused into a canine.

      (d) Reassess the MWD after each unit. Continue resuscitation until a palpable femoral pulse, improved mental status or systolic BP of 80-90 is present.
   v. If in shock and blood products are not available due to tactical or logistical constraints:

(a) Lactated Ringer's, Normosol R or Plasma-Lyte A
(b) Reassess the MWD after each 500mL IV/IO bolus.
(c) Continue resuscitation until a palpable femoral pulse, improved mental status, or systolic BP of 80-90mmHg is present.
(d) Discontinue fluid administration when one or more of the above end points has been achieved.

vi. If a MWD with an altered mental status due to suspected TBI has a weak or absent femoral pulse, resuscitate as necessary to restore and maintain a normal femoral pulse. If BP monitoring is available, maintain a target systolic BP of at least 90mmHg.

vii. Reassess the MWD frequently to check for recurrence of shock. If shock recurs, re-check all external hemorrhage control measures to ensure that they are still effective and repeat the fluid resuscitation as outlined above.

e. Refractory Shock

i. If a MWD in shock is refractory to fluid resuscitation and canine blood products are not available, consider:

ii. The use of synthetic colloids (Hextend® and/or Hespan®) – 150–200mL bolus IV/IO. Can repeat if shock state is not resolved.

iii. Untreated tension pneumothorax as a possible cause of refractory shock. Thoracic trauma, persistent respiratory distress, absent breath sounds, and hemoglobin oxygen saturation < 90% support this diagnosis. Treat as indicated above with repeated NDC or finger thoracostomy/chest tube insertion.

7. Hypothermia Prevention

a. Minimize MWD's exposure to the elements.

b. Remove any wet outer wear (e.g., vests, harnesses, booties, etc.). GENTLY pat dry any wet tissues or hair coat.

c. Get the MWD onto an insulated surface as soon as possible.

d. Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the MWD's torso (not directly on the skin) and cover the MWD with the Heat-Reflective Shell (HRS).

e. If an HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready Heat blanket may also be used.

f. If the items mentioned above are not available, use dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the MWD dry.

g. Warm fluids are preferred if IV fluids are required.

8. Penetrating Eye Trauma

a. If a penetrating eye injury is noted or suspected:

i. Place muzzle if practical before examining the eye

ii. Do NOT attempt to bandage or cover the eye. Make every effort to prevent MWD from scratching at the eye. Consider sedation as outlined in number 10.

iii. If possible, gently rinse the eye with clean water
iv. Ensure that oral or IV/IM antibiotics are given as outlined below.

Ketamine can cause nystagmus and increased intraocular pressure in a MWD. Therefore consider alternative sedatives/analgesics in MWDs with penetrating eye traumas unless other alternatives do not exist or are ineffective.

9. Monitoring

a. Initiate advanced electronic monitoring if indicated and if monitoring equipment is available.
   i. Monitors of choice include pulse oximetry (placed on the lip, tongue or prepuce) and capnography if intubated

10. Analgesia

a. Analgesia on the battlefield should generally be achieved using 1 of 3 options:

Option 1

i. Mild to Moderate Pain
   (a) Meloxicam – ½ of a 7.5mg tablet (0.1mg/kg) PO once a day
   (b) DO NOT give Tylenol or ibuprofen to an MWD

Option 2

i. Moderate to Severe Pain
   (a) MWD IS NOT in shock or respiratory distress AND
   (b) MWD IS NOT at significant risk of developing either condition
   (c) Do not attempt to give Oral transmucosal fentanyl citrate (OTFC) to an MWD. Rather administer ONE of the below options:
      - Morphine at 0.25-0.5mg/kg IM (equivalent to one 10mg morphine autoinjector) or
      - Hydromorphone 0.1mg/kg IV/IO/IM or
      - Fentanyl (injectable) q20–30min at:
         - 2–5mcg/kg IV/IO
         - 10mcg/kg IM
         - 4mcg/kg IN (Intranasal)

Morphine and hydromorphone often causes vomiting in dogs so handlers and medics should be prepared to remove the muzzle after administration of an opioid. Hydromorphone causes excessive panting; use caution with head injuries and respiratory disease.

