DOMINATUS COMMINUS REMEMDIUM

Ranger Medic Handbook

Official 2025 Edition

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MEDICAL DIRECTION

Hemorrhage remains the number one cause of preventable death on the battlefield. Evaluate and treat each patient in accordance with protocols. Ranger Medics must apply thought and cannot blindly follow algorithms. Since hemorrhage accounts for approximately 90% of potentially survivable battlefield death, always consider and treat for hemorrhagic shock when in doubt. Although Medics should follow the MARCH algorithm, always ask yourself, "What is killing my patient now?" Act on that question, regardless of the algorithm if there is a clear cause. Patients may stop breathing because of hemorrhage.

Treating hemorrhage remains a higher priority than airway control or breathing assistance.

Ranger Medics will always train and master the basics before pursuing more advanced skills, procedures, or techniques. While these skills are care enhancing, the basics of Tactical Combat Casualty Care (TCCC) will save the most lives on the battlefield.

UPDATES IN THIS ISSUE

1. Rolling a patient with a pelvic binder in place to assess downside wounds is approved so long as the movements are minimal, controlled, and do not cause further harm to the patient. Hemorrhage control supersedes not rolling a patient.
2. Expanded explanation on tension physiology onset time, ventilated vs. spontaneous breathing.
3. Medics are approved to slow-push Calcium in the same access port as blood if no other access is available in extreme situations. Medics should always work toward having a dedicated drug port for trauma patients.
4. In extreme deployed situations, Ranger Medics are approved for slow and controlled re-perfusion of partially filled donation bags (deliberate slow infusion due to risk of citrate concentration in blood stream causing cardiac dysrhythmias).
5. Updates to calcium administration and addition of calcium chloride to the medications.
6. Updates to Pain management protocol
7. Updates to Flail chest management protocol
8. Updates to Anaphylactic shock protocol
9. Separation of UTI and STI protocols
10. Updates to Crush protocols
11. Added Pediatrics TCCC protocols
12. Updates to packing lists

COMMONLY ASKED QUESTIONS

1. TXA may be predrawn into a STERILE 10mL syringe. This should be replaced every 7 days due to bacterial infection risk.
2. Although the prehospital data is not clear at this time it is likely best practice to administer TXA 2g IV/IO flush as the initial dose and then do not redose. Ranger Medics are approved to pre-draw 2g TXA and give this as an initial dose.
3. Finger Thoracostomy is a CLEAN procedure. Do not cut into a patient's chest without cleaning the skin or changing to clean gloves.
4. Chest Tube is a STERILE procedure. Medics and providers will make every attempt to use sterile gloves, chest tubes, and peans to decrease our patient's risk of infection.
5. Backboards are mandated by regulation to carry but have limited proven benefit to spinal patients. Backboards should be used for patient transfer only. No patient should be on a backboard longer than 10 minutes. A rigid litter provides the same care without the risks of pressure ulcers.
6. Both Calcium Gluconate and Chloride are approved for use in the Pre-hospital environment. Calcium administration will be considered after the transfusion of 2 units of blood products and every 4 units after. Calcium should never be prioritized over Blood and TXA in resuscitation efforts. 1–3g of Calcium will be administered as a slow IV/IO push over 1–2 minutes or as an infusion in a 100mL or 250mL NaCl bag.
7. Always reassess your patient and treat based on current or trending vital signs.
8. In hemorrhagic shock the priority and focus of the Ranger Medic should be administering blood products; do not delegate this important task. TXA, calcium, and other adjuncts should not delay blood products.
9. Cold stored blood products will be warmed. In extremis, cold blood is better than no blood, but every attempt must be made to warm blood. **A BLOOD WARMER WILL BE CARRIED.**
10. Your medical direction only comes from those within Ranger Regiment. While we appreciate the experts that give advice and learn from them, they will never dictate your scope of practice. Do not contradict your Ranger medical leadership by following outside advice.
11. The 75th Ranger Regiment does not promote commercial products or companies. No Medic will be mandated to carry a specific product unless a clear, overwhelming, significant advantage can be proven.
12. All fluoroquinolones now have a US Black Box Warning due to serious adverse reactions including tendinitis and tendon rupture, peripheral neuropathy and CNS effects. In some rare cases benefits may outweigh the risks of fluoroquinolone use. Fluoroquinolone use requires prior approval from unit physician or physician assistant with the exception of otic or ophthalmic routes. **DO NOT PRESCRIBE OR DISPENSE THESE MEDICATIONS WITHOUT PRIOR APPROVAL!**
13. Medics will carry diagnostics equipment (BP Cuff, Stethoscope, EMMA, Pulse Oximetry) and spare batteries for their equipment. Medics will be trained on troubleshooting issues with electronics and incorporate patient management should these items fail.

In Memoriam to Our Fallen Ranger Medic Comrades…

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. . . and one for the Airborne Ranger in the Sky.

In recognition of the groundbreaking work of the past Ranger Medic Handbook versions upon which the 2025 version is written.

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2025 RANGER MEDIC HANDBOOK ACKNOWLEDGEMENTS

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SECTION 1

THE RANGER MEDIC & CASUALTY RESPONSE SYSTEMS

Foreword

The 75th Ranger Regiment has been continuously engaged in combat operations since the beginning of the Global War on Terrorism. Since Oct 2001, the Regiment has remained the standard for prehospital care. Ranger medics continue to be at the cutting edge of battlefield medicine driving changes to TCCC. Given the Ranger mission, life-threatening injuries will still be encountered as we continue prosecuting our nation's enemies.

Though we have lost too many Ranger brethren, executing the fundamentals of the unit's casualty response and medical programs has produced astounding results. Based on the principles that have evolved in the last two decades, the 75th Ranger Regiment's standard of medical care is zero preventable battlefield deaths. This hallmark is a direct result of the mastery of the medical fundamentals of individual Rangers, Ranger leaders, and Ranger medical personnel.

The success of Ranger medicine is the success of the 75th Ranger Regiment. The Ranger First Responder, Advanced Ranger First Responder, Ranger Medic, and Ranger leaders integrate casualty scenarios into battle drills. Preventing death does not depend solely on the Ranger Medic but on the effectiveness of the Ranger team to respond to a fallen comrade. The chain of survival starts in training and allows for both success of the mission and care for the casualty.

"Mastery of the Fundamentals" is and always has been a standard to live by within the 75th Ranger Regiment. The mastery of casualty response and medical skills at all levels has saved numerous Ranger lives. Rangers are continuously self-critical and use every training or real casualty scenario to improve themselves. The unit also looks for emerging technology and techniques and swiftly adapts them to the combat environment.

The foundation of the unit's medical programs remains based on the integrated tenets of Tactical Combat Casualty Care (TCCC), innovative medical planning, and casualty response training for Ranger leaders, and when employed to their fullest, saves lives on the battlefield. Through the continuous evolution of our training and equipment programs, the Regiment will always strive to be the tip-of-the-spear for developing the battlefield medicine standard of care for the Infantry and Special Operations communities.

The 75th Ranger Regiment and Ranger Medical Team will continue to hold true the Ranger Creed and the unit charters and complete any mission placed before it.

I will never leave a fallen comrade…

Ranger Medic Charter

Operate as a combat multiplier in highly mobile Ranger units in austere environments, engaging the enemy to protect both casualties and self while enhancing overall mission effectiveness.

A master of the medical fundamentals and skilled practitioner of point-of-injury trauma care, Ranger medics leverage tactical combat casualty care protocols and an advanced skill set to stabilize and evacuate casualties.

An Advanced Tactical Paramedic who assists licensed medical providers with medical emergencies and routine healthcare encountered while in garrison, in training, and during deployments.

Regimental Medical Charter

Provide optimal tactical healthcare support in accordance with TCCC and the Ranger Medic Handbook.

"Absolute Mastery of the Basics"

Train and operate medics who are relatively independent with highly dispersed highly mobile combat formations in an austere environment.

"Advanced skills within a Scope of Practice"

Train and operate medics to move tactically through unsecured areas who can communicate, engage targets, and remain a combat multiplier.

"Be a Ranger on the Battlefield"

Provide training to individual Rangers and leaders to provide first responder care and command/control of casualty response operations.

"Teach and mentor Rangers and Leaders in Combat Medicine"

Evaluate and develop casualty response tactics, techniques, equipment, and procedures as the standard bearer of tactical medicine for the armed forces.

"Set the Standard for the Armed Forces in Tactical Medicine"

Senior Enlisted Medical Advisor (SEMA) Duties & Responsibilities

The SEMA is customarily known as a battalion senior medic and traditionally functions in the capacity of a platoon sergeant. However, in the context of the *Ranger Medic Handbook*, the senior medic duty description will be used to define the responsibilities of the highest ranking and most experienced medic present at any given location and time. This medic is designated as the "senior medic" at that specific location and thus is responsible for the duties and responsibilities as listed below.

- **Principal medical advisor to the commander and senior enlisted advisor**

- **Provide and supervise advanced trauma management within protocols and sick call within scope-of-practice**

- **Lead, supervise, and train junior medics**
  - Individual training
  - Health and welfare
  - Development and counseling
  - Troop leading procedures and precombat inspections (PCIs)

- **Plan, supervise, and conduct casualty response training for Rangers and leaders**
  - Ranger first responder (RFR)
  - Casualty Response Training for Ranger Leaders (CRTRL)
  - Opportunity training/spot-checking

- **Maintain company/platoon-level medical equipment and supplies**
  - Accountability/inventory
  - Maintenance/serviceability
  - PCI of individual Ranger bleeding control kits
  - PCI of squad casualty response kits
  - Requisition and receive Class VIII from appropriate source

- **Plan, coordinate, and execute medical planning for company-level operations**
  - Task organization of company medics
  - On-target casualty response plan
  - CASEVAC from target to next higher medical capability

- **Conduct after action reviews and report and archive medical lessons learned**

- **Monitor the status of health in the unit/element**
  - Physically limiting profiles
  - Command health reporting and tracking
  - MEDPROS data entry and information review

SCOPE OF PRACTICE

CASUALTY RESPONSE SYSTEM – The Regiment's solution for managing combat casualties is to recognize that the problem is solved by the entire unit, not just medics, and that a casualty can occur during any phase of an operation. The principles of the casualty response system are the first responder to a casualty can be any Ranger in the unit; that medical personnel manage casualty care; and that leaders run the mission. When a casualty is incurred, it immediately becomes a component of the unit's mission to extract, treat, and evacuate the casualty while still completing the assigned combat mission as an integrated team. Thus, every member of the unit must maintain first responder medical skills, medics must be highly proficient, and leaders must know how to properly integrate casualty management into any phase of an operation.

RANGER FIRST RESPONDER (RFR) – An RFR is the baseline for all Rangers. This level of training equips all Rangers with treatment skills as a secondary mission to their primary mission role. The RFR medical capability provides a tactical combat casualty care skillset with specific trauma skills. An RFR is always trained and employed in conjunction with a Platoon Medic or higher but has the skillset to provide basic medical interventions independent of any trained medical personnel. This skillset will be trained and verified annually.

The 8 Critical RFR Tasks

CARE UNDER FIRE	**C**ontain Scene and Assess Casualties ○ Return fire and secure scene ○ Direct casualties to cover ○ Evaluate for life-threatening injuries ○ Triage – immediate, delayed, minimal, expectant ○ Call medical personnel for assistance as required **R**apidly Identify and Control Massive Hemorrhage ○ Direct & indirect pressure ○ Tourniquet ○ Emergency trauma dressing
TACTICAL FIELD CARE	**I**nspect and Ensure Patent Airway ○ Open and clear airway ○ Nasopharyngeal airway **T**reat Life-Threatening Torso Injuries ○ Occlusive seal dressing ○ Needle decompression ○ Abdominal wound management **I**nspect for Bleeding, Gain IV Access, Manage Shock ○ Head-to-toe blood sweeps ○ 18-Gauge saline lock ○ IV fluids when dictated by shock ○ Prevent hypothermia
TACTICAL EVACUATION	**C**ontrol Pain and Prevent Infection ○ Combat wound pill pack **A**id and Litter Team ○ Package and prepare for transfer ○ SKEDCO, litters, manual carries **L**eader Coordinated Evacuation ○ Command & control of casualty evacuation integrated with ongoing combat operation ○ Request & coordinate evacuation asset and establish evacuation site (HLZ) ○ Casualty precedence – critical (urgent), priority, routine CASEVAC or MEDEVAC coordination

ADVANCED RANGER FIRST RESPONDER (ARFR) – The ARFR medical capability is a nonmedical Ranger trained on specific first responder medical skills beyond the RFR level, to provide a higher level of trauma response during Ranger operations. This is the highest level of capability for nonmedical Rangers. The ARFR is expected to provide limited scope trauma and emergency care in a tactical or austere setting; they may work independently or in support of a medical provider. They are proficient at advanced medical procedures and basic medication administration.

PLATOON MEDIC – The Ranger Platoon Medic is the minimum standard for an individual serving as sole medical support for a Ranger mission. The Ranger Platoon Medic is a Special Operations-Advanced Tactical Paramedic (SO-ATP). The Ranger Platoon Medic provides advanced emergency medical care for critical and emergent casualties in a tactical setting with a specific focus on trauma for patient care less than 4 hours duration. These personnel are employed in disaggregated operations to ensure tactical elements have adequate advanced trauma medical capabilities. The Ranger Platoon Medic also provides medical support to the platoon outside of tactical operations, is able to treat basic medical conditions independently and difficult medical conditions with oversight or medical direction. Ranger Platoon Medics are responsible for training and validating Ranger First Responders.

COMPANY SENIOR MEDIC – The Company Senior Medic is a Ranger Medic serving in the capacity of Provider-Extender Primary Medic for a Special Operations maneuver element. The Company Senior Medic is expected to independently manage multiple complex traumatic and medical problems on the modern battlefield and in remote or austere conditions. While deployed, the Company Senior Medic independently delivers a selected level of healthcare normally provided by mid-level practitioners. The Company Senior Medic is expected to manage and lead the company level casualty collection point (CCP). The Company Senior Medic is responsible for training and validating Ranger Platoon Medics and Advanced Ranger First Responders.

BATTALION SENIOR ENLISTED MEDICAL ADVISOR – The Battalion SEMA is a Ranger Medic capable of providing critical care and advanced resuscitative care to a Ranger maneuver element. He is an integral member of the Ranger Resuscitation Team who provides far forward critical care for complex trauma and medical patients. The Battalion SEMA is expected to manage and lead the battalion-level CCP. He also trains, validates, and employs all Ranger Medics and nonmedic providers.

DAMAGE CONTROL RESUSCITATION TEAM – The Damage Control Resusitation Team provides a team-based approach capable of providing critical care and advanced procedures during SOF missions. The team is composed of a medical provider and senior medic. The team can care for two critical care patients simultaneously for up to 6 hours while providing advanced airway interventions, ventilation, cardiovascular support, and advanced hemorrhage control.

Ranger Medics provide routine garrison care to include assisting unit medical officers with daily sick call. This requires advanced knowledge in common orthopedic problems, respiratory illnesses, gastrointestinal disorders, dermatological conditions, and environmental hazard illnesses. Ranger Medics train nonmedical personnel on first responder skills and preventive medicine. Ranger Medics conduct their scope of practice under the licensure of a medical director and are not independent healthcare providers. Ranger Medics should always obtain medical director advice and supervision for all care provided. However, on rare occasions Ranger Medics may be required to operate relatively independently with only indirect supervision in remote, austere, or clandestine locations. In these cases, it is still extremely rare that a Ranger Medic will be unable to communicate by radio, phone, or computer.

STANDING ORDERS – Advanced life support interventions, which may be undertaken ***before*** contacting online medical control.

PROTOCOLS – Guidelines for out-of-hospital patient care when a medical director is not locally available. Only the portions of the guidelines that are designated as “standing orders” may be undertaken before contacting an online medical director.

MEDICAL CONTROL/MEDICAL DIRECTOR/MEDICAL OFFICER – This is a licensed and credentialed medical provider, physician or physician assistant, who verbally, or in writing, states assumption of responsibility and liability and is available on-site or can be contacted through established communications. Medical care, procedures, and advanced life-saving activities will be routed through medical control in order to provide optimal care to all sick or injured Rangers. Medical Control will always be established, regardless of whether the scenario is a combat mission, a training exercise, or routine medical care. **Note that, ultimately, all medical care is conducted under the licensure of an assigned, attached, augmenting, or co-located PHYSICIAN.**

STANDING ORDERS AND PROTOCOLS

As published, these standing orders and protocols will be used ONLY by Ranger Medics currently assigned to the 75th Ranger Regiment who have demonstrated competency through Ranger Medic Assessment & Validation (RMAV) and expressly given a scope of practice by their supervising Medical Director.

Purpose

The primary purpose of these protocols is to serve as a guideline for tactical and nontactical pre-hospital trauma and medical care. Quality out-of-hospital care is the direct result of comprehensive education, accurate patient assessment, good judgment, and continuous quality improvement. The protocols contained within this handbook make the following specific assumptions on when and how they are employed.

Ranger Medics may often find themselves in austere tactical environments where evacuation of a unit member to a medical treatment facility for a medical emergency would entail either significant delays to treatment or compromise the unit's mission. The disorders chosen have one of the following properties in common: they are relatively common, acute in onset; the Ranger Medic is able to provide at least initial therapy that may favorably alter the eventual outcome; the condition is either life-threatening or could adversely affect the mission readiness of the injured or ill Ranger; immediate evacuation may not be possible and, even if it is, may still entail significant delays to definitive treatment; and the medical problem may worsen significantly if treatment is delayed. The Ranger Medic will contact a consulting physician as soon as feasible. Treatment will be done under the appropriate protocol.

Medical Director approved medication regimens are designed to provide the Ranger Medic the ability to manage multiple conditions without compromising standards of care. Appropriate documentation of diagnosis and treatment rendered in the patient's medical record will be accomplished when the unit returns to their forward operating base.

Unit Protocols are not designed to conduct Medical/Civic Action (MEDCAP) missions independently. Evacuation recommendations are based on the appropriate therapy per protocol being initiated on diagnosis. The definitions of *urgent, priority*, and *routine* evacuations are based on the times found in Joint Publication 4-02.2 of 2, 4, and 24 hours, respectively.

Unit medical officers use protocols to develop the knowledge base and capability of Ranger Medics during unit sick call. Ranger Medics *should not* perform any step in a standing order or protocol if they have not been trained to perform the procedure or treatment in question.

Emergency, trauma, and tactical medicine continues to evolve at a rapid pace. Accordingly, this document is subject to change as new information and guidelines become available and are accepted by the medical community. The Ranger Medic must continuously expand and sustain his knowledge base.

Standing Orders and Protocols

These standing orders and protocols are for use ONLY by Ranger Medics while providing emergency care under the license of their medical director. Ranger Medics who are authorized to operate under the trauma management team guidelines may not use these standing orders outside of their military employment. Revocation of privileges will be considered by the granting authority if these standards are violated.