Option 3

i. Moderate to Severe Pain
   (a) MWD IS in hemorrhagic shock or respiratory distress OR
   (b) MWD IS at significant risk of developing either condition
   (c) Ketamine 2–5mg/kg (60–90mg) IV/IO/IM/IN

If possible, strongly consider combination therapy whenever using ketamine in MWDs. Suggest a combination of 50mg ketamine with either an opioid (5mg of morphine OR 3mg of hydromorphone OR 150mcg fentanyl) OR a benzodiazepine (10mg of midazolam or diazepam) to improve analgesia and sedation

(d) End points: Control of pain and appropriate level of sedation. MWD should be generally recumbent but responsive and breathing comfortably

b. For all casualties given opioids or ketamine – monitor airway, breathing, and circulation closely

c. Consider adjunct administration of antiemetics (Ondansetron 8-16mg IV or 24mg PO) prior to administering opioids.

d. Naloxone should be available when using opioid analgesics.

(a) Recommended doses are: 2mg IV/IO or 4mg IM/IN, Repeat as needed.

e. Both ketamine and opioids have the potential to worsen severe TBI. The combat medic, corpsman, or PJ must consider this fact in his or her analgesic decision, but if the MWD is vocalizing and demonstrating painful behaviors, then the TBI is likely not severe enough to preclude the use of ketamine or opioids.

f. Ketamine may be a useful adjunct to reduce the amount of opioids required to provide effective pain relief. It is safe to give ketamine to a MWD who has previously received morphine. IV Ketamine should be given over 1 minute.

g. If respirations are noted to be reduced after using opioids or ketamine, provide ventilatory support with a bag-valve-mask or mouth-to-mask ventilations.

h. REASSESS, REASSESS, REASSESS

11. Antibiotics:

a. Antibiotics are recommended for all open combat wounds.

b. Recommended antibiotics in order of preference are:

i. Ceftriaxone 25mg/kg IV/IM q12hr

ii. Cefotaxime 25mg/kg IV/IM q8hr

iii. Ertapenem, (15-30mg/kg) IV/SC q8hr

iv. If able to take PO meds consider:

(a) Moxifloxacin (from the CWMP), 400mg PO qd

12. Inspect and dress known wounds.

13. Check for additional wounds.

14. Burns

a. Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early intubation or surgical airway for respiratory distress or oxygen desaturation.

b. Estimate total body surface area (TBSA) burned to the nearest 10% using the Rule of Nines.

c. Cover the burn area with dry, sterile dressings. For extensive burns (>20%), consider placing the casualty in the Heat-Reflective Shell or Blizzard Survival Blanket from the Hypothermia Prevention Kit in order to both cover the burned areas and prevent hypothermia.

d. Fluid resuscitation (extrapolated from the USAISR Rule of Ten)
   i. If burns are greater than 20% of TBSA, fluid resuscitation should be initiated as soon as IV/IO access is established. Initiate resuscitation with (order of preference) Lactated Ringer's, Plasma-Lyte A/Normosol-R, Normal Saline, or Hextend; if Hextend is used, no more than 20mL/kg (500–800mL) should be given, followed by Lactated Ringer's or normal saline as needed.
   ii. Initial IV/IO fluid rate is calculated as %TBSA x 10mL/hr.
   iii. If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the K9TCCC Guidelines in number 6.

e. Analgesia in accordance with the K9TCCC Guidelines in number 10 may be administered to treat burn pain.

f. Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per the K9TCCC guidelines in number 11 if indicated to prevent infection in penetrating wounds.

g. All K9TCCC interventions can be performed on or through burned skin in a burn casualty.

h. Burn patients are particularly susceptible to hypothermia. Extra emphasis should be placed on barrier heat loss prevention methods.

15. Splint fractures and re-check pulses.

a. **Important:** Handle an injured canine with a fracture with extreme care and proper restraint and muzzling, if appropriate. Consider sedation and analgesia before manipulating the fractured site (see number 10).

b. SAM splints and spoon splints can be applied below the knee or below the elbow. Ensure sufficient padding is in place along pressure points when applying these splints to minimize the risk of further injuries.

16. Communication

a. Communicate consistently with the canine handler or assigned escort. Explain care provided and request support required for canine management and positioning. Handler and canine should travel together whenever feasible to facilitate handling and comfort of the MWD.

b. Communicate with tactical leadership as soon as possible and as needed during the treatment process. Provide leadership with casualty status on a regular basis and evacuation requirements to assist with coordination of evacuation and dedication of on-site support assets. Include canine handler or escort in evacuation planning for casualty management.

c. Communicate with the established evacuation system for that specific locale to arrange TACEVAC. Provide mechanism of injury, injuries sustained, identified signs/symptoms, current status, and treatments/medications administered to medical providers on evacuation platform. Ensure receiving medical providers are aware of the need to have canine Handler or assigned escort accompany the casualty for management.
   i. K9TCCC recommends the use of S-MIST reporting for MWD casualties. The MIST report is not a formal part of the US Standard MEDVAC request. It is supplemental to a MEDEVAC request and should be sent as soon as possible, but should not delay the MEDEVAC mission. The MIST report is also a verbal exchange between the current provider and the next level of care. For example, when a ground medic hands a patient off to a flight medic, he gives the MIST report along with the TCCC/canine TCCC card.
      (a) S-MIST is a simple yet thorough and efficient way to convey the salient details of a patient's status. Stated another way, it is a succinct format to communicate the status and treatment performed so the next Role of care knows what they need to know for immediate treatment.
      (b) S-MIST Report:
         - S- Stable or Unstable
         - M – Mechanism of Injury: A brief description of the MOI and time of injury (if known).
         - I – Injury or Illness: A brief description of the injuries sustained starting with the most serious first. Highlight life-threatening injuries.
         - S – Symptoms and Vital Signs: A – Airway Status, B – Breathing Rate, C – Pulse Rate, D – Conscious/Unconscious, E – Other signs
         - T – Treatment given: Treatments rendered; medications given.

17. Cardiopulmonary Resuscitation (CPR)

a. CPR within a tactical or high-threat environment for victims of blast or penetrating trauma who have no pulse, no ventilations, and no other signs of life is not often successful
b. Bilateral needle decompression (See number 3) for MWDs suffering torso or polytrauma with no respirations or pulse should be performed to verify that tension pneumothorax is not the cause of cardiac arrest. This should be completed prior to determining if CPR should be initiated or continued

18. Documentation of Care

a. Complete the Canine Tactical Combat Casualty Care Card. Request general information from Handler or assigned escort. Document evacuation category, evacuation type, mechanism of injury, treatments, and medications administered.
b. Update the signs and vital parameters every 5 minutes for critical/unstable MWD casualties every 15 minutes for stable, non-critical canine casualties.

c. Document any additional information that would be beneficial for higher level of care under NOTES portion.

19. Prepare Casualty for Evacuation

a. Complete and secure the canine TCCC Card to the MWD. If available, use Canine Deployment Medical Card for missing information.
b. Secure Canine Deployment Medical Card to canine.
c. Verify placement and efficacy of all interventions.
d. Secure all loose ends of bandages and wraps.
e. Secure litter straps based on configuration requirements if applicable. Consider padding for extended evacuations.
f. Stage casualty for evacuation based on unit standard operating procedures.
g. Position canine handler or assigned escort at the head of the MWD.
h. Protect artificial airway, if present, from excessive wind, dirt, foreign objects.
i. Maintain security at the evacuation point in accordance with unit standard operating procedures.
j. Transport injured MWD requiring emergent surgery to the closest surgical team regardless if there is a veterinary team at that location.

CANINE-TACTICAL COMBAT CASUALTY CARE CARD (cTCCC)

EVAC CAT: ☐Urgent ☐Priority ☐Routine

EVAC TYPE: ☐Fixed ☐Rotary ☐Ground ☐MEDEVAC ☐CASEVAC

UNIT: _____ **NAME:** _____ **TATTOO:** _____

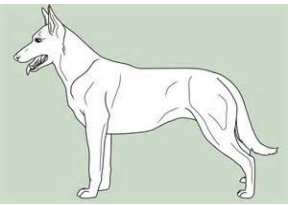
DATE: (DD-MM-YY)_____ **TIME:** _____ **GENDER:** ☐**M** ☐**F**