Communication

In a case where the Ranger Medic cannot contact medical control due to an acute time-sensitive injury or illness, a mass casualty scenario, or communication difficulties, all protocols become standing orders. *Likewise, in the event that medical control cannot respond to the radio or telephone in a timely fashion required to provide optimal care to a patient, all protocols are considered standing orders. In the event that medical control was not contacted, and treatment protocols were carried out as standing orders, Medical control will be contacted as soon as feasible following the incident and the medical record (Casualty Card, SF 600 or Trauma SF 600) will be reviewed and countersigned by medical control. Retroactive approval for appropriate care will be provided through this process.*

When communicating with medical control, a medical officer, or a receiving facility, a verbal report will include the following essential elements:

1. **Provider –** name, unit, and callback phone number
2. **Patient –** name, unit, age, and gender
3. **Subjective –** findings to include chief complaint and brief history of event
4. **Objective –** findings to include mental status, vital signs, and physical exam
5. **Assessment –** to include differential diagnosis, presumed diagnosis, and level of urgency
6. **Plan –** to include treatment provided, patient response to treatment, and patient status updates

NEVER HESITATE TO CONTACT A MEDICAL DIRECTOR AT ANY TIME FOR ASSISTANCE, QUESTIONS, CLARIFICATION, OR GUIDANCE THROUGH ANY COMMUNICATIONS MEANS AVAILABLE.

Patient Care Documentation

Patient care documentation is of paramount importance and will be performed for every patient encounter using a Tactical Combat Casualty Card, Trauma SF 600 Medical Record, SF 600 Medical Record, or designated electronic health record and transported with the patient to a medical treatment facility or provider. Lack of a card or form is not an excuse for lack of documentation. Rangers Medics will use all resources available to attempt documentation for the next-level provider. Documentation by writing on dressings, tape, or even the patient is completely acceptable if other resources are not available. If time constraints that might delay the evacuation of the patient prevent real time documentation, then the Ranger Medic will document at the first available opportunity.

Medical Personal Protective Equipment (PPE) and Universal Precautions

Medical PPE and the concepts of universal precautions will be used whenever possible and indicated. When the circumstances allow, use a minimum of nonsterile exam gloves. If possible, actions normally considered sterile procedures will be conducted in as clean an environment as can be maintained. Awareness of patient protection from infection must be maintained during the execution of any protocol or procedure. Ranger Medics will conduct precombat inspections of all invasive or sterile materials prior to every mission and replace accordingly.

Resuscitation Considerations

Resuscitation is not warranted in patients who have sustained obvious life-ending trauma or patients with rigor mortis, decapitation, decomposition, or mass casualty situations. When reasonable, consider performing resuscitation efforts when this is your only patient. The perception of fellow Rangers and family members in this instance should be that every effort was made to sustain life.

When possible, use ultrasound to confirm no cardiac activity, or place ECG leads to confirm asystole in three leads and attach a copy of this strip to the medical record. Also note that, technically, only a medical officer can pronounce a patient as deceased. Refer to the protocol *Determination of Death/Discontinuing Resuscitation*.

General Guidelines For Protocol Usage

1. Documentation should not delay the treatment of the injured patient. Life-threatening problems detected during the primary assessment **must be treated first**.
2. Cardiac arrest due to trauma is not treated with medical cardiac arrest protocols. Trauma patients should be transported promptly to the previously coordinated medical treatment facility with control of external hemorrhage, blood product resuscitation, bilateral finger thoracostomies, and other indicated procedures attempted en route. CPR should be a last resort.
3. In patients who require a saline lock or intravenous fluids, only two attempts at IV access should be attempted in the field, then proceed immediately to intraosseous infusion for life-threatening emergencies. Patient transport to definitive care **must never be delayed** for multiple attempts at IV access or other advanced medical procedures.
4. Medics will verbally repeat all orders received and given prior to their initiation. It is preferable that medical personnel work as trauma teams whenever practical.
5. Due to the high level of physical fitness of Rangers and Special Operations personnel, there may be a prolonged period of mental lucidity and apparent stable vital signs despite a severe injury. Always treat the injury at hand and be prepared under the assumption that the patient's condition will worsen.
6. Oxygen is indicated only for respiratory distress or SpO_2 desaturations, and rarely available during a ground tactical operation. If oxygen is available and indicated, the expectation is that a Medic will administer it appropriately.
7. Highly trained Ranger Medics have a clear understanding of the circumstances to determine the appropriate level of protocol usage. During combat operations in an austere environment, a medic will fully utilize the protocols contained within this handbook and within his scope of practice. In the non deployed training environment within CONUS, a Ranger Medic is expected to implement the US standards of care and evacuate to an appropriate medical treatment facility as previously planned. However, whether executing protocols in an austere environment or at a training exercise on a military installation, the goal of the Ranger Medic is to provide the most up-to-date standard of care.

After Action Reviews (AAR) and Ranger Prehospital Trauma Registry (PHTR)

In accordance with RTC 350-29, Ranger medical personnel will submit a casualty after action review for any injury/illness that occurs on a combat target. The timeframe for reporting begins on departing the staging base, through the combat operation, and ends on return to staging base.

Medical personnel are required to submit the casualty AAR no later than 72 hours post mission. Casualty AARs will also be completed for injuries that occurred during the mission but are not reported or observed until after returning to the staging base. All casualty AARs are to be self-critical and lead to medical education. No comments in an AAR will be used in disciplinary matters against a medic.

TACTICAL COMBAT CASUALTY CARE (TCCC)

Trauma is the leading cause of death in the first four decades of life. Current protocols for civilian trauma care in the US are based on the Advanced Trauma Life Support (ATLS) course, which was initially conducted in 1978. Since that time, ATLS protocols have been accepted as the standard of care for the first hour of trauma management that is taught to both civilian and military providers. ATLS is a great approach in the civilian setting; however, it was never designed for combat application.

Historically, most combat-related deaths have occurred in close proximity to the point of injury, prior to a casualty reaching an established medical treatment facility. The combat environment has many factors that affect medical treatment, including temperature and weather extremes, severe visual limitations, delays in treatment and evacuation, long evacuation distances, a lack of specialized providers and equipment near the scene, and the lethal implications of combat weapons. Thus, a modified approach to trauma management must be used while conducting combat operations.

The tactical environment and causes of combat death dictate a different approach for ensuring the best possible outcome for combat casualties while sustaining the primary focus of completing the mission. CAPT Frank Butler and LTC John Hagmann proposed such an approach in 1996. Their article, "Tactical Combat Casualty Care in Special Operations," emphasized three major objectives and outlined three phases of care.

Objectives:	Phases of Care:
✓ Treat the patient	1. Care under fire
✓ Prevent additional casualties	2. Tactical field care
✓ Complete the Mission	3. Combat casualty evacuation (CASEVAC) care

The 75th Ranger Regiment adopted the principles of TCCC in the late 1990s and institutionalized them with training programs prior to combat operations in Afghanistan and Iraq. Today, mastering the basics of TCCC remains the bedrock of the Ranger Medic. This, along with casualty response training for Ranger leaders and dedication to meticulous medical planning, produces astounding casualty survival rates on the modern battlefield.

Care Under Fire

Care under fire is the care rendered by the first responder or combatant at the scene of the injury while they are still under effective hostile fire. Available medical equipment is limited to that carried by the individual or by the medical provider in their aid bag.

Major goals of CUF are to move the casualty to safety, prevent further injury to the casualty and provider, stop life-threatening external hemorrhage, and **gain and maintain fire superiority – the best medicine on the battlefield!**

Tactical Field Care

Tactical field care is the care rendered by the first responder or combatant once they are no longer under effective hostile fire. TFC may consist of rapid treatment of the most serious wounds with the expectation of a re-engagement with hostile forces at any moment, or there may be ample time to render whatever care is possible in the field. It also applies to situations in which an injury has occurred but there has been no hostile fire. Available medical equipment is still limited to that carried into the field by unit personnel. Time to evacuation to a medical treatment facility may vary considerably. Remember – effective hostile fire could resume at any time.

Tactical Evacuation Care

Tactical evacuation care is the care rendered once the casualty has been picked up by an aircraft, vehicle, or boat. Additional medical personnel and equipment that may have been pre-staged should be available in this phase of casualty management. The term "tactical evacuation" encompasses both casualty evacuation (CASEVAC) and medical evacuation (MEDEVAC).

TCCC Concepts

Casualty scenarios in combat usually entail both a medical problem and a tactical problem. We want the best possible outcome for both the casualty and the mission. Good medicine can sometimes be bad tactics; bad tactics can get everyone killed or cause the mission to fail. Doing the RIGHT THING at the RIGHT TIME is critical.

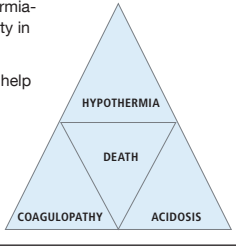
Hypotensive Resuscitation

Goals of Fluid Resuscitation Therapy: (1) improved state of consciousness, (2) palpable radial pulse, and (3) avoid over resuscitation of shock. Basing the titration of fluids upon a monitored physiologic response may avoid the problem of excessive blood pressure elevation and fatal rebleeding from previous clotted injury sites. **BLOOD** and blood products are the only fluids for trauma resuscitation.

Preventing the Trauma Lethal Triad

Hypothermia is a significant concern in any trauma victim because it leads to hypothermia-induced coagulopathy by both decreasing platelet function and slowing enzyme activity in the coagulation cascade.

Prevention of hypothermia, along with hemorrhage control and fluid resuscitation, will help maintain the casualty's ability to generate heat.



NOTES

SECTION 2

PRIMARY TRAUMA PROTOCOLS

Triage

Triage is the process of sorting casualties into groups based on their need for or likely benefit from immediate medical treatment. Obviously, all casualties need treatment. However, accurate triage aids the provider in deciding which casualties have the greatest likelihood of survival if immediate care is rendered and which casualties can wait until the immediate care is completed. Triage ensures the greatest care for the greatest number and the maximal utilization of medical personnel, equipment, evacuation, and facilities. At any location or CCP, the most experienced provider assumes the role of triage officer. All casualties, including traumatic brain injury, must be assumed to have multisystem trauma until proven otherwise

Triage is a dynamic and continuous process that must continue as the casualty's status changes.

TCCC Application

Care Under Fire: CUF is primarily self-aid and buddy-aid. If a patient is conscious, then direct to seek cover and provide self-treatment. If a patient is nonresponsive, when tactically feasible, move the patient to cover. Address only immediate life threatening hemorrhage if possible. Continue the mission/fight. Leave a Ranger buddy or report the GPS location of any patients who are separated from the maneuver element for later recovery.

Tactical Field Care: Direct all casualties through a choke point and triage into the CCP to provide appropriate treatment and accountability. Perform initial tactical trauma assessments on casualties. Separate casualties into four distinct categories using the UPR method. If a casualty can walk and talk (can follow instructions or describe injuries), then they are most likely going to be categorized as "routine." Routine casualties should tend to their own wounds if possible. Routine casualties may also assist with other casualties. If a casualty has obvious signs of death, then they should be categorized as "expectant." Casualties who require life-saving interventions, cannot obey simple commands, have abnormal (or no) radial pulses, or are in respiratory distress are categorized as "urgent." All others will most likely fall into the "priority" category. As soon as initial triage is completed, the primary effort is the life-saving interventions for the urgent casualties. When moving from patient to patient, each is rendered a complete trauma assessment in a head-to-toe-treat-as-you-go manner. When the provider has completed with one category group, he moves to the next. The provider should return to the urgent category group routinely, or after each other group is completed, to assess and provide continued resuscitation as needed. When all category casualties have been completed, the provider starts over with the urgent group and cycles back through all casualties in each category. Triage is a constantly continuing process until all casualties have been evacuated. In some cases, depending on injuries, interventions completed, or emerging complications, a casualty may be downgraded to a lower category or upgraded to a higher category. There may be instances of a small number of casualties in which a single patient is obviously expectant while others are obviously minimal. In this case, a patient normally classified as expectant may be the focus of your attention. This action is for the benefit of the patient's comrades in that you attempted everything possible to save his life. Expectant casualties receive comfort measures and pain medications.

Tactical Evacuation: Triage is again conducted as casualties are packaged and prepared for evacuation. In this phase, triage is categorized into evacuation precedence of urgent, priority, or routine. Urgent casualties are those who require surgical or advanced medical intervention within 2 hours to save life, limb, or eyesight. Priority casualties are those who require evacuation to a higher level of care within 4 hours. Routine casualties are those who remain including minimal, expectant, and depending on the tactical situation, KIA, or DOW. Some minimal casualties may not require evacuation and can exfiltrate with the unit for further medical treatment upon return to base. It is critical that the Medic has a good understanding of the evacuation assets/capabilities and receiving facility's capabilities. When evacuation is imminent, casualties should be arranged in evacuation precedence keeping in mind the capability of the evacuation asset. In cases of a small asset (MEDEVAC or MH60) that can carry only a few of your casualties, then urgent casualties are loaded and evacuated first while remaining casualties are evacuated on subsequent turns of the asset. In cases of a large asset (MH47), then priority litter casualties are loaded first followed by urgent litter casualties. This is so that the urgent casualties will be the first unloaded at the receiving facility. Minimally or walking wounded are loaded last. In all cases, the evacuation medical provider will override the ground Medic in casualty loading based on placement of resuscitation equipment on the vehicle or aircraft.

Extended Care: Triage continues through extended care as casualty conditions may improve or deteriorate and require less or more medical care over time. TCCC management does not stop until a casualty is turned over to an equal or higher level of care.

Triage Categories & Evacuation Precedence

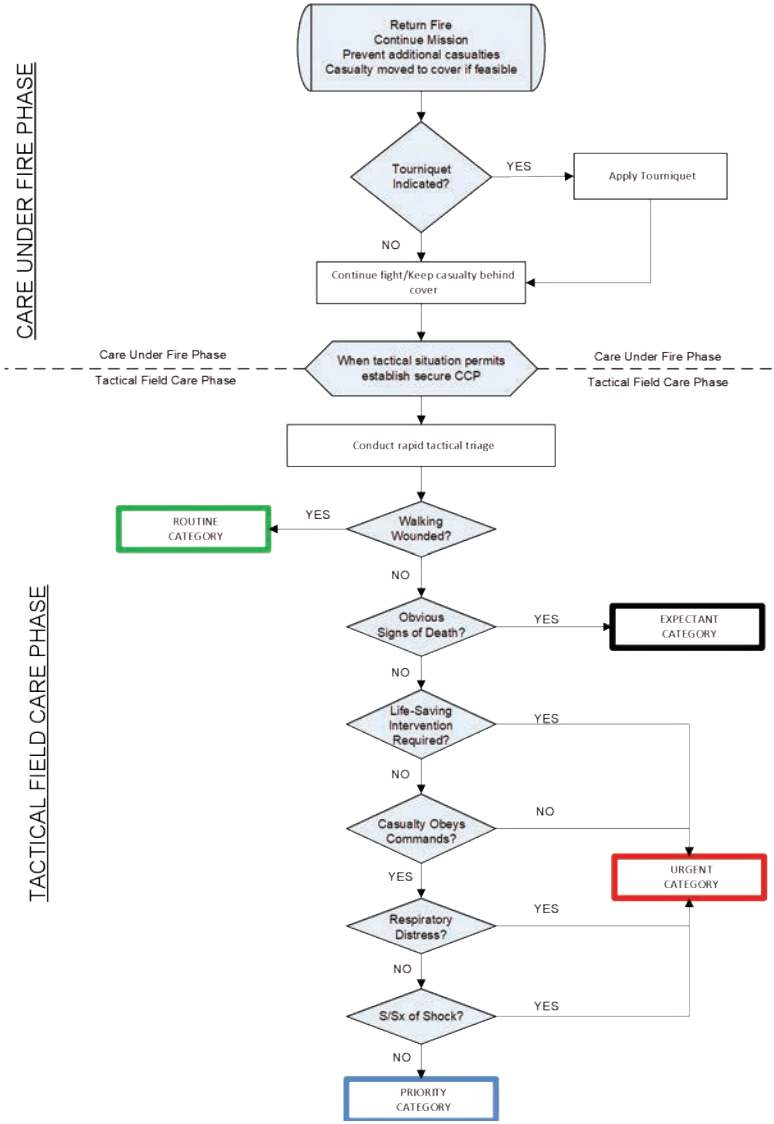
Urgent: This category includes those casualties who require an immediate life-saving intervention or surgery. Example casualties include those who are hemodynamically unstable and those who have airway complications, chest or abdominal injuries, massive external hemorrhage, shock, or burns > 20% TBSA. Casualties require evacuation within 2 hours.

Priority: This category includes those wounded who may need surgery but whose condition permits delay in treatment without unduly endangering life, limb, or eyesight. Example casualties include those with no evidence of shock, large soft tissue wounds with controlled bleeding, fracture s of major bones, torso wounds with controlled bleeding, or burns < 20% TBSA. Casualties require evacuation within 4 hours.

Routine: This category is for casualties often referred to as the walking wounded. These casualties have minor injuries such as small burns, lacerations, abrasions, and small bone fractures. Casualties require evacuation within 24 hours.

Expectant (Routine): This category is for casualties who have wounds so extensive that even if they were the only casualty, they would have little hope for survival. Examples of expectant casualties are those who are unresponsive with massive penetrating head trauma, massive torso trauma, or no signs of continued life.

Tactical Triage Protocol



Tactical Trauma Assessment

Patient Assessment

Follow TCCC Guidelines of Care Under Fire, Tactical Field Care, and Tactical Evacuation Care.

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

Massive hemorrhage – control life-threatening bleeding.
Airway – establish and maintain a patent airway.
Respiration – decompress suspected tension pneumothorax, seal sucking chest wounds, and support ventilation/oxygenation as required.
Circulation – establish IV/IO access and administer blood products 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.

TCCC Application

Care Under Fire: Return fire and take cover. Direct or expect casualty to remain engaged as a combatant if appropriate. Direct casualty to move to cover and apply self-aid if able. Try to keep the casualty from sustaining additional wounds. 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. Tactical patient assessment during this phase is limited to identifying life-threatening hemorrhage in a rapid head-to-toe survey taking less than 10–15 seconds or as tactically feasible. Airway management, other than positioning, is generally best deferred until the tactical field care phase. Stop *life-threatening* external hemorrhage if tactically feasible with an approved tourniquet.

Tactical Field Care: Consolidate casualties in CCP. Initially, conduct triage to identify which patient needs attention first and who can wait. Identify any life-threatening hemorrhage not already controlled. In this phase, the first priority is to conduct a rapid trauma assessment. A more deliberate and traditional head-to-toe MARCH survey is completed on each casualty after all life threats have been addressed. Casualties with an altered mental status should be disarmed immediately, including communications equipment. Injuries are managed in a head-to-toe-treat-as-you-go manner. Triage recurs during this entire phase. Delegate treatment of minor injuries to ARFRs or RFRs, freeing the Medic to focus on more seriously injured. Provide instructions to ARFRs or RFRs if tasked to assist you with multisystem trauma casualties. Communicate casualty status and evacuation requirements to C2. Consolidate medical supplies in CCP. Prepare and package casualties for evacuation.