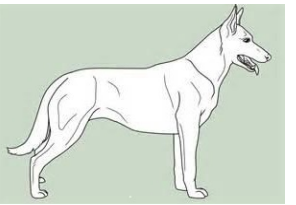
Mechanism of Injury: (Mark **X** all that apply

☐IED ☐GSW ☐MINE ☐BURN ☐GRENADE ☐ARTILLERY ☐FALL

☐OTHER: _____

Injury: (Mark all injuries that apply with an **X**)





Signs and Symptoms: (fill in the blank)

Time					
Pain Score (0-10)					
Temperature (99-102.5)					
Pulse Rate/Location (60-80)					
Respirations (16-30)					
Blood Pressure (120/80)					
Pulse Ox% (> 95%)					
Capillary Refill (< 2 sec)					

NOTES: _____

_____

_____

DD FORM 3073 OCTOBER 2019 (Send card to dog.consult@us.af.mill)

(continues)

PURPOSE: The Canine Tactical Combat Casualty Care (cTCCC) card is for documenting a trauma or disease non-battle injury (DNBI) at the point of injury anywhere a canine is deployed in support of DoD operations. The cTCCC card will be filled out by the handler or provider who attends to the canine's trauma or DNBI. After medical treatment and resuscitation care is provided, the cTCCC card can be handed off to the nearest veterinary treatment facility or supporting veterinary unit to be scanned, uploaded and emailed to dog.consult@us.af.mil or the unit providing care can email directly. Once the MWD Trauma Registry is online, the first veterinary unit can input the information into the registry and scan the cTCCC card to upload into ROVR. The cTCCC card becomes part of the canine's permanent DoD medical record. For US Special Operations Command (SOCOM) canines, the cTCCC card will be filled out and returned to the handler or operator. The handler or operator will route the card to their respective veterinarian to be inputted into the MWD Trauma Registry and the canine's record.

PAGE 1:

GENERAL INSTRUCTIONS

- To be completed by the handler, human medical provider, veterinary technician or veterinarian fulfilling the role at the point of injury.
- Time Zones: Record all time local 24 hour military format, hh:mm
- A+ (plus sign) means positive test result; a - (minus sign) means negative test result.

EVACUATION CATEGORY (mark as appropriate)

URGENT – Patient who should be evacuated as soon as possible and within **two** hours to save life, limb or eyesight

PRIORITY – Patient who should be moved within **four** hours or their condition will deteriorate to such a degree that will be urgent

ROUTINE – Patient whose condition is not expected to worsen significantly and who will require evacuation in the next **24** hours

EVACUATION MODE & TYPE (mark as appropriate)

PATIENT IDENTIFICATION

UNIT. Record the unit the canine is assigned

ANIMAL NAME. (self-explanatory)

TATTOO. (self-explanatory)

DATE. (DD-MM-YY)

TIME. Record all time local 24 hour military format, hh:mm

GENDER. (mark as appropriate)

MECHANISM OF INJURY (mark as appropriate – use other for DNBI or if unknown – describe)

INJURY (mark the diagram where the trauma/injury or disease is located – if there are more than one injury, identify each with the mechanism of injury)

VITAL SIGNS (input vital signs at least hourly)

NOTES

SECTION 5
Burn Quick Reference Guide

Burn Quick Reference Guide

Type of Injury

1. **First Degree:** superficial, involving only epidermal damage
   a. erythematous and painful due to intact nerve endings
   b. heal in 5 to 10 days; pain resolves within 3 days
   c. no residual scarring
2. **Second Degree:** partial thickness, involving the epidermis and dermis
   a. more superficial burns are moist and blister; deeper burns are white and dry, blanch with pressure, and have reduced pain
   b. heal in 10 to 14 days
   c. can develop into third degree burns with infection, edema, inflammation and ischemia
   d. treatment varies with degree of involvement – grafting is indicated for deep burns
3. **Third Degree:** full-thickness, most severe of burns
   a. results in necrosis and avascular areas
   b. tough, waxy, brownish leathery surface with eschar, numb to touch
   c. grafting required
   d. usually have permanent impairment
4. **Fourth Degree:** full-thickness as well as adjacent structures such as fat, fascia, muscle or bone
   a. reconstructive surgery is indicated
   b. severe disfigurement is common