Tactical Evacuation: After evacuation movement, reassess patient's mental status, airway, vital signs, and any interventions.

Trauma Assessment Principles

Massive Hemorrhage: Obvious external sources of bleeding should be controlled with tourniquets, direct pressure, and pressure dressings. Clamping of injured vessels is not indicated unless the bleeding vessel can be directly visualized. Sources of internal hemorrhage should be identified. Initial tourniquets are to be placed "high and tight." Effort should be made to convert these as distally as possible or to a pressure dressing as soon as the tactical situation allows.

Airway: A conscious and spontaneously breathing patient rarely requires immediate airway intervention. If the patient is able to talk normally, then his airway is intact. If the patient is semiconscious or unconscious, the tongue is the most common source of airway obstruction. Patient positioning and airway adjuncts (NPA/OPA) should be the first choice to maintain a patent airway. Ranger Medics train extensively in order to proficiently conduct a surgical cricothyroidotomy. This should be the first choice for any patient requiring a definitive airway. Penetrating trauma causing C-spine fractures is almost universally fatal. One should consider C-spine fracture in blunt trauma and take appropriate precautions.

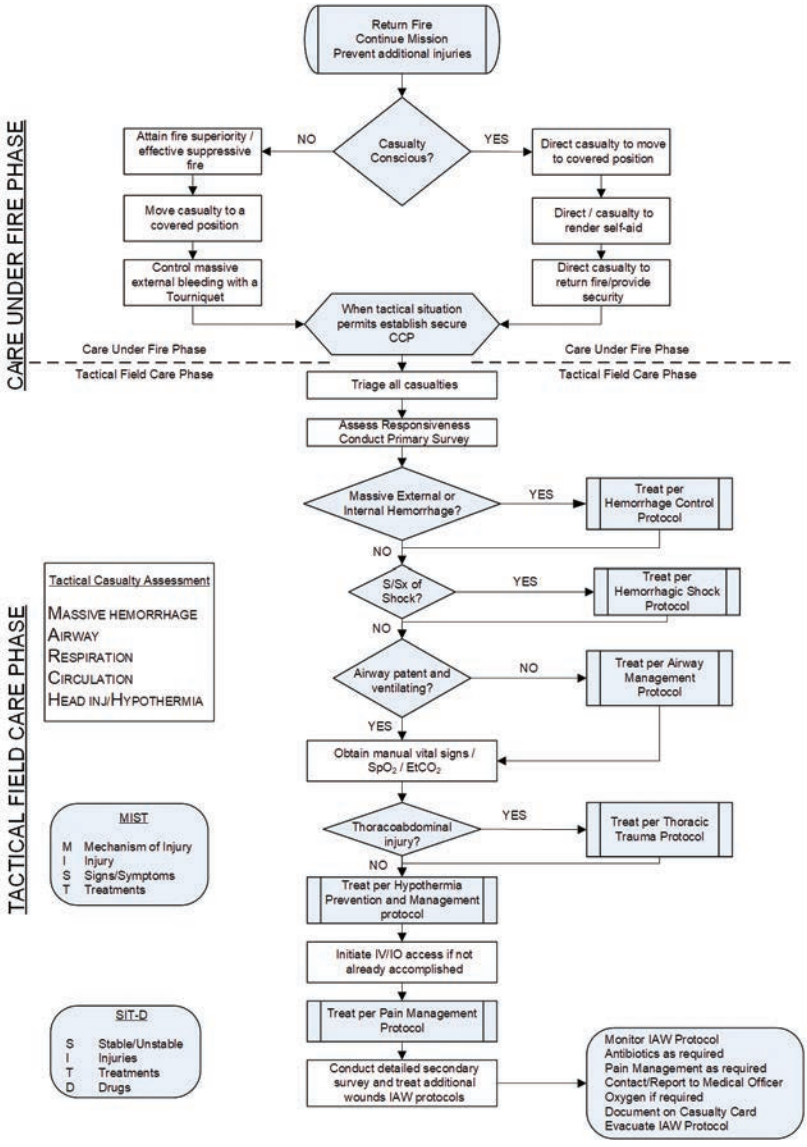
Respirations: In the conscious patient, who is alert and breathing normally, no interventions are required. If the patient has an appropriate mechanism of injury and signs of respiratory distress such as tachypnea, dyspnea, or cyanosis, which may be associated with agitation or decreasing mental status, then a presumption of tension pneumothorax management is indicated.

Circulation: Important information can be rapidly obtained regarding perfusion and oxygenation from the level of consciousness, pulse, skin color, and capillary refill time. Decreased cerebral perfusion may result in an altered mental status. Skin color and capillary refill will provide a rapid initial assessment of peripheral perfusion. Pink skin is a good sign versus the ominous sign of white or ashen, gray skin depicting hypovolemia. Pressure to the thumb nail or hypothenar eminence will cause the underlying tissue to blanch. In a normovolemic patient, the color returns to normal within 2 seconds. In the hypovolemic, poorly oxygenated patient and/or hypothermic patient, this time period is extended or absent.

Head Injury/Hypothermia: Clothing and protective equipment such as helmets and body armor should only be removed as required to evaluate and treat specific injuries. If the patient is conscious with a single extremity wound, only the area surrounding the injury should be exposed. Unconscious patients may require more extensive exposure in order to discover potentially serious injuries but must subsequently be protected from the elements and the environment. Hypothermia is to be avoided in trauma patients. A brief neurological assessment should be performed, and LOC can be described through, preferably, AVPU or, alternately, the Glasgow Coma Scale (GCS) method. If the pupils are found to be sluggish or nonreactive to light with unilateral or bilateral dilation, one should suspect a head injury and/or inadequate brain perfusion. Assess for any fractures or deformities of extremities or joints.

Vital Signs: Vital signs should be assessed frequently, especially after specific therapeutic interventions, and before and after moving patients. As a group, Ranger patients are in excellent physical condition and may have tremendous physiological reserves. They may not manifest significant changes in vital signs until they are in severe shock. Technology can fail, and Ranger Medics must be capable of obtaining manual vital signs. $EtCO_2$ monitors attached to a facemask are inaccurate; the trend is often more important than the number.

Tactical Trauma Assessment



Hemorrhage Management

Hemorrhage Control

Extremity trauma hemorrhage is the most frequent cause of preventable combat death, which can generally be prevented by the early use of a tourniquet. The use of compression dressings and/or hemostatic agents to control bleeding or convert tourniquets is imperative in continued casualty management. For internal or uncontrollable hemorrhage of the chest or abdomen, the most crucial life-saving intervention is rapid evacuation to a surgical capability. Measures that will enhance the possibility of survival of these casualties are early resuscitation with blood products, avoidance of aggressive crystalloid/colloid fluid resuscitation, prevention of clotting dysfunction caused by hypothermia and acidosis, and avoidance of platelet-impairing medications.

TCCC Application

Care Under Fire: Stop *life-threatening* external hemorrhage if tactically feasible. Direct casualty to control hemorrhage by self-aid/buddy-aid if able. Use a CoTCCC-recommended tourniquet for hemorrhage that is anatomically amenable to tourniquet application. Apply the tourniquet proximal to the bleeding site, over the uniform, tighten, and move the casualty to cover. Initial tourniquet placement should be as high as possible on the limb.

Tactical Field Care & Tactical Evacuation: Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2–3 inches above wound and never over a joint. For compressible hemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than 2 hours), use a pressure dressing with a hemostatic agent. Hemostatic gauze should be packed into cavitation of wound with at least 3 minutes of direct pressure. Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitation efforts (i.e., a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury). Reassess prior tourniquet application. Expose wound and determine if tourniquet is needed. If so, move tourniquet from over uniform and apply directly to skin 2–3 inches above wound. If a tourniquet is not needed, use other techniques to control bleeding. When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse. Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use a permanent marker.

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

Advanced Hemorrhage Control: Consider the early use of a junctional tourniquet for high femoral or axillary bleeding not amendable to tourniquet application. Any improvised junctional technique must be trained and practiced to ensure proper application. Other advanced hemorrhage control techniques such as REBOA should only be performed by those with extensive training and experience in the individual tasks required to successfully complete the procedure.

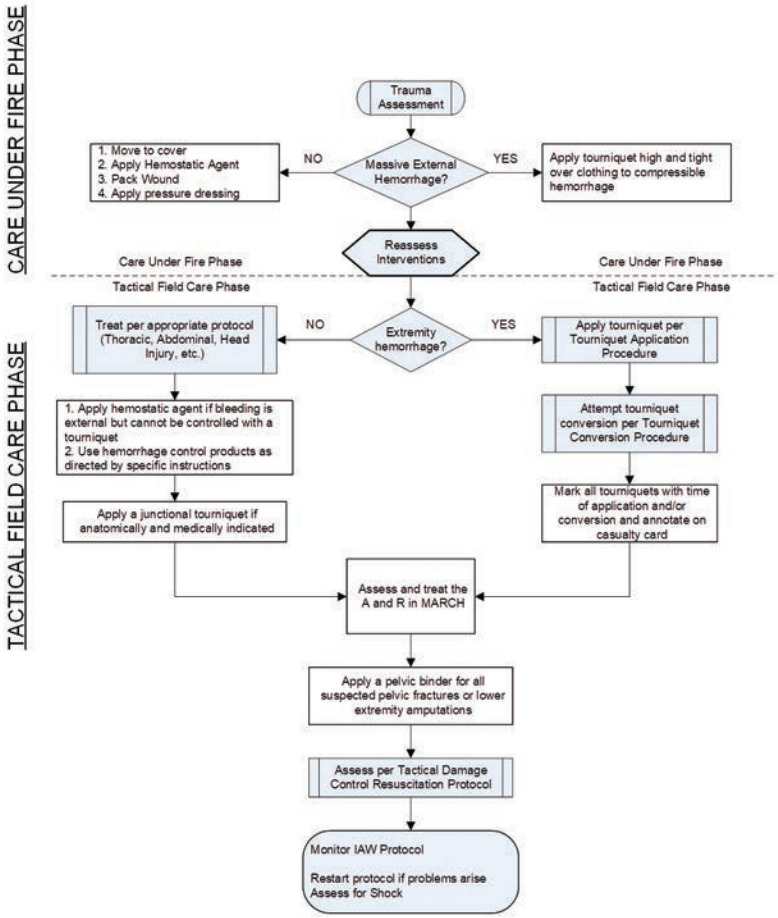
Extended Care

Tourniquet Conversions: If a tourniquet is applied, loosened, or reapplied, ensure the approximate time is recorded on the tourniquet and the casualty card. Reevaluate all applied tourniquets for efficacy and further need. Perform tourniquet conversion procedure as applicable, as early as possible, and if hemorrhage control is achieved otherwise. **This has never been more important given extended casualty evacuation times.**

Wound Management: Change and/or reinforce all hemorrhage control dressings as applicable and dependent on medical supplies. Irrigate and redress wounds (any potable water can be used for irrigation). Debride only **obviously** devitalized tissue. Change dressings every 24 hours or as needed. Consider converting to silver impregnated dressings to reduce frequency of dressing changes. Continue antibiotics. Repeat moxifloxacin 400mg PO or ertapenem 1g IV/IO/IM q24hr.

Abdominal Injuries: Control any visible hemorrhage from bowel. Irrigate gross debris off of exposed bowel. Attempt to gently reduce bowel back into abdominal cavity. If bowel is reduced, approximate skin (sutures or staples) and cover abdominal wound with dressing. If bowel is unable to be reduced, cover bowel with moist dressing and keep covered.

Hemorrhage Control Protocol

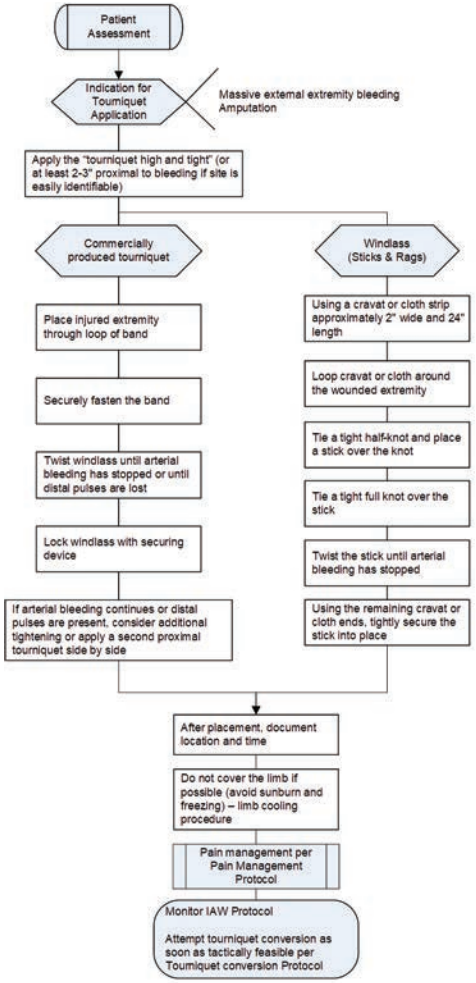


1. If bleeder is visualized or palpated, apply hemostatic agent directly to site.
2. For truncal bleeding, assume the possibility of intra-abdominal and thoracic injury.
3. If a tourniquet is applied, loosened or re-applied, ensure the approximate time is recorded on the tourniquet and the casualty card.
4. Lower extremity injuries often require a second tourniquet proximal to the initial tourniquet.

All hemorrhage control measures should be confirmed and reconfirmed to be intact before and after any movement of patient.

TRANEXAMIC ACID ADMINISTRATION:
If a casualty is anticipated to need a blood transfusion (eg; presents with hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding). Administer 2g of tranexamic acid IV/IO flush.

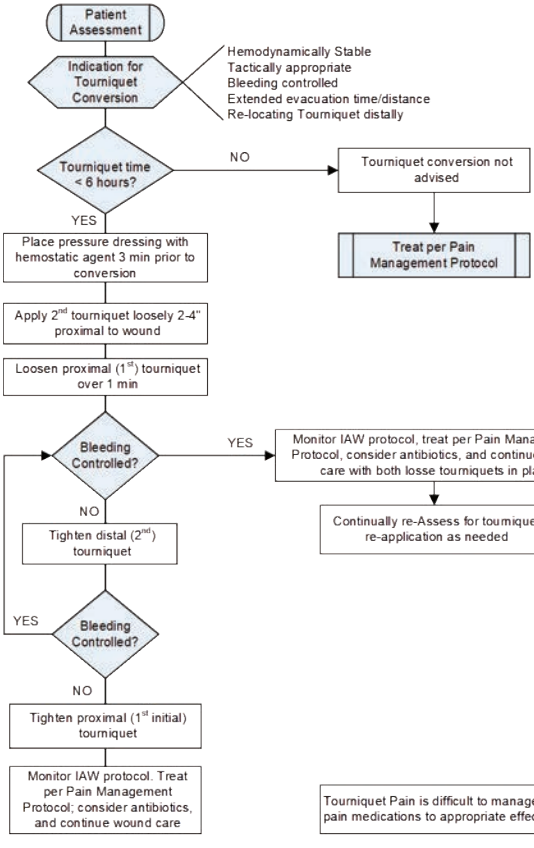
Tourniquet Application Procedure



DOCUMENTATION:
- Detailed assessment
- Vital signs
- SpO_2
- Complications encountered
- Time TQ placed

1. Depending on injury patterns, consider assessment of tourniquet tightness by eliminating a distal pulse as opposed to only stopping arterial bleeding.
2. Initial CUF tourniquets are to be placed as high and tight as possible on long bones of extremities to ensure adequate hemorrhage control during rapid evacuation. When feasible, such tourniquet applications should be converted 2-3" proximal to the wound directly over the skin.
3. Tourniquet pain is difficult to manage – titrate pain medication to desired effect. Do not allow casualty to loosen for pain relief.
4. Tourniquet Conversion is to only be performed by a Ranger Medic or ARFR.

Tourniquet Conversion Procedure



EQUIPMENT NEEDED:
- Tourniquet
- Pressure dressing

DOCUMENTATION:
- Detailed assessment
- Vital signs
- Date/Time of procedure
- Skin color
- Capillary refill
- Response to procedure
- Complications encountered

Airway Management

Airway management must be of prime concern for any trauma casualty. The setting, conditions, and injuries must be taken into account for every casualty. In the tactical setting, hemorrhage control and shock resuscitation are more important than definitive airway management. Aggressive airway management is warranted in some casualties. However, in many casualties, simple repositioning of an airway may solve airway, breathing, and oxygenation problems. Assess every patient's airway based on the setting, patient condition, and patient's pending condition and take the appropriate action. **A patient who can breathe on his own should be allowed to breath on his own unless the injury pattern or predicted clinical course warrants a more aggressive action.**

TCCC Application

Care Under Fire: Airway management, other than patient positioning, is generally best deferred until the Tactical Field Care phase.

Tactical Field Care:

Unconscious casualty without airway obstruction:

- Inspect oropharynx and remove any foreign body from airway or lip. Do not conduct blind finger sweeps.
- Chin-lift or jaw-thrust maneuver
- Nasopharyngeal airway
- Place casualty in the recovery position

Casualty with airway obstruction or impending airway obstruction:

- Inspect oropharynx and remove any foreign body from airway or lip. Do not conduct blind finger sweeps.
- Chin-lift or jaw-thrust maneuver
- Nasopharyngeal airway
- Allow casualty to assume any position that best protects the airway, including sitting up
- Place an unconscious casualty in the recovery position.
- If previous measures are unsuccessful: surgical cricothyroidotomy (with pain control if conscious)

Tactical Evacuation: With every evacuation movement of a casualty, confirm airway placement and reassess airway patency.

Unconscious casualty without airway obstruction:

- Inspect oropharynx and remove any foreign body from airway or lip. Do not conduct blind finger sweeps.
- Chin-lift or jaw-thrust maneuver
- Nasopharyngeal airway
- Place casualty in the recovery position

Casualty with airway obstruction or impending airway obstruction:

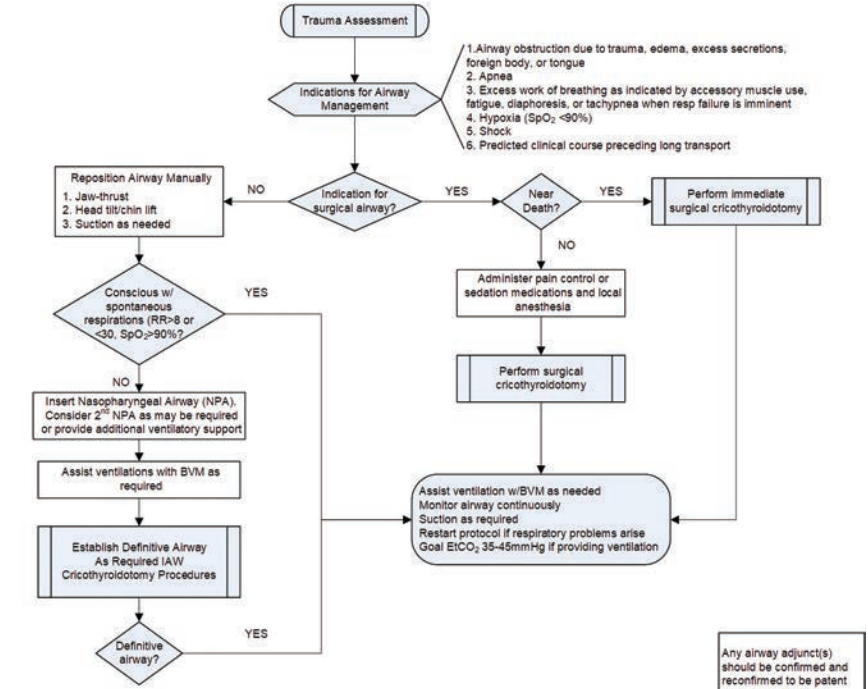
- Inspect oropharynx and remove any foreign body from airway or lip. Do not conduct blind finger sweeps.
- Chin-lift or jaw-thrust maneuver
- Nasopharyngeal airway
- Allow casualty to assume any position that best protects the airway, to include sitting up
- Place unconscious casualty in the recovery position
- If above measures are unsuccessful:
  - ➢ Surgical cricothyroidotomy (with pain control if conscious)
  - ➢ Supraglottic airway

Spinal immobilization is not necessary for casualties with penetrating trauma.

Extended Care

1. Monitoring: Maintain continuous pulse oximetry and $EtCO_2$; document serial vital signs.
2. Verify airway patency and with any evacuation or movement of the patient.
3. Suction: Consider periodic suctioning of the oropharynx and established airway tube.
4. Ventilation: The SAVe II Ventilator is a small, lightweight ventilator that automatically recommends ARDSnet lung protective settings based on the patient's height. The default settings do not have PEEP and Medics must manually set the vent to a PEEP of 5 at a minimum. The SAVe II does not require an external O_2 source, but supplemental O_2 can be attached and set at no higher than 6L/m, which provides 62% oxygen. Any ventilator battery lasts for a limited amount of time. For extended periods, consider alternating between a ventilator and BVM assisted ventilations with an attached PEEP valve. **Keep in mind that positive pressure ventilation is a known cause of tension pneumothorax.**
5. Consider local wound care and further securing of cricothyroidotomy site if applicable.

Airway Management Protocol



Any airway adjunct(s) should be confirmed and reconfirmed to be patent before and after any movement of patient.

Glasgow Coma Scale

Eye Opening	Spontaneous	4
	To Voice	3
	To Pain	2
	None	1
Verbal Response	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Words	2
	None	1
Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraws (Pain)	4
	Flexion	3
	Extension	2
	None	1

Document as: E___ + V___ + M___ = ___

Airway Placement Verification

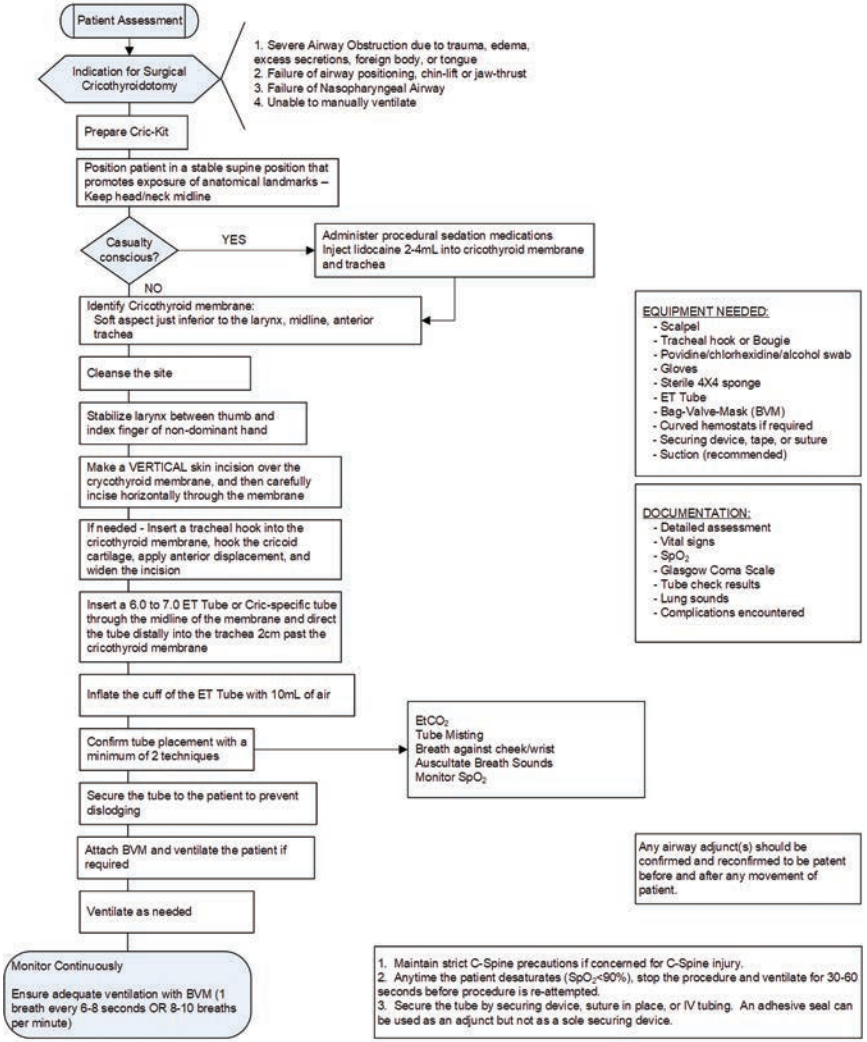
Visualization
Misting of the tube
Auscultation
End tidal CO_2 monitor
Increase in SpO_2 if hypoxic

* DO NOT rely on auscultation or visual misting as sole placement confirmation.

DOPE

D Dislodgement – Check tube placement
O Obstruction – Consider suctioning
P Pneumothorax – Consider NCD
E Equipment failure – Disconnect vent and BVM

Surgical Cricothyroidotomy Procedure



Thoracic Trauma Management

Thoracic Trauma

Penetrating and blunt chest trauma remains a threat regardless of the use of body armor. The primary life-threat that is preventable is tension pneumothorax. Always consider presumptive diagnosis of tension pneumothorax when progressively worsening respiratory distress develops in a casualty with a known or suspected torso trauma. The late signs of decreased breath sounds, tracheal deviation, and jugular vein distention may not always be present and may be difficult to assess on the battlefield. Relief of tension pneumothorax requires release of air under pressure within the chest cavity. Constant reassessment of patients with chest trauma is imperative to identify progression or reemergence of tension pneumothorax. The management of an open chest wound with an occlusive dressing sealing the wound may lead to the development of a pneumothorax. Once sealed, patients must be monitored for development of tension pneumothorax. Continued assessment for hemothorax, flail segments, or cardiac tamponade should follow management of tension.

TCCC Application

Care Under Fire: No specific action.

Tactical Field Care: In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with at least a 14-G, 3.25-inch needle/catheter inserted in the 5th intercostal space, anterior axillary line (preferred), or second intercostal space, mid clavicular line (secondary site). Ensure that the needle entry into the chest is not medial to the nipple line and is not directed toward the heart. All open and/or sucking chest wounds should be treated by immediately applying an occlusive material to cover the defect and securing it in place. Monitor the casualty for the potential development of a subsequent tension pneumothorax. Casualties with evidence of torso trauma and no vital signs should have bilateral needle decompression or finger thoracostomy (preferred) performed to ensure they do not have a tension pneumothorax prior to all resuscitation efforts being halted.

Tactical Evacuation: Consider finger thoracostomy or chest tube insertion if multiple needle decompressions, no improvement, life-threatening complications and/or long transport is anticipated. Most combat casualties do not require supplemental oxygen, but administration of oxygen may be of benefit for the following types of casualties: low oxygen saturation, injuries associated with impaired oxygenation, casualties with TBI (maintain oxygen saturation > 95%), casualties in shock, and casualties at altitude.

Extended Care

Reassess patient for development of tension pneumothorax. Consider finger thoracostomy or chest tube if: patient requires multiple needle decompressions **OR** no improvement with needle decompression **OR** evacuation time is prolonged (> 1 hour) **OR** evacuation requires transport at high altitude in unpressurized aircraft. If available, provide oxygen as needed to maintain O_2 saturation > 90% (> 95% and < 100% for TBI). Apply negative pressure to chest tube if available, not exceeding –20cm H_2O. Consider rib blocks for pain management. If patient is being ventilated, maintain strict bagging cycles (1 breath every 5 seconds) and a tidal volume of approximately 500mL to allow for complete exhalation and avoid stacking breaths. Always use a PEEP valve when bagging. Consider the use of a ventilator if available and add physiologic PEEP (3–5cm H_2O). Consider sedation for casualties requiring prolonged intubation/ventilation if no shock or hypotension. If a sufficient supply of chest seals are available, then consider removing seals, "burping" wounds, and resealing with a new occlusive dressing. Resuscitative fluids should be managed very conservatively unless there is significant blood lost from other injuries. Regardless, manage resuscitation fluids only to maintain a systolic pressure of 90–100mmHg, radial pulse, and/or mentation.

Flail Chest Management: Casualties with flail chest can present with tachypnea and eventual hypoxia due to shallow breaths. The primary treatment for flail chest is PAIN CONTROL to allow the casualty enough relief for sufficient inspiration and oxygenation. This will prevent respiratory fatigue. If unable to improve vitals with pain management, consider alternate etiology for symptoms (pneumothorax, hemorrhagic shock, hemothorax etc). If alternate etiologies for respiratory distress have been ruled out and/or treated, and casualty continues to demonstrate signs of severe fatigue, consider systemic analgesic and sedation, placement of a surgical airway, and mechanical ventilation.

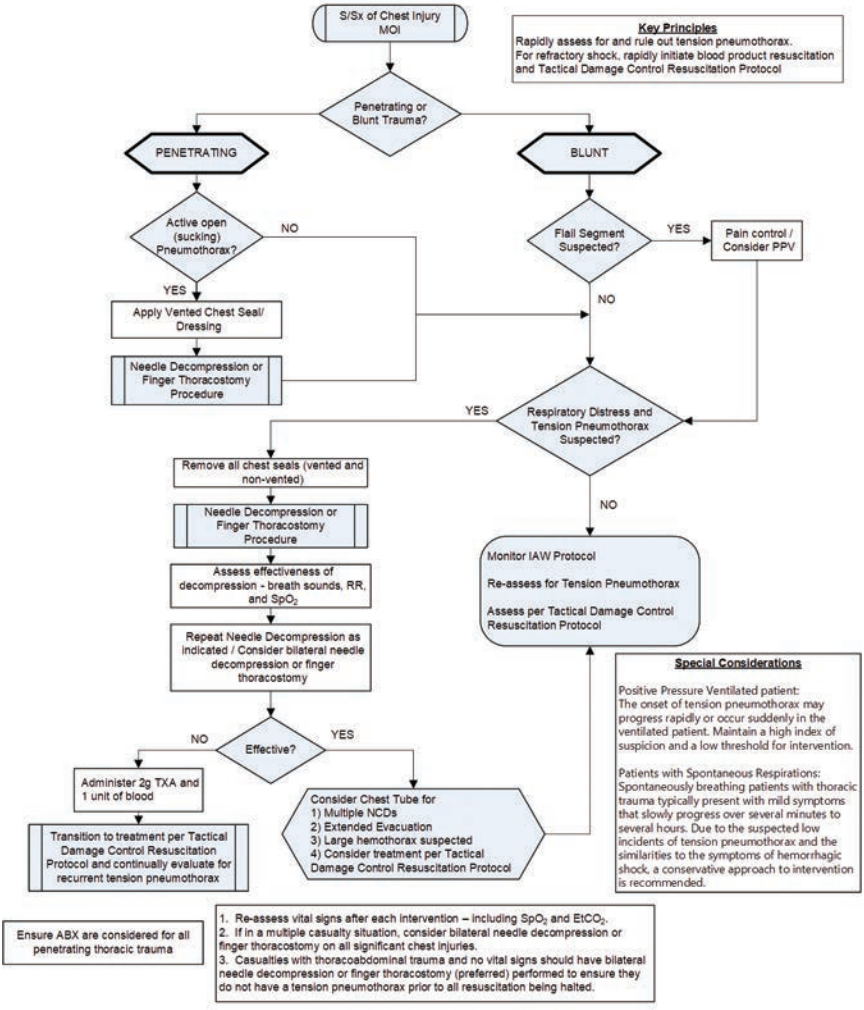
Hemothorax: Identification of hemothorax is difficult to assess in the field. MOI, reduced breath sounds, difficulty breathing, and unexplained shock should lead to suspicion of hemothorax. Rapid evacuation to surgical capability, ventilation support, judicious fluid therapy, and chest tube are indicated for hemothorax. If continuous output from the chest tube is > 200–250cc/hr over the first 4 hours, there is a very high likelihood of intrathoracic vascular injury that requires surgical intervention. If evacuation capabilities are significantly delayed or blood products are limited, high output chest tube drainage may require re-triage of casualty and consideration for transition to expectant/palliative care.

Cardiac Tamponade: Bleeding or fluid collection into the pericardium may often be expected from hard frontal trauma to the chest or small puncture wounds creating compression on the heart. Little can be accomplished in the field if this injury is suspected. The suspicion of this injury should elevate the urgency of evacuation and should be communicated to receiving facility if possible. If properly trained, a pericardiocentesis may be performed in extremis situations.

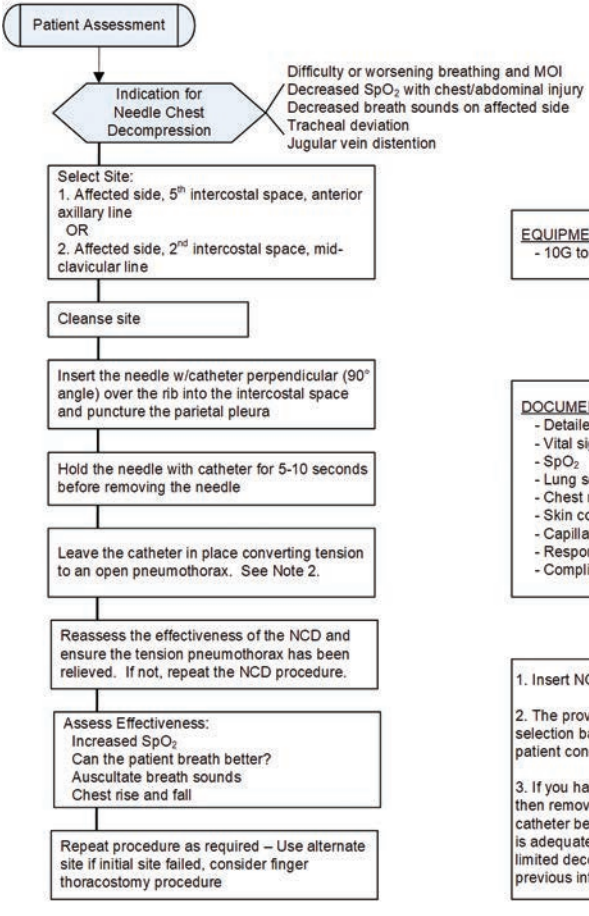
Cardiac Dysrhythmias: If patient is being monitored with ECG capability, cardiac dysrhythmias with chest trauma (especially blunt trauma) may occur. Manage any such dysrhythmias as with any such cardiac patient IAW ACLS guidelines.

Accompanying Abdominal Injuries: Any injury between the nipple and the navel may be assumed to be a thoracoabdominal injury. Consider the use of occlusive dressings over these wounds if concerned for tension pneumothorax. Subsequently, assess patient for development of tension pneumothorax physiology. Diaphragmatic rupture or injuries may occur and have a significant effect on respiratory effort. Control any visible hemorrhage from bowel using approved hemostatic agent or gauze. Irrigate gross debris off of exposed bowel. Attempt to gently reduce bowel back into abdominal cavity. If bowel is reduced, approximate skin (sutures or staples) and cover abdominal wound with an occlusive dressing. If bowel is unable to be reduced, cover bowel with moist dressing.

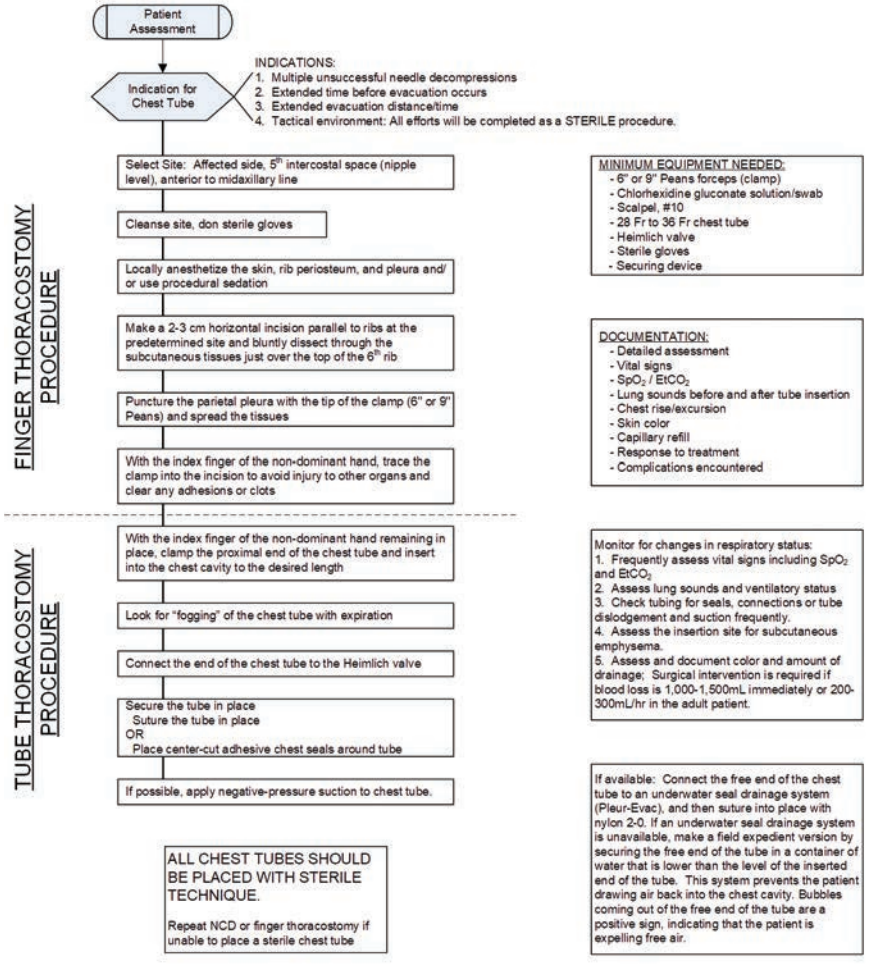
Thoracic Trauma Management Protocol



Needle Chest Decompression Procedure



Chest Tube Insertion and Finger Thoracostomy Procedure



Tactical Damage Control Resuscitation

Prevention of hypovolemic shock (inadequate tissue perfusion) is critical in a trauma casualty. Shock can be thought of as a pause in the act of dying and requires aggressive actions to prevent its progression. Once a casualty has progressed to shock, he is susceptible to the lethal triad of coagulopathy, hypothermia, and acidosis. Early preventative actions can delay hypothermia. Controlling blood loss and appropriate blood product administration can delay the progress of coagulopathy.