Body Surface Area (BSA)

1. **Adult**
   a. "rule of nines": each arm is 9% of BSA, leg is 18%, anterior trunk is 18%, posterior trunk is 18%, head is 9%, and perineum is 1% (see chart)
2. **Children**
   a. BSA varies with age (children have a larger percentage of body surface area which exaggerates fluid losses)
   b. children under 10 years old should be evaluated by the Lund-Browder burn chart (see chart)
   c. quick method: the patient's palm is 1% of the total body surface area

Severity

1. Minor:
   a. partial thickness: <15% BSA in adults, <10% BSA in children
   b. full thickness: <2% BSA

2. Moderate:
   a. partial thickness: 15%–25% BSA in adults, 10%-20% BSA in children
   b. full thickness: 2%–10% BSA
3. Major:
   a. partial thickness: >25% BSA in adults, >20% BSA in children
   b. full thickness: >10% BSA
   c. burns of hands, face, eyes, ears, feet or perineum
   d. associated injuries, such as inhalation injury, fractures, other trauma
   e. poor risk patients with underlying disease or suspicion of child abuse

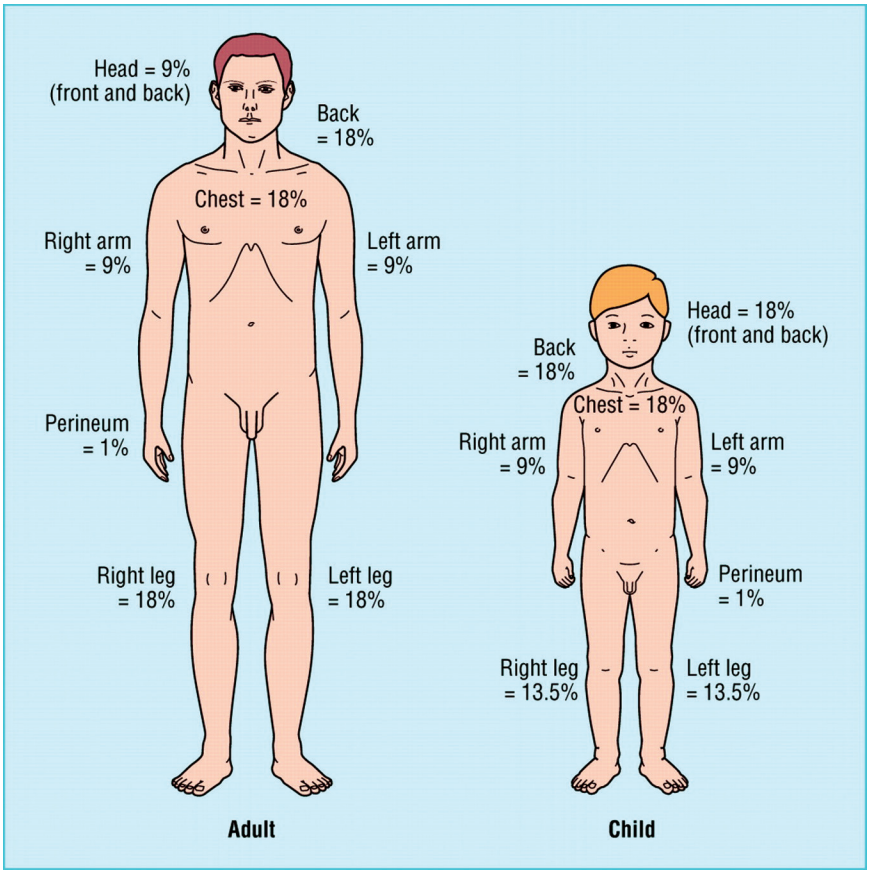
(http://understandingburncare.org/burn-severity.html)

Modified Brooke formula for adults: 2mL/kg/%TBSA. Plan to give ½ of the estimated fluid in the first 8hr.