TCCC Application

Care Under Fire: Stop life-threatening bleeding.

Tactical Field Care: The first priority is to stop any active hemorrhage. Initiate intravenous (IV) access if indicated. Start an 18-G or larger IV or saline lock. If resuscitation is required and IV access is not obtainable, use the intraosseous (IO) route. Assess for hemorrhagic shock; decreased mental status (in the absence of head injury) and weak or absent peripheral pulses are the best field indicators of shock. If indicated by assessment, initiate fluid resuscitation. If not in shock, resuscitation is not necessary. If in shock, administer whole blood or blood products in a 1:1:1 ratio. Repeat if still in shock. Warm fluids are preferred if IV fluids are required. Be aware of warmer constraints as applying pressure to increase flow may cause ineffective warming and cell lysis. Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties. If a casualty with TBI is unconscious and has no peripheral pulse, resuscitate to restore the radial pulse. Prevention of hypothermia is critical in a shock patient. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible. Replace wet clothing with dry if possible. Get the casualty onto an insulated surface as soon as possible. Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS). If an HRS is not available, the combination of any blanket and the Ready-Heat Blanket may also be used. If the items mentioned above are not available, use dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry.

TXA Administration: If a casualty is anticipated to need a blood transfusion (e.g., presents with hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding), administer 2g of tranexamic acid (TXA) as an IV/IO flush as soon as possible but not later than 3 hours after injury. If initial dose of TXA was 1g, administer second infusion of 1g TXA after the first unit of blood or blood product treatment. Record on CAX Card "2g TXA given". Drug must be properly maintained at 15–30°C/59–86°F. **Do not delay blood product resuscitation for a trauma patient in shock in order to administer TXA and/or calcium.**

Calcium Administration: Many patients who require Blood resuscitation will present with hypocalcemia. Calcium administration will be considered after the 2nd unit of blood and again after every 4th unit of blood. Unless tactically unfeasible, calcium will be administered using a secondary IV/IO site. **Do not delay blood product resuscitation for trauma patients in shock in order to administer Calcium.**

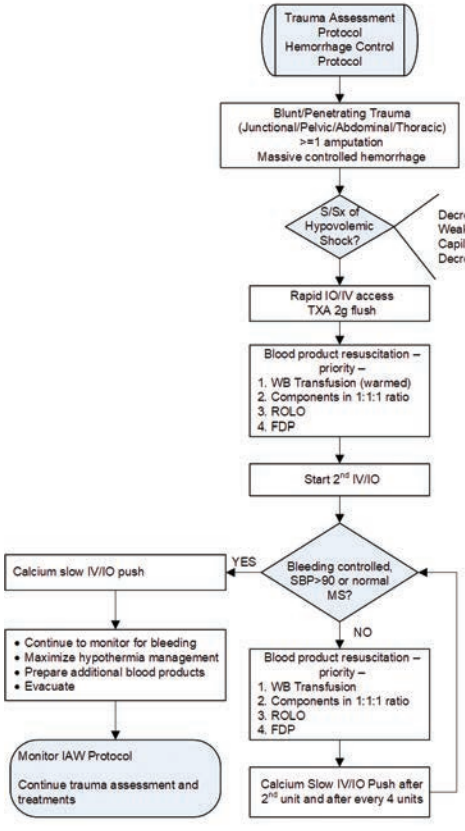
Tactical Evacuation: Reassess need for IV access if not previously established. Reassess for hemorrhagic shock. If not in shock, then no IV fluids are necessary. Avoid PO fluids for casualties requiring surgical intervention. Continue resuscitation with whole blood, packed red blood cells (PRBCs), plasma, and platelets in a 1:1:1 ratio as indicated. If a casualty with TBI is unconscious and has a weak or absent peripheral pulse, resuscitate as necessary to maintain a systolic blood pressure of 110mmHg or above. Prevention of hypothermia is even more critical for a trauma patient in moving vehicles or aircraft. Keep protective gear on or with the casualty if feasible. Remove and replace wet clothing with dry if possible. Get the casualty onto an insulated surface as soon as possible. Apply external warming devices as depicted in tactical field care if not already accomplished. Use a portable fluid warmer capable of warming all IV fluids including blood products. Protect the casualty from wind if doors must be kept open.

Extended Care

Fluid Management: Continue resuscitation with whole blood or blood products as indicated. Maintain a palpable radial pulse or systolic blood pressure of 90–100mmHg in all unconscious patients with noncompressible, internal hemorrhage. Maintain a normal radial pulse character or systolic blood pressure > 110mmHg in TBI patients with altered mental status. If available, insert Foley catheter and titrate IV/IO/NG/PR crystalloid fluids to maintain urine output of 30–50mL/hr.

ROLO Transfusion: All lifesaving TCCC protocols and procedures should be completed while ARFRs obtain blood for transfusion. Evacuation should not be delayed for field transfusions. ROLO may be considered for trauma casualties showing signs of hemorrhagic shock; shock from internal, noncompressible, or uncontrollable bleeding; massive blood loss with tachypnea, tachycardia, systolic hypotension and altered mental status; or extended evacuation.

Tactical Damage Control Resuscitation Protocol



TXA Indications:

Presence of hemorrhagic shock
One or more major amputations
Penetrating torso trauma
Evidence of severe bleeding
Evidence of pelvic fracture

TXA Instructions:

Only store inside and within temperature range.
If pre-drawn – replace every 7 days.
Draw TXA into 10mL syringe in a sterile fashion, cap, and clearly label.
Do not delay blood product resuscitation for TXA administration.

1. The goal of this protocol is to prevent the lethal triad of hypothermia, acidosis and coagulopathy.
2. Fluid of choice for shock resuscitation is whole blood then component therapy in a 1:1:1 ratio.
3. Patient warming procedures are to be initiated as soon as possible.
4. ARFRs are expected to initiate the ROLO protocol independent of a medic and resuscitate with stored blood products if available.
5. Foley catheters should be packed in vehicle-based trauma bags and utilized based on extended evacuation time.

1. Ca can be pushed in the same port used for blood if no other access is available. This is not the primary option and medic should always be attempting to gain more access. Ca administration should NEVER take priority over blood administration.
2. Both Ca Gluconate and Ca Chloride are approved for use. 30mL (3g) of 10% Ca Gluconate or 10mL (1g) of 10% Ca Chloride.
3. Ca will be administered IV/IO slow push over 1-2 minutes or as an infusion in a 100mL or 250mL bag.

Shock Management

Hypotensive Resuscitation

The employment of hypotensive resuscitation is meant to avoid over resuscitation of shock. Basing the titration of fluids on a monitored physiologic response may avoid the problem of excessive blood pressure elevation and fatal rebleeding from previously clotted injury sites.

Shock Assessment

Important information can be rapidly obtained regarding perfusion and oxygenation from the level of consciousness, pulse, skin color, and capillary refill time. Mental status is the most important indicator of shock. Decreased cerebral perfusion may result in an altered mental status. The patient may progress from anxious to confused to unresponsive. Beware of the patient with an impending sense of doom. The patient's pulse is easily accessible, and if palpable, the systolic blood pressure in millimeters of mercury (mmHg) can be roughly estimated as follows:

RADIAL PULSE:	PRESSURE 80mmHg
FEMORAL PULSE:	PRESSURE 70mmHg
CAROTID PULSE:	PRESSURE 60mmHg

It is important to state that the above pressure ranges are merely quick estimates of systolic blood pressures and are generally OVERESTIMATED and inaccurate. They are to be used during the rapid initial assessment of a trauma patient. Actual blood pressure measurement and a complete patient assessment should direct your trauma and shock management decisions.

Narrowed pulse pressure, < 30mmHg (decreased difference between systolic and diastolic pressures) are extremely sensitive and specific for identifying shock early, and they should trigger consideration for blood product resuscitation and advanced care.

Skin color and capillary refill will provide a rapid initial assessment of peripheral perfusion. Pink skin is a good sign versus the ominous sign of white or ashen, gray skin depicting hypovolemia. Pressure to the thumb nail or hypothenar eminence will cause the underlying tissue to blanch. In a normovolemic patient, the color returns to normal within 2 seconds. In the hypovolemic, poorly oxygenated patient and/or hypothermic patient, this time period is extended or absent.

The classic classes of shock are inaccurate and misleading but are often referred to in trauma literature. Ranger Medics should consider mechanism of injury, mental status, pulse, and other signs when making decisions on triage, treatments, and evacuation priority.

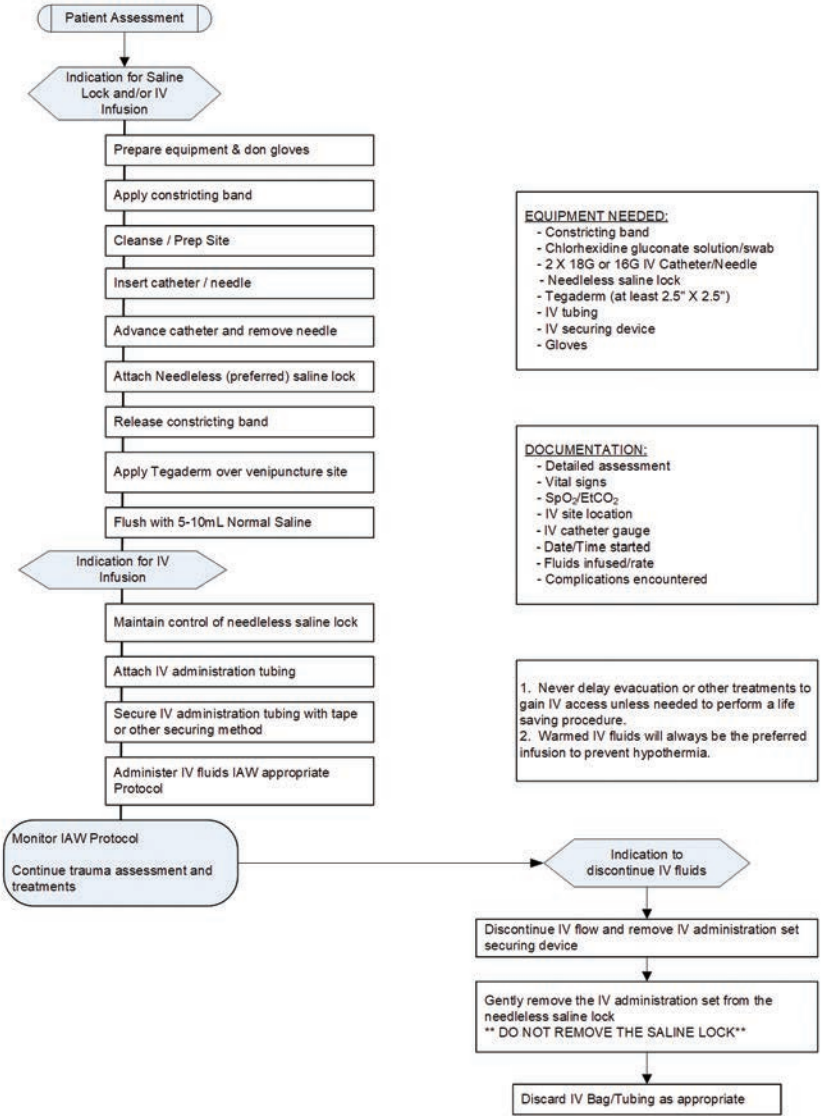
The following table is provided for educational purposes only and should not be relied on.

Estimate of Fluid and Blood Requirements in Shock*

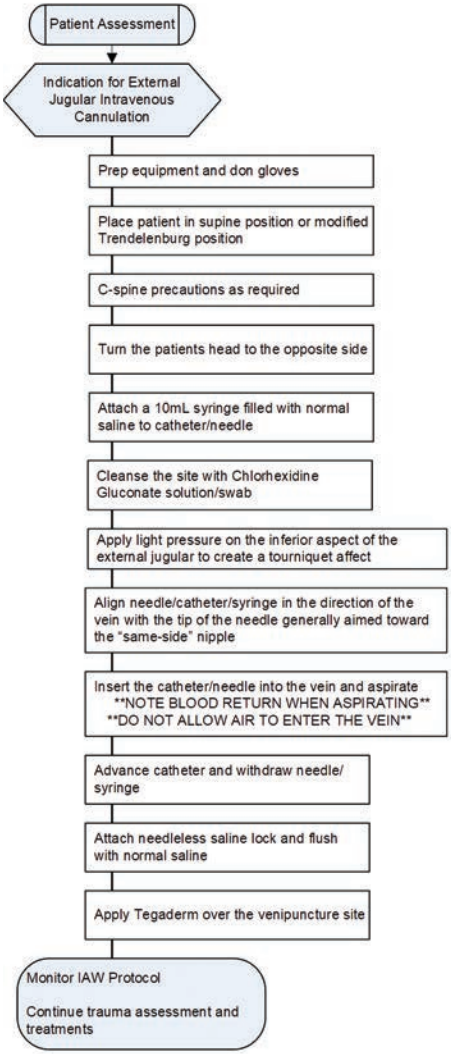
	Class I	Class II	Class III	Class IV
Blood loss (mL)	Up to 750	750–1,500	1,500–2,000	> 2,000
Blood loss (%BV)	Up to 15%	15–30%	30–40%	> 40%
Pulse rate	< 100	> 100	> 120	> 140
Blood pressure (mmHg)	WNL	WNL	Decreased	Decreased
Pulse pressure (mmHg)	WNL/increased	Decreased	Decreased	Decreased
Capillary blanch test	Normal	Positive	Positive	Positive
Respiratory rate	14–20	20–30	30–40	> 35
Urine output (mL/hr)	> 30	20–30	5–15	Negligible
CNS mental status	Slightly anxious	Mildly anxious	Anxious/confused	Confused/lethargic

*Modified from ATLS.

Saline Lock & Intravenous Access Procedure



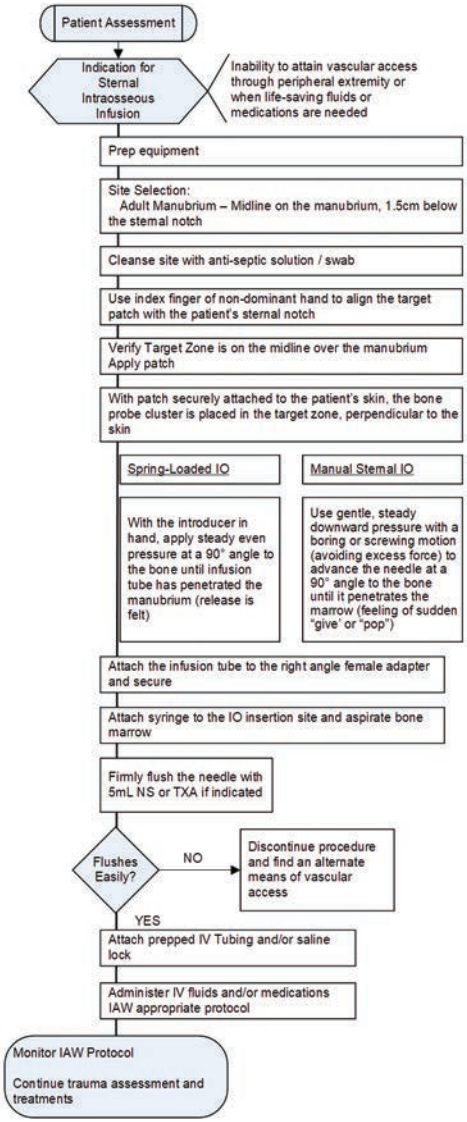
External Jugular Intravenous Cannulation Procedure



MINIMUM EQUIPMENT NEEDED:
- Constricting band
- Chlorhexidine gluconate swab
- 2 X 14G IV catheter/needle
- 10mL syringe
- Needleless saline lock
- Tegaderm (at least 2.5" x 2.5")
- Gloves

DOCUMENTATION:
- Detailed assessment
- Vital signs
- SpO_2
- IV site
- IV gauge
- Date/time started
- Fluids infused/rate
- Complications encountered

Sternal Intraosseous Infusion Procedure

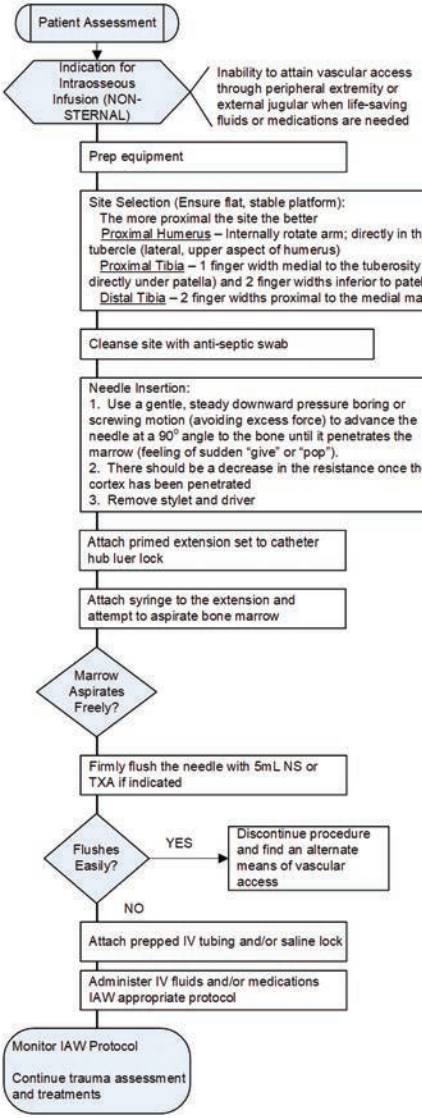


MINIMUM EQUIPMENT NEEDED:
- 38.5mm 15G manual IO device
  OR
- Spring-loaded IO device
- Flush

DOCUMENTATION:
- Detailed assessment
- Vital signs
- IO Site
- Date/time started
- Fluids infused/rate
- Complications encountered

CAUTIONS:
1. Do not rock or bend during manual needle insertion. Maintain a 90° angle.
2. Do not leave catheter inserted for longer than 24 hours.
3. Do not attach a syringe directly to the IO catheter hub.
4. Consider 5-10m: lidocaine flush for pain control

Intraosseous Infusion Procedure (Non-Sternal)



MINIMUM EQUIPMENT NEEDED:
- 45mm 15G IO device (Humeral)
- 38.5mm 15G IO device (Sternal)
- 25mm 15G IO device (Tibial)
- Flush

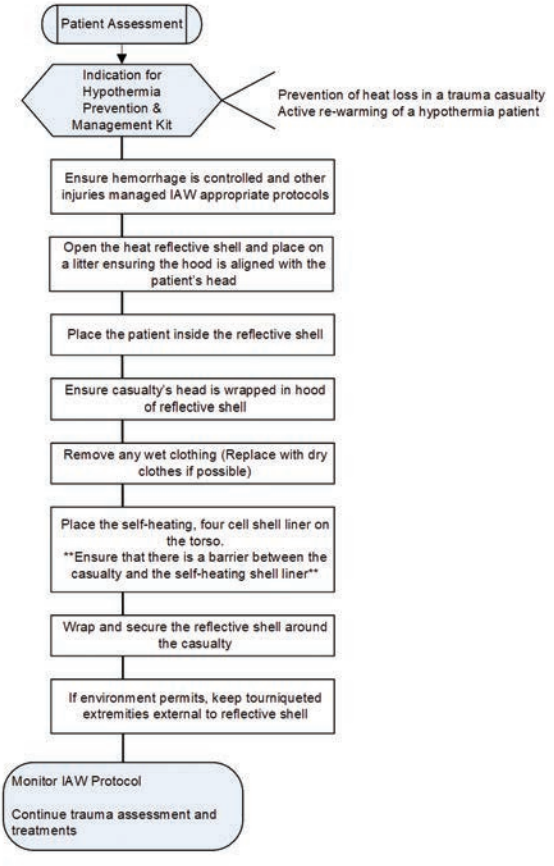
CONTRAINDICATIONS:
- Fracture or injury to site
- Absence of landmarks
- Injury proximal to IO site

Use each device and needle size ONLY for its indicated site

DOCUMENTATION:
- ABC's
- Detailed assessment
- Vital signs
- Complications encountered

CAUTIONS:
1. Do not rock or bend during manual needle insertion. Maintain a 90° angle.
2. Do not leave catheter inserted for longer than 24 hours.
3. Consider 5-10mL lidocaine flush for pain control

Hypothermia Prevention & Management Kit Procedure



Head Trauma

Open head injury results from application of force with penetration of the skull. The most common agents are missiles and blunt instruments. The lethality is proportional to the energy of the missile (which in turn is proportional to the square of the velocity). Injuries caused by blunt instruments can cause open depressed skull fractures but are usually of relatively low energy and cause only local injury to the brain. Nonetheless, these are serious wounds and have a high potential for infection.

Closed head injury results from application of force to the head that does not involve penetration of the skull but may involve scalp lacerations and facial fractures. The degree of injury to the brain is dependent on the energy transferred to the brain as a result of the force applied to the head. Closed head injury most often results from falls and motor vehicle accidents, even in an operational environment. Alteration of consciousness is the hallmark of brain injury and may be mild or severe, immediate or delayed, brief or permanent. Delayed deterioration of consciousness may occur as a result of hematoma formation within the skull or worsening swelling of the brain. The mechanism for this impairment of consciousness is increasing intracranial pressure, with subsequent impairment of brain perfusion (blood flow).

Assessment & Management

Generally, with head injuries the primary damage is done and there is little that can be done to correct that damage. The primary goal of head injury management is to identify or rule out intracerebral hemorrhage and then prevent secondary injuries associated with hypoxia, hypotension, anemia, hyperthermia, and hypothermia. This equates to aggressive bleeding control and airway management. Avoid hypoxia (any SpO_2 < 90%) and hypotension (any SBP < 100), and react to the signs of brain edema, herniation, or seizures.

The hallmark of head injury is alteration of consciousness. This is best assessed using the Glasgow Coma Scale. Pupillary function is also important to assess, and this can be done with any light source. In bright sunlight conditions, closing the eye for 30 seconds and observing while quickly opening demonstrate pupillary reactivity. Regular reassessment, as the tactical situation permits, is critical as a neurologic status may vary significantly over time.

Inspection: Vital signs should be assessed in any patient with a head injury and patency of the airway confirmed. The head should be inspected for signs of open injury or skull fracture. Open injury will be accompanied by a defect, and basal skull fracture may be associated with Battle's sign (retroauricular ecchymosis) or raccoon eyes (periorbital ecchymoses). Leakage of cerebrospinal fluid from the ears or nose may also be present. The pupils should be inspected for equality and/or reactivity. Unequal or nonreactive pupils in an unconscious patient are ominous signs.

Auscultation: Auscultation is generally not helpful in the evaluation of the head injury itself, but in a patient with impaired consciousness, a full exam, including auscultation of the lungs, should be performed.

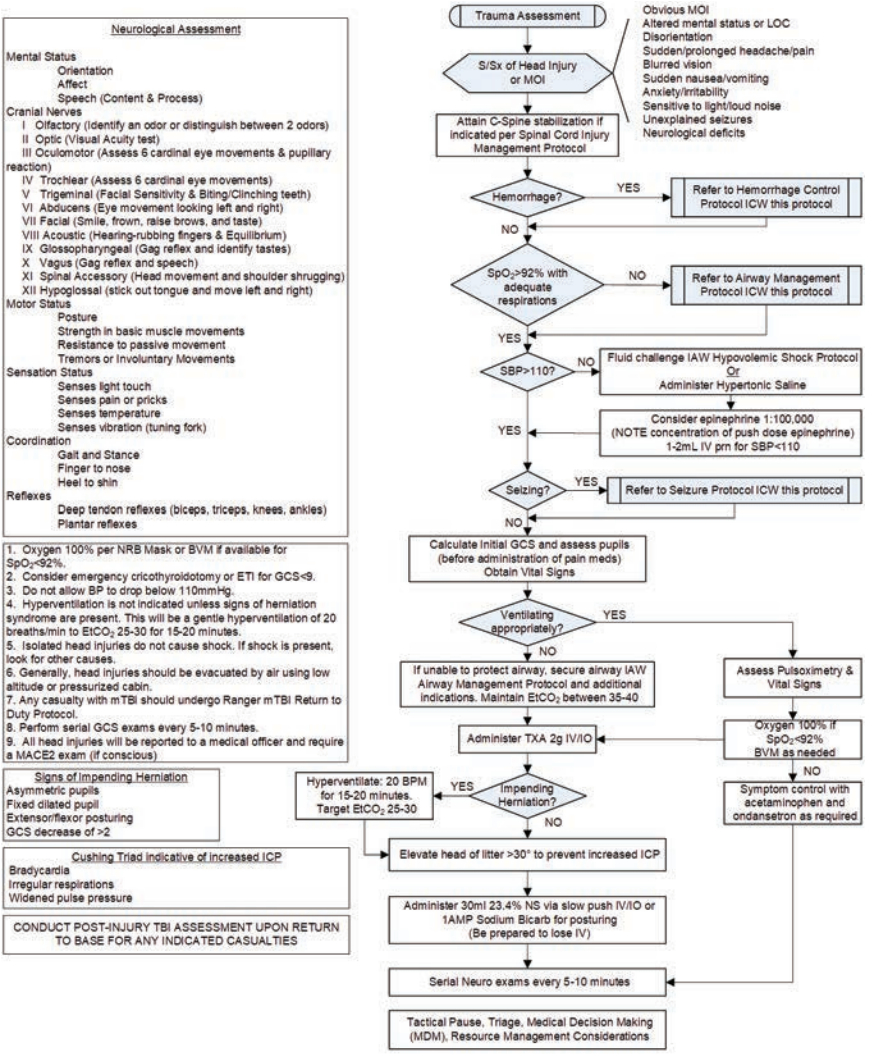
Palpation: Palpation of the head may reveal an underlying closed depressed skull fracture (an "ashtray" feel). The cervical, thoracic, and lumbar spine should be palpated to assess for tenderness or deformity, possibly indicating an associated spinal injury.

MANAGEMENT: Treatment involves securing the airway, maintaining systolic blood pressure > 110, maintaining oxygen saturation > 92% and < 100%, stabilizing the cervical spine (C-spine) if indicated, dressing any wound, and establishing an intravenous line. Prevent seizures IAW Seizure Protocol and treat, if indicated, with hypertonic saline.

Extended Care

Key aspects of field management of severe TBI are the prevention of hypoxia and hypotension. Ensure early establishment of a definitive airway, aggressively treat respiratory compromise, administer oxygen if available (to maintain saturation > 92% and < 99%), and fluid resuscitate hypotension. **DO NOT** hyperventilate unless indicated for signs of herniation. Controlled hyperventilation may be considered as a temporizing measure for evidence of increasing intracranial pressure (ICP) and herniation (deteriorating mental status, unequal pupils, posturing). For impending herniation, ventilate to achieve $EtCO_2$ of 25–30mmHg for 15–20 minutes. Otherwise, and without impending herniation, maintain $EtCO_2$ of 35–40mmHg. If $EtCO_2$ monitor is not available, ventilate at a rate of 20/min and a tidal volume of approximately 500mL. Prevent seizures as per *Seizure Protocol*. Administer with 4g of levetiracetam for seizure prophylaxis if available. Elevate the head 30 degrees. Prevent hypo/hyperthermia. Antibiotic prophylaxis for penetrating head trauma: ceftriaxone 2g IV/IO. Ensure casualty is evacuated to a facility with a neurosurgeon available.

Head Trauma Management Protocol



Concussion

A concussion is a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain. Not all blows or jolts to the head cause a brain injury. In combat, concussions are usually caused by a bullet, fragment, blast, fall, direct impact, or motor vehicle crash. Some, but not all, persons with a concussion lose consciousness.

S/Sx: Headache; fatigue; sensitivity to noise and light (phonophobia and photophobia); difficulty concentrating; loss of balance; nausea/vomiting; insomnia/sleep disturbances; vision changes/blurred vision; ringing ears; excessive tiredness; dizziness; drowsiness; difficulty remembering; confusion; irritability.

TCCC Application

Care Under Fire: Manage life-threatening hemorrhage. No specific action for TBI/concussion.

Tactical Field Care: Treat other injuries in accordance with TCCC guidelines. For patients with S/Sx of traumatic brain injury or potential for blast injury, assess for RED FLAG symptoms, and conduct neurological evaluation.

S/Sx of RED FLAG Evacuation:
Tactical Evacuation: Evacuate based on appropriate protocol of other injuries or red flag symptoms.

Special Considerations

Mandatory events requiring MACE 2:

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

All return-to-duty must be evaluated and approved by an MD/PA.

Concussion 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 re consult your medical provider.

Management

1. Consider 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 concussion.
3. If red flags are present – consult with medical provider for possible urgent evacuation.
4. Administer MACE 2, initiate 24-hour rest and consult with medical provider.
5. Treatment: Treat symptoms with acetaminophen, NSAIDs, and ondansetron as needed. **DO NOT** use narcotics or tramadol for symptom management. Not all symptoms will respond to conservative management as the brain heals. This is to be expected. Refer to the Ranger mTBI Return to Duty Protocol for clearance.

Extended Care

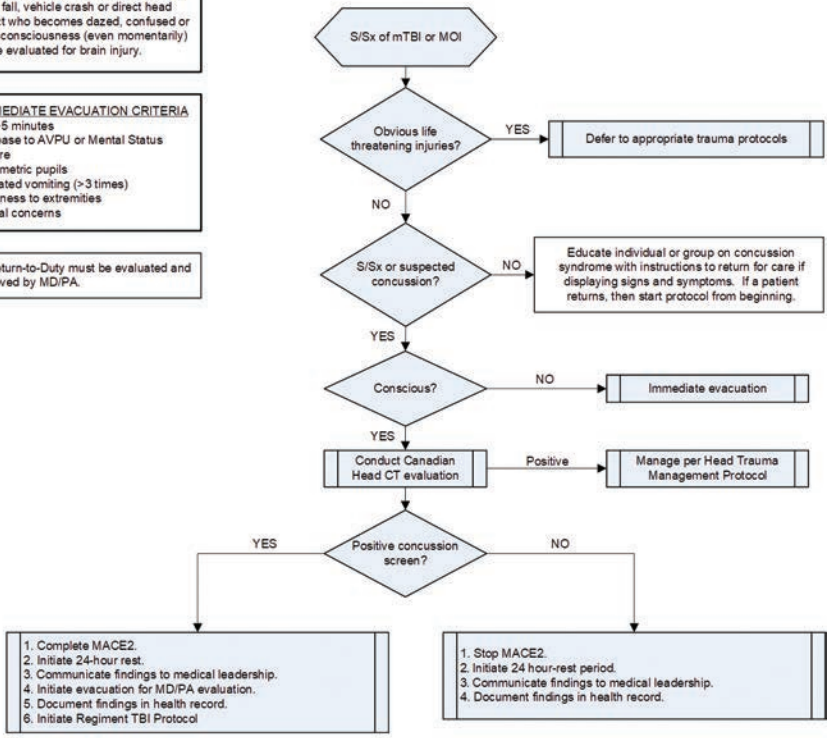
All patients with TBI/concussion injuries are to be evaluated by an MD/PA as soon as tactically feasible. If evacuation is delayed, then remove patient from an active tactical role. If no RED FLAG indications, then place patient in a limited duty role that will allow for rest and sleep if possible. Identify a Ranger buddy who will remain in close proximity and monitor patient status – **DO NOT** allow patient to be left alone while remaining in a tactical situation. Medical personnel should assess patient frequently for general responsiveness, vital signs, and any indication of red flag symptoms. Explain to patient and Ranger buddy the importance of alerting medical personnel of any red flag symptoms. If possible, rest will be the best recovery. Ensure patient remains well hydrated as dehydration will aggravate recovery. Allow patient to eat small, light meals if not affected by nausea or vomiting. Avoid exertion and any kind of strenuous events or situations that will hinder healing. Limit work to mundane tasks that are not critical to tactical situation but still allow a feeling of importance.

Concussion Management Protocol

All personnel exposed to or involved in a blast, fall, vehicle crash or direct head impact who becomes dazed, confused or loses consciousness (even momentarily) will be evaluated for brain injury.

IMMEDIATE EVACUATION CRITERIA
LOC>5 minutes
Decrease to AVPU or Mental Status
Seizure
Asymmetric pupils
Repeated vomiting (>3 times)
Weakness to extremities
Clinical concerns

All Return-to-Duty must be evaluated and approved by MD/PA.



RESPONSIVENESS ASSESSMENT (AVPU)
Alert
Verbal: Responds to verbal stimuli
Pain: Responds to painful stimuli
Unconscious: No response to any stimuli

Concussion Red Flags
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 extremities

Canadian Head CT Injury Rule
(any positive refer to Head Trauma Management Protocol)
Seizure after injury
GCS<15 at 2 hours post injury
Suspected open or depressed skull fracture
Any signs of basilar skull fracture
(hemotympanum, racoon eyes, Battle's sign, CSF oto rhinorrhea
>= 2 episodes of vomiting

Abdominal Trauma

Penetrating abdominal injuries are characterized by a violation of the peritoneal or retroperitoneal spaces by any variety of low- to high-velocity objects. Injuries represent a spectrum that includes impalement with foreign objects or stab, gunshot, and fragment wounds. Tissues are crushed and torn by the penetrating missile, or they are injured indirectly by stretching and cavitation. Multiple abdominal organs are commonly damaged as a result of penetrating trauma. The management of abdominal trauma in the field centers on adequate resuscitation, pain control, and intravenous antibiotics with the goal of evacuating the patient to a location where surgical care is available. Wound care and other supportive measures should also be given.

Initial Assessment & Management

Visible evidence of abdominal trauma may not always be immediately present (especially when associated with blunt MOIs). Abdominal pain is not always a reliable indicator of abdominal injury as it may be mimicked by fractures of the ribs and pelvis or not be readily evident because of decreased mental status due to associated head or spinal cord injury. Furthermore, severe pain from other injures such as extremity fractures may mask the patient's perception of pain in the abdominal area.

Inspect for: Entrance and exit wounds, contusions and abrasions, distention, protruding bowel or omentum, gastrointestinal hemorrhage (bloody emesis or rectal bleeding), hematuria, and signs of shock.

Palpation: Palpation of the abdomen can reveal tenderness, guarding, and rigidity. Assess all abdominal quadrants for superficial, deep and rebound tenderness. If an obvious evisceration is present, palpation should be deferred. Involuntary guarding is a reliable sign of peritoneal irritation. Pelvic stability should be assessed especially when blunt trauma is the mechanism of injury. A pelvis that is determined to be unstable should not be subjected to repeated manipulation to test for stability. If possible, a rectal examination should be done in all patients with suspected abdominal injuries. Gross blood indicates gastrointestinal hemorrhage or perforation of the bowel, a high riding prostate is suspicious for urethral injury, and poor rectal tone indicates neurological injury.

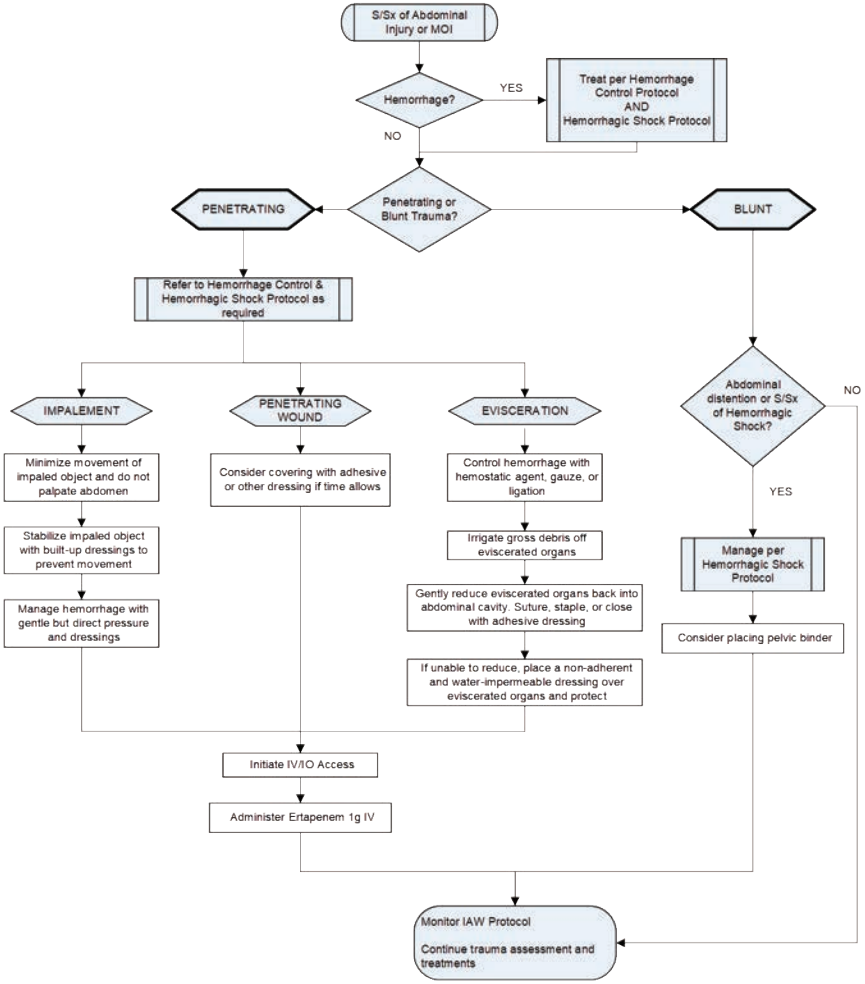
Auscultation: Auscultation is difficult and misinterpreted in the tactical setting and should not be used as a singular diagnostic measure. Absent or decreased bowel sounds are commonly associated with injury to abdominal viscera. However, patients with audible bowel sounds can still have significant underlying abdominal injuries. Auscultation of bowel sounds in the thorax is suggestive of diaphragmatic injury.