In children weighing less than 30kg the infusion rate is estimated at 3mL/kg/≥%TBSA. Plan to give ½ of the estimated fluid over the first 8hr. Children will also need maintenance fluids of 5% dextrose in ½ normal saline. This should be given using a rule such as the 4-2-1 rule: 4mL/kg/hr for the first 10kg, 2mL/kg/hr for the next 10kg, and 1mL/kg/hr for the next 10 kg. If a patient's resuscitation has been delayed by a few hours, then give fluid more rapidly.

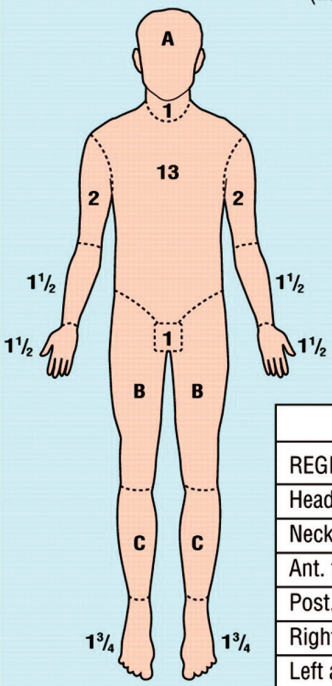
Adjust the initial fluid infusion rate to the urine output. Failure to monitor and record the urine output (catheter or bedpan) and adjust the fluid rate hourly may result in death or severe complications. Adequate urine output is 30–50mL/hr in an adult and 1mL/kg/hr in a child who weighs less than 30kg. If the output is greater, or less than, the target for 2 consecutive hours, decrease, or increase, the IV rate by 20% respectively until the rate is satisfactory.
(Special Operations Forces Medical Handbook, 2nd Edition)

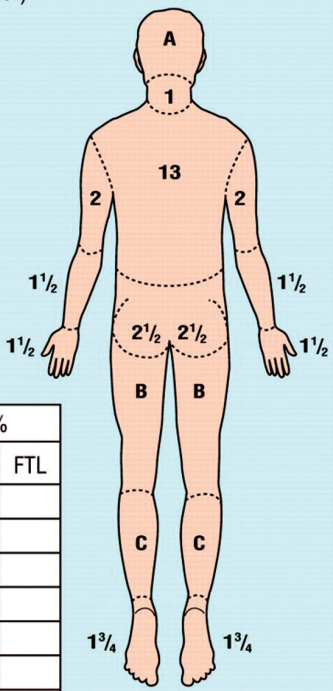
Rule of 10 for Fluid Resuscitation of Burn Victims
1. Initial rate is 10mL per %TBSA per hour for a maximum casualty weight of 80kg.
2. Add 100mL/hr to the rate for each 10kg above 80kg.
3. Example: A 90kg casualty with 50% TBSA burn would receive an initial rate of (10mL × 50)/hr + 100mL/hr or 600mL/hr.


Head = 9%
(front and back)
Back
= 18%
Chest = 18%
Right arm
= 9%
Left arm
= 9%
Perineum
= 1%
Right leg
= 18%
Left leg
= 18%
Adult
Head = 18%
(front and back)
Back
= 18%
Chest = 18%
Right arm
= 9%
Left arm
= 9%
Perineum
= 1%
Right leg
= 13.5%
Left leg
= 13.5%
Child

% Total Body Surface Area Burn

Be clear and accurate, and do not include erythema
(Lund and Browder)





	%	
REGION	PTL	FTL
Head		
Neck		
Ant. trunk		
Post. trunk		
Right arm		
Left arm		
Buttocks		
Genitalia		
Right leg		
Left leg		
Total burn		

AREA	Age 0	1	5	10	15	Adult
A = ½ OF HEAD	9½	8½	6½	5½	4½	3½
B = ½ OF ONE THIGH	2¾	3¼	4	4½	4½	4¾
C = ½ OF ONE LOWER LEG	2½	2½	2¾	3	3¼	3½