Control any visible hemorrhage from bowel using approved hemostatic agent or gauze. Irrigate gross debris off of exposed bowel. **Attempt to gently reduce bowel back into abdominal cavity. If bowel is reduced, approximate skin (adhesive dressing, sutures, or staples) and cover abdominal wound with dressing.** If bowel has been penetrated or fecal matter is present, do not attempt to reduce back into abdomen. If bowel is unable to be reduced, cover bowel with a non-adherent and water impermeable dressing. If uncontrolled abdominal hemorrhage is suspected, immediately begin resuscitation with whole blood or blood products in a 1:1:1 ratio. Resuscitation efforts should be directed at maintaining cerebral perfusion as indicated by patient's mental status if there is no associated head injury. If there is no associated head injury, a systolic blood pressure of 90–100mmHg is adequate and will prevent rebleeding from over-resuscitation. The patient who is hemodynamically unstable and requires ongoing large-volume resuscitation is probably bleeding from an intra-abdominal or intrathoracic source.

Extended Care

Eviscerated bowel and omentum should be covered with a non-adherent and water-impermeable dressing. The wound should be reassessed and remoistened every 1–2 hours. Clamps for hemorrhage control should be applied only to easily seen bleeding vessels. Do not attempt to pull out more bowel or omentum. A nasogastric (NG) tube should be placed to decompress the stomach in order to decrease the risk of vomiting and aspiration. The NG tube may be reserved for those patients who are vomiting or have a distended abdomen. A Foley catheter may be useful in patients who are unstable in order to monitor urine output and to obtain urine samples to evaluate for blood. Worsening pain or worsening signs of shock, peritonitis, or sepsis indicate deterioration and should accelerate efforts to evacuate the patient to a location where surgical care is available. Antibiotic therapy should be initiated as soon as a penetrating injury is suspected. Administer ertapenem 1g IV.

Abdominal Trauma Management Protocol



Blast Injury Assessment

TCCC Application

INITIAL EVALUATION AND TREATMENT PER APPROPRIATE TRAUMA PROTOCOL

All unit members exposed to blast will be assessed for blast injuries as soon as tactically feasible, with documentation if possible. Any indications or complications from blast injuries should warrant immediate evacuation for evaluation at a more capable facility.

Blast injuries have a wide range from minor tympanic membrane (TM) ruptures to hollow organ overpressure injuries. All personnel must be evaluated and monitored for at least 6 hours for injuries. Submersion or confined space environments significantly increase the incidence of injury. Special caution should be taken when examining these patients.

Signs & Symptoms

HEENT – Careful inspection for TM rupture during examination. Intact TMs do NOT exclude significant blast injury to other parts of the body. Check for ear discharge, tinnitus, and hearing loss.
Pulmonary – Evaluate for shortness of breath and abnormal breath sounds.
Neurologic – Evaluate for TBI with MACE 2 and neurological exam.
Abdomen – Monitor until 48–72 hours post injury.

Management

1. All asymptomatic patients should be monitored for at least 6 hours after the event to rule out late presenting complications.
2. TM: Keep ear canal dry/covered (use cotton balls if possible) in case of TM rupture. Refer to ENT for evaluation when possible.
3. MACE 2 examination needs to be accomplished on all personnel affected by the blast.
4. Pulmonary decompensation: High-flow O_2 if available. Use caution with high-pressure ventilation; this may worsen the patient's condition. Follow rules for hypovolemic resuscitation given risk for pulmonary edema. Have high suspicion for tension pneumothorax. Be prepared for needle decompression. Consider tube thoracostomy: recurrence or persistence of respiratory distress after two needle decompressions **OR** evacuation time > 1 hour **OR** patient requires positive pressure ventilation. For air evacuation, fly at the lowest tactically feasible altitude.
5. Abdomen: Any abdominal pain or tenderness within 48–72 hours of a blast exposure should be presumed to be a bowel perforation and warrants urgent surgical evaluation. Follow *Abdominal Pain Protocol* for urgent evacuation.
6. Consider possibility of arterial gas embolism (AGE) in patients with focal neurological deficits after pulmonary blast injury. AGE may require recompression therapy. See *Barotrauma Protocol.*
7. Spine injury: Patients involved in vehicular blasts or thrown by explosions are at high risk for spinal injury. Maintain a high index of suspicion for spinal injury, especially in unconscious patients. Manage IAW *Spinal Trauma Protocol.*

Disposition & Evacuation

1. TM rupture without complications – RTD after 6 hours of observation
2. TM rupture with hearing loss – *Routine* evacuation
3. Neurologic Injury – *Urgent for neurosurgical evaluation*
4. Pulmonary complications – *Urgent* evacuation
5. Abdominal pain – *Urgent* evacuation
6. AGE or barotrauma – *Urgent* evacuation
7. Spinal injury – *Urgent* evacuation to neurosurgical capability

Eye Injury

Penetrating injuries to eye globe or fracture of the orbit must be assessed with any facial trauma in the combat setting. In the combat setting, penetrating wounds of the eye may be very common from shrapnel and debris. Blunt trauma that may disrupt the integrity of the globe may be seen during facial trauma from falls, PLF, FRIES landings, hand-to-hand combat, or MVA-type collisions. The primary management in any setting includes a rigid eye shield that does not put pressure on the globe of the eye. Avoid any manipulation of eye or eye globe if penetrating injury is suspected. Infection may cause later permanent loss of vision, so early broad-spectrum systemic antibiotic therapy is critical to prevent post-traumatic endophthalmitis.

TCCC Application

Care Under Fire: Stop life-threatening bleeding.

Tactical Field Care/Tactical Evacuation: If a penetrating eye injury is noted or suspected: Perform a rapid field test of visual acuity and document findings. Cover the eye with a rigid eye shield (NOT a pressure patch). Give ondansetron 4–8mg IV/IM/ODT/PO to prevent vomiting and the subsequent increase in IOP. Ensure that the 400mg moxifloxacin tablet in the combat pill pack is taken if possible. If able to take PO: moxifloxacin, 400mg PO once a day. If unable to take PO: ertapenem, 1g IV/IM once a day.

Extended Care

Retrobulbar Hematoma: Blunt or penetrating periocular trauma may result in orbital bleeding. As the pressure in the orbital compartment is progressively elevated, the intraocular pressure will also rise. If intraocular pressure rises to a sufficiently high level (> 21mmHg), either central retinal artery occlusion or damage to the optic nerve may ensue and vision may be permanently lost in the eye. Signs and symptoms of retrobulbar hemorrhage include pain, periorbital ecchymosis, progressive proptosis (bulging forward of the eye), decreased vision, diffuse subconjunctival hemorrhage, and an afferent papillary defect. Optic nerve ischemia can develop as quickly as 45–90 minutes after onset of hematoma. The definitive management for this disorder is a lateral canthotomy.

Rapid Field Visual Acuity Test	Eye Examination (TRAUMA)
Visual acuity is the vital sign of the eye in your assessment. Vision in affected eye should be checked with unaffected eye closed. A simple quantification is from best to worst: 1. Able to read print 2. Can count the number of fingers held up 3. Can see hand motion 4. Can see light Document the finding on Casualty Card.	**Inspect surrounding structures:** Inspect the symmetry of the eyes, eyebrows, and orbital area for any abnormalities. **Eyelids:** Inspect the patient's lightly closed eyelids for symmetry, fasciculation, tremors, and presence of eyelashes. While closed, look to ensure eyelids close completely. **Pupils:** PERRLA, distortion, size **Iris:** Details clear, blood in anterior chamber, evidence of iris tissue in cornea or limbus, laceration or indication of penetrating trauma **Sclera:** Obvious lacerations, dark iris or uveal tissue, redness, subconjunctival hemorrhage **Cornea:** Obvious defects (laceration or penetration), iris tissue in cornea **Ocular motion:** Inability to move eye

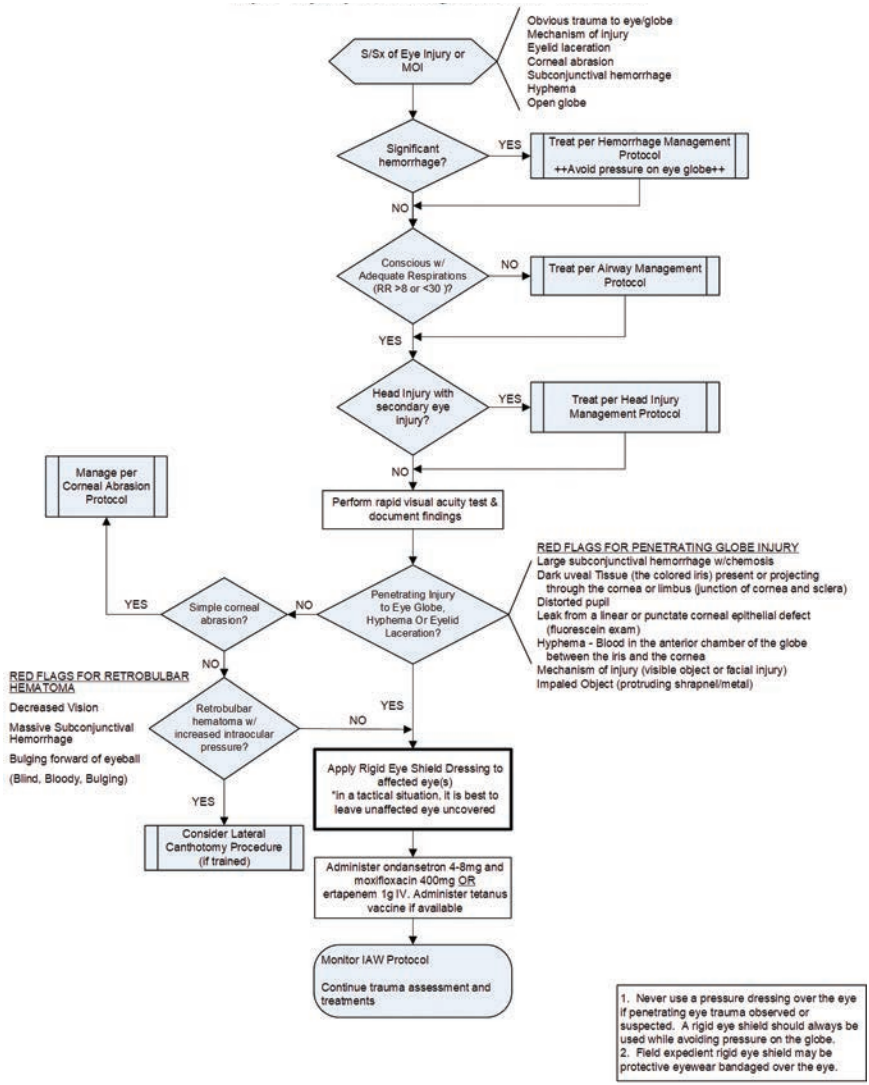
Standard Visual Acuity Test

Distant visual acuity is tested using a Snellen chart with patient 20 ft away in a well-lighted area. Test each separately, with one eye being covered while testing the opposite eye. Allow a few moments for eyes to adjust between tests. If patient wears corrective vision, record two separate tests: one with and one without correction. Documentation is recorded as a fraction in which the numerator indicates the distance from the chart (20), and the denominator indicates the distance at which the average eye can read the line (i.e., 20/40 indicates the patient is reading at 20 ft what the average eye can read at 40 ft). Tell patient to read the line most clear to them and then proceed to the next distance level. Record the distance in which the patient can still accurately read the text.

Near visual acuity is tested using the same principles as distant vision, but with Rosenbaum pocket vision screener. The patient holds the card approximately 14 inches from the eye and reads the smallest line possible.

Peripheral visual acuity is tested using the confrontation test. Stand facing the patient at eye level and test each eye separately. While the patient covers one eye, you cover the opposing eye (patient, left; examiner, right). Fully extend your arm midway between yourself and the patient and then move it centrally with the fingers moving. Have the patient tell you when the moving fingers are first seen. Compare the patient's response with your response in the upper, lower, left, and right spectra. Record as the estimated degrees of vision, with directly ahead being 0 degrees.

Eye Injury Management Protocol



Lateral Canthotomy

Patient Assessment

Indication for Lateral Canthotomy

Retrobulbar hematoma
(Pain, proptosis, decreased vision/visual acuity)
BLOODY, BLIND, BULGING

Prep equipment

Administer local and topical anesthesia
Inject 1-2mL of lidocaine in lateral canthus area

Crimp the lateral canthus area with hemostats or needle driver.
Grasp lateral canthus with clamp for 60 to 120 seconds

Incise lateral canthus at area "marked" by crimping clamp with iris scissors laterally about 1-2cm

Pull inferior lid away to visualize the inferior lateral canthal tendon (use tissue forceps if available)

Incise the inferior crux of lateral canthal tendon

Gently pull tissue to allow global pressure release

Symptoms Improved?

NO → Incise the superior crux

YES

Apply loose protective dressing material (no pressure)

Monitor IAW Protocol

Continue trauma assessment and treatments

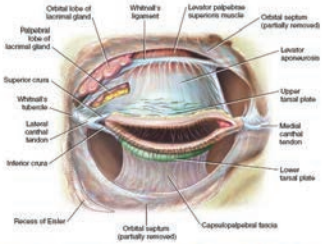
EQUIPMENT NEEDED:
Mosquito clamp, hemostats, or needle driver
Lidocaine 1% w/Epi (preferred) or w/o/Epi
Syringe w/25G 5/8" Needle
Iris scissors
Tissue forceps

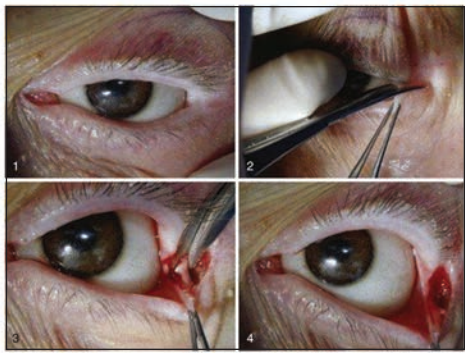
CONTRAINDICATIONS:

Globe rupture

CAUTION:
All aspects of procedure should be performed lateral to the eye

DOCUMENTATION:
- ABC's
- Detailed assessment
- Vital signs
- Complications encountered





Seizures

A seizure is an uncommon event that can be caused by many different ailments and processes. Not all convulsions become an epileptic condition, and most are brief and self-limited. Seizures are characterized by abrupt onset of abnormal muscle activity or a prodrome of confusion, peculiar behavior, automatisms, or vivid sights/smells.

Assessment & Management

Assessment: May have sudden onset of loss of consciousness, followed by abnormal motor activity such as tonic rigidity, clonic rhythmic movements of the limbs, urinary incontinence, frothing at the mouth, and biting the tongue and mouth; may last seconds to minutes and is usually followed by a period of weakness, somnolence, and confusion (postictal state). Seizures will often spontaneously stop without any intervention after a few minutes. The differential diagnosis of a convulsive event is extensive: idiopathic epilepsy, alcohol or drug associated seizures, post concussive syndrome, convulsive syncope, heat stroke, infection (meningitis), brain mass lesions, nerve gas exposure, metabolic abnormalities, and eclampsia in pregnancy. Wellbutrin, INH, tramadol, and other medications may lower seizure threshold.

Management: Remove the patient from an area where he could injure himself or others. Keep sharp and breakable objects away from the patient. Pad objects to avoid injury. Do not put anything in the patient's mouth. Never put your fingers in the patient's mouth.

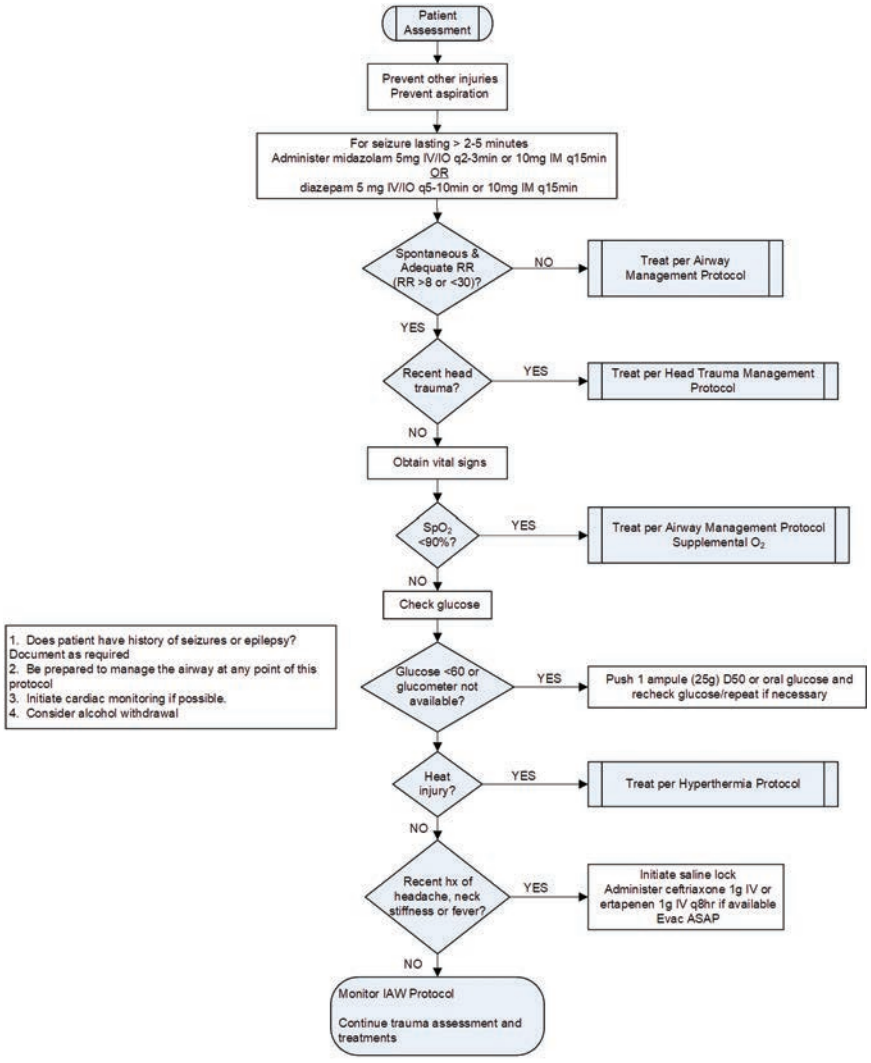
Medications are rarely required to break a first-time seizure. After the seizure, evacuate the patient to an appropriate treatment facility for a neurological examination and further evaluation. The exam will usually be normal, other than confusion and somnolence in the immediate postictal period, which may last for hours. After focal motor seizures, there may be a period of Todd's paralysis, which is focal weakness of the affected limb. If seizure lasts longer than 5 minutes, then it is considered status epilepticus. These seizures must be stopped ASAP. This is a life-threatening event and may produce significant brain injury if the patient survives. Emergency medical assistance and intervention must be rapidly sought. Begin an IV access line. Administer benzodiazepines until the seizure stops or the patient requires airway management. **Midazolam** 5mg IV/IO q2–3min/10mg IM q15 min or diazepam 5mg IV/IO q5–10min/10mg IM q15min for 2 doses. For persistent seizures despite adequate treatment above, confirm no secondary medical cause, continue benzodiazepines and be prepared to secure airway IAW Airway Management protocol. Evacuate for further imaging and EEG monitoring if available.

If available, after seizure has stopped, administer a loading dose of levetiracetam 4g IV over 5–15 minutes to prevent seizure recurrence. If evacuation is delayed > 12 hours after loading dose, administer 1g IV levetiracetam every 12 hours until patient reaches higher level of care.

Extended Care

Attempt to identify and manage underlying condition prompting the seizure activity. **NO DRIVING, WEAPONS HANDLING, OR OTHER DANGEROUS ACTIVITIES UNTIL MEDICALLY CLEARED.** Urgent evacuation is not normally required for a patient with a single seizure that spontaneously resolved. Patients should ultimately be referred for a nonemergent, ROUTINE neurological consultation.

Seizure Management Protocol



Spinal Cord Injury Management

While cervical spine (C-spine) injuries are relatively common in major trauma, they receive less attention in the combat environment due to the prevalence of penetrating injury mechanisms. With the high incidence of explosive injury in present conflicts, providers must pay attention to the indications for and methods of ruling out cervical or spinal injury. IED blasts and jump injuries have a high risk for lumbar fractures. Physical exam is essential for C-spine clearance, but most patients will require some form of imaging.

Spine boards have never been proven to provide any benefit to the patient and often cause harm through prolonged pressure. Even patients with suspected spinal injuries are best cared for on a rigid litter and not on a spine board. If used, patients should spend no more than 10 minutes on a spine board as they make transferring/moving patients easier. Remove the patient as soon as possible from a spine board and place on a padded rigid litter. Do not place a suspected spine-injured patient on a SKEDCO or other flexible litter.

Likewise, cervical collars are also known to cause harm by interfering with lifesaving interventions and hiding other injuries. Use NEXUS Criteria to aid in C-spine clearance and only place a collar when necessary. Penetrating trauma patients rarely require cervical collars. If required, perform all lifesaving interventions with an assistant preventing unnecessary C-spine movement prior to placing a cervical collar.

TCCC Application

Care Under Fire: Manage life-threatening hemorrhage. No specific action. On the battlefield, preservation of the life of the casualty and Medic is of paramount importance. In these circumstances, evacuation to a more secure area takes precedence over spine immobilization.

Tactical Field Care: Medics should consider cervical collar placement on all patients who have sustained injuries through the following mechanisms if the tactical situation allows: major explosive or blast injury; mechanism that produces a violent impact on the head/neck; mechanism that creates sudden acceleration/deceleration or lateral bending forces on the neck; fall from height (vs. fall from standing); and ejection or fall from any motorized vehicle. Autopsy data show patients with penetrating cervical injury in war almost never survive the injury. Therefore, spinal stabilization should only be performed after all other lifesaving interventions. All providers must be aware that the collar may hide other injuries, increase the difficulty of airway management, and mask developing pathology such as expanding hematoma. Patients with isolated penetrating cervical injury who are conscious and have no neurological signs should not have a cervical collar placed in the prehospital environment. Patients with isolated penetrating brain injury do not require a cervical collar unless the trajectory suggests C-spine involvement. Field expedient cervical immobilization methods include IV bags, rolled poncho liner, stacked/taped MRE package, rolled up uniform shirt, or snivel gear.

Tactical Evacuation: Evacuate as determined by other significant injury protocols. Evacuate as *Urgent* patients with gross neurological deficits. Evacuate as *Priority* patients without other significant injuries or without neurological deficit. Consider padding of litter for extended distance evacuations. Ensure hypothermia prevention measures are rendered.

Extended Care

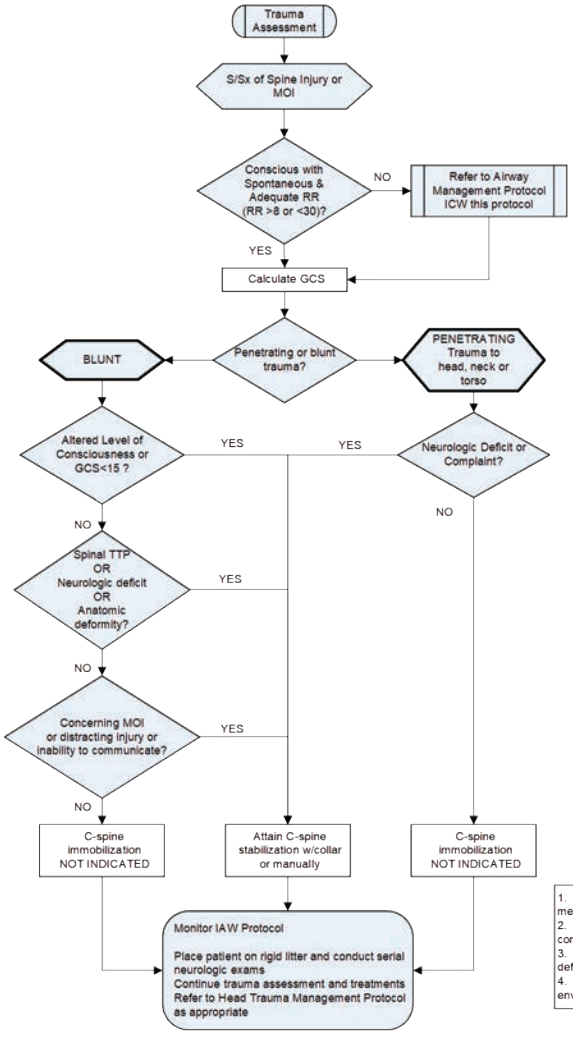
In the event of extended care, there is little that can be done for known spinal injuries. If possible, avoid repeated litter movements of the casualty. If extended spinal immobilization is expected, then attempt to pad the litter prior to placement of the patient to reduce the risk of development of pressure ulcers. Attempt to pad any areas near bony prominences. Immobilized patients are at risk of aspiration. Be prepared for emergency suction and/or the ability to tip the immobilized patient if vomiting is imminent. Use prophylactic antiemetics to help reduce risk. High spinal cord injuries may affect the diaphragm and put the patient at risk for respiratory failure. Be prepared for ventilation procedures. These patients may also display hypotension (from neurogenic shock) and bradycardia. Fluid challenge within normal guidelines. If tachycardia is present, then assume hypovolemic shock and attempt to determine cause.

Patient comfort while immobilized will become a greater concern as time passes. Urination may be controlled by use of Foley catheterization or tipping the immobilized casualty.

Spinal Injury Assessment

1. Do not administer procedural sedation until after completion of neurovascular check and assessment of GCS.
2. Report & document GCS, paralysis, and any neurological deficit.
3. Concerning MOIs:
   a. Any mechanism that produced a violent impact to the head, neck, torso, or pelvis.
   b. Incidents producing sudden acceleration, deceleration or lateral bending forces to neck.
4. Distracting injuries are any injury that may potentially impair the patient's ability to recognize other injuries or neurological deficit.

Spinal Cord Injury Management Protocol



Glasgow Coma Scale		
Eye Opening	Spontaneous	4
	To Voice	3
	To Pain	2
	None	1
Verbal Response	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Words	2
	None	1
Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraws (Pain)	4
	Flexion	3
	Extension	2
	None	1

Document as: E___ + V____+ M____=____

NEXUS

Focal neurologic deficit?
Midline spinal tenderness?
Altered level of consciousness?
Intoxication?
Distracting injury?

If all are "no" then a cervical collar is not necessary

1. In Care Under Fire phase, do not jeopardize mission/men to attain spinal immobilization.
2. Do not administer pain control drugs until after completion of neurovascular check.
3. Report & document GCS, paralysis or neurovascular deficit.
4. There are relatively few "spinal" injuries in the combat environment.

Orthopedic Trauma

Trauma to the extremities is common and can range from simple sprains to massive soft tissue injury and bony destruction associated with explosive devices. The sensation of a "pop" or "crack" is often misleading and should not be relied on. The patient's exam is often the key to diagnosis and initiating proper treatment. Any bleeding, even a small amount, should indicate an open fracture. Examine joints for dislocation and splint any obvious deformity in two planes.

TCCC Application

Care Under Fire: Control massive life-threatening hemorrhage.

Tactical Field Care: Initially splint any fractures in position of function or immobilize in current position. Generally, splinting in position of function will reduce overall pain to patient. Use traction on indicated fractures but stop if it is causing worse pain. By splinting and reducing fractures, attempt to restore any vascular compromise. If possible, clean and irrigate any gross contaminated wounds/fractures. If conscious, administer combat wound pill pack. Administer antibiotics: ertapenem 1g IV/IM qd **OR** ceftriaxone 2g IV q24hr. Reassess neurovascular status every 5–10 minutes and document changes. Dislocations with distal pulse may be reduced based on evacuation time and training/experience in procedure. Consider pain management, local/regional anesthesia, or dissociative agents prior to manipulating dislocations. Splint and/or sling/swathe as appropriate.

Tactical Evacuation: Reassess splints, interventions, and neurovascular status after any evacuation movements. If previously unable to provide traction or adequate splinting, apply as appropriate.

Extended Care

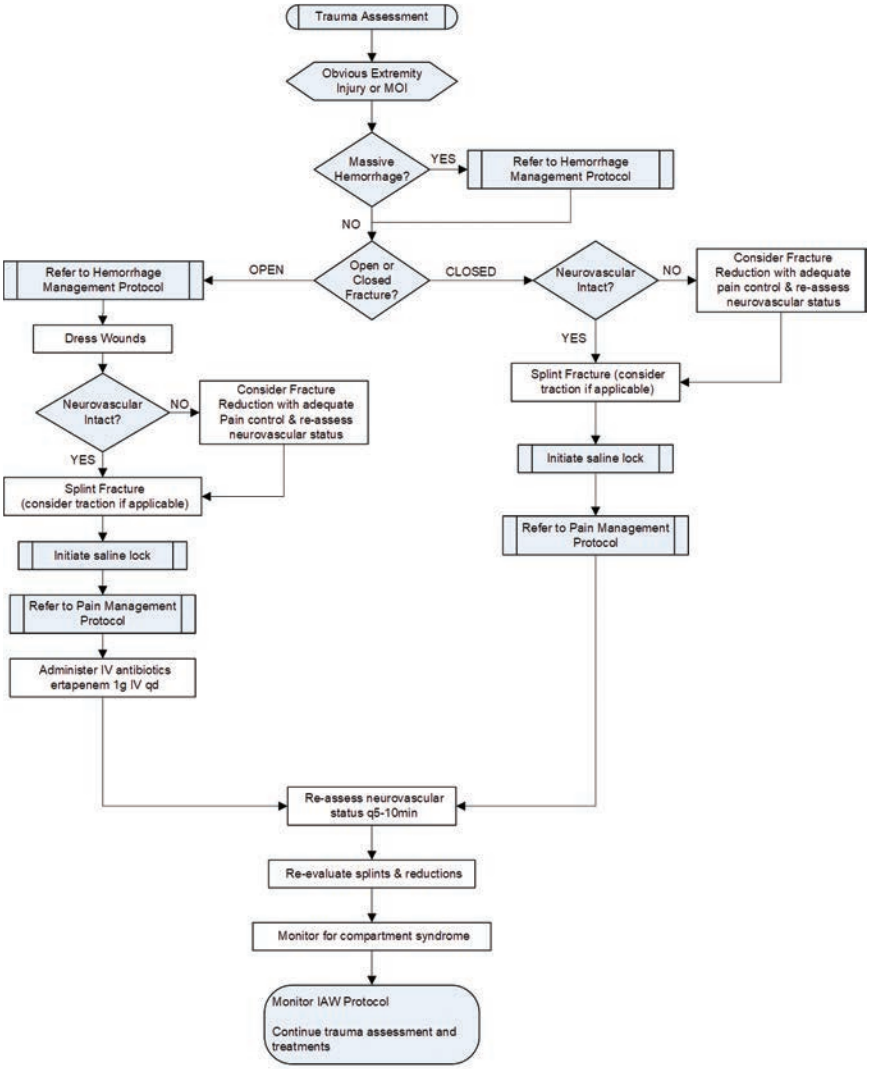
Orthopedic injuries often accompany other significant injuries. Prioritize patient management based on severity of multiple injuries. Vital signs should be monitored regularly to include color, temperature, motor and sensory function. Conduct repeat motor and sensory exams in conjunction with vital sign checks. IV fluids administered to maintain SBP of 90–100mmHg or as indicated by other conditions. Focus extended care efforts on extremity perfusion. Splinting in anatomical position of function will optimize improved blood flow. If tourniquets have been applied, consider tourniquet conversion if hemorrhage can be controlled through other means.

Consider patient comfort for extended timeframes and re-splint as necessary. Use hematoma blocks, local, or regional anesthesia for pain control. Consider padding points of contact on splinting devices. Treat IAW Pain Management Protocol; consideration of effect on other injury patterns. Contaminated wounds should be flushed with normal saline or clean water. The intent is to remove gross contamination such as dirt and debris.

Monitor for development of compartment syndrome. Be suspicious of compartment syndrome in the following conditions: fractures, crush injuries, vascular injuries, or multiple penetrating injuries (fragmentation). The classic clinical signs of compartment syndrome: pain out of proportion to injury, pain with passive motion of muscles in the involved compartment, pallor, paresthesia, and pulselessness are late findings. Be aware that peripheral pulses are present in 90% of patients with compartment syndrome. Monitor closely and be aware of any pain out of proportion. Compartment syndromes make take hours to develop. For patients with suspected compartment syndrome, reevaluate every 30 minutes for 2 hours, then every hour for 12 hours, then every 2 hours for 24 hours, then every 4–6 hours for 48 hours. Extremity compartment syndromes may occur in the thigh, lower leg/calf, foot, forearm, and hand.

Compartment syndrome management: maintain extremity at level of heart. **Do not elevate.** Loosen encircling dressings. Urgent evacuation. Only attempt fasciotomy if evacuation is delayed 6 hours or longer and with online medical direction. Fasciotomy is not within the independent scope of the Ranger Medic.

Orthopedic Trauma Management Protocol



Burn Management

TCCC Application

Care Under Fire: 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.

Tactical Field Care: Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury and/or carbon monoxide inhalation. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation. Estimate total body surface area (TBSA) burned to the nearest 10% using the rule of nines. Cover the burn area with dry, sterile dressings. For extensive burns (> 20%), if available, consider placing the casualty in a ready-heat blanket from the Hypothermia Prevention and Management Kit to both cover the burned areas and prevent hypothermia. Initiate fluid resuscitation (USAISR Rule of Ten): 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 crystalloids. Do not use more than 3L of NS due to the risk of causing hyperchloremic metabolic acidosis. Initial IV/IO fluid rate is calculated as %TBSA × 10mL/hr for adults weighing 40–80 kg. For every 10 kg ABOVE 80 kg, increase initial rate by 100mL/hr. If available, a balanced crystalloid like Plasmalyte or Osmolyte is ideal for burn resuscitation. Lactated Ringer is the preferred crystalloid if Plasmalyte/Osmolyte is not available. Only use Normal Saline if no other options are available due to resulting hyperchloremic metabolic acidosis. If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Treat the burn patient IAW the Pain Management Protocol. Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given as indicated for other traumatic injuries. All TCCC interventions can be performed on or through burned skin in a burn casualty.

Tactical Evacuation: Initiate any tactical field care interventions not previous performed. Burn patients are particularly susceptible to hypothermia. Extra emphasis should be placed on barrier heat loss prevention methods and IV fluid warming in this phase.

Extended Care

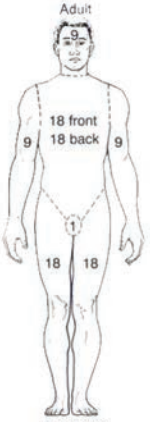
Extended care in the prehospital environment will remain focused on prevention of hypothermia, airway, and vital sign monitoring as well as initiation of fluid resuscitation avoiding bolus fluids if possible. Elevate injured extremities 30–45°. Documentation of input/out of fluids must be initiated and evacuated with patient to the next higher facility. Fluid resuscitation will be in accordance with the USAISR rule of ten. Assess distal circulation of all extremities by palpating the radial, dorsalis pedis, and posterior tibial arteries. If a pulse is palpable in one or more arteries in each extremity escharotomy is not indicated.

Inhalation burns should be assumed with any burns to the face and neck and may require aggressive airway management. Inhalation injury is further exacerbated by retained soot and chemicals. Not every patient with soot in the airway will require airway management. Use clinical judgment and assess the patient before taking the airway. Remember, inhalation injury is mostly a chemical injury that will benefit from removing the chemical. Suction the airway carefully using the endotracheal suction tubing if available to remove both secretions and soot or chemical materials. Irrigation of any kind in the field is not warranted and will most likely move materials to unaffected airways or pulmonary tissue.

Burn Guidelines: Do not administer prophylactic antibiotics for burns without other combat wounds. Splint burned hands and feet in position of function with dressings separating digits. Aggressively manage pain and hypothermia for critical burn patients. Commercial burn dressings are not required and add little to patient care. In the acute phase do not be distracted by a burn. **DO NOT OVER RESUSCITATE WITH IV FLUIDS. RECORD STRICT I/OS AND MAINTAIN 0.5–1mL/kg/hr UOP.**

Escharotomy: The requirement for escharotomy usually presents in the first few hours following injury. If the need for either procedure has not presented in the first 24 hours, then circulation is likely to remain adequate without surgical intervention. Escharotomy is normally performed when an extremity has a circumferential full-thickness burn. If the burn is superficial or not circumferential and pulses are absent, consider inadequate circulation from other causes such as hypovolemia, hypotension, or occult traumatic injury. If indicated, extend escharotomy incisions the entire length of the full-thickness burn and carry across the joint when the burn extends across the joint. In the lower extremity, make a mid-lateral or mid-axial incision with a surgical knife through the dermis to the level of fat. It is not necessary to carry the incision to the level of fascia. Although full-thickness burn is insensate, the patient will often require intravenous pain management during this procedure. Perform pain management or sedation as required. On completion of mid-lateral or mid-medial escharotomy, reassess the pulses. If circulation is restored, bleeding should be controlled and the extremity dressed and elevated at a 30–45° angle. Assess pulses hourly for at least 12–24 hours. If circulation is not restored, perform a second incision on the opposite side of the extremity. For upper extremities, place the hand in the anatomic position (palm facing forward) and make an incision in the mid-radial or mid-ulnar line. Ulnar incisions should stay anterior (volar) of the elbow joint to avoid the ulnar nerve, which is superficial at the level of the elbow. If pulses are not restored, a second incision may be necessary on the opposite side of the extremity. If both the hand and arm are burned, continue the incision across the mid-ulnar or mid-radial wrist and onto the mid-ulnar side of the hand or to the base of the thumb and then the thumb webspace. Following escharotomy