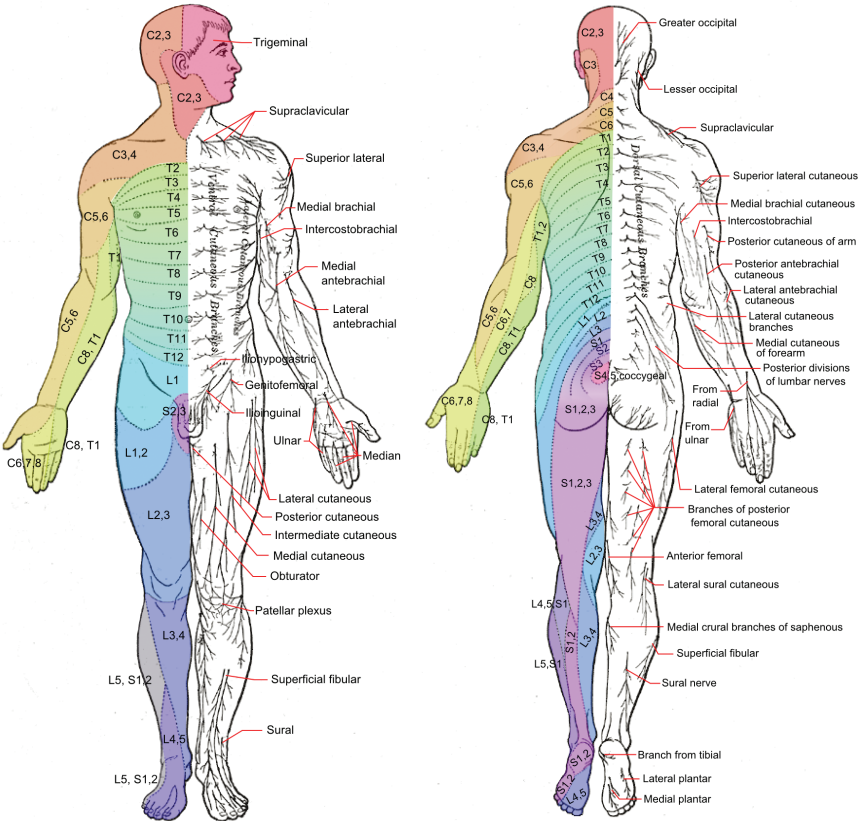
NOTES

SECTION 6
Nerve Charts

NERVE CHARTS

Dermatomes and Cutaneous Nerves

Schematic demarcation of dermatomes.
There is considerable overlap between any two adjacent dermatomes.



Häggström, Mikael. "Medical gallery of Mikael Häggström 2014". Wikiversity Journal of Medicine 1 (2). DOI:10.15347/wjm/2014.008. ISSN 20018762
https://en.wikipedia.org/wiki/Dermatome_(anatomy)

For levels of principal dermatomes, see page 322.

Levels of Principal Dermatomes

- C5 – clavicles
- C5, C6, C7 – lateral parts of the upper limb
- C8, T1 – medial sides of the upper limb
- C6 – thumb
- C6, C7, C8 – hand
- C8 – ring and little fingers
- T4 – level of nipples
- T10 – level of umbilicus
- T12 – inguinal or groin regions
- L1 L2 L3 L4 – anterior and inner services of lower limb
- L4, L5, S1 – foot
- L4 – medial side of big toe
- S1. S2, L5 – posterior and outer surfaces of lower limbs
- S1 – lateral margin of foot and little toe
- S2, S3, S4 – perineum

NERVE TABLE

Sensory/Motor Impairments Related to Level of Spinal Injury

Disc	Root	Reflex	Muscles	Sensation
C4-C5	C5	Biceps	Deltoid Biceps	Lateral arm Axillary nerve
C5-C6	C6	Brachioradialis Biceps	Wrist extension Biceps	Lateral forearm Musculocutaneous nerve
C6-C7	C7	Triceps	Wrist flexors Finger extension Triceps	Middle finger
C7-T1	C8		Finger extension Hand intrinsics	Medial forearm Medial antebrachial cutaneous nerve
T1-T2	T1		Hand intrinsics	Medial arm Medial antebrachial cutaneous nerve
L3-L4	L4	Patellar	Anterior tibialis	Medial leg Medial foot
L4-L5	L5	Internal hamstring (difficult to elicit)	Extensor hallucis longus Peroneus longus	Lateral leg Dorsum of foot
L5-S1	S1	Achilles Internal hamstring External hamstring	Gastrocnemius	Sole of foot Lateral foot

NOTES

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NOTES

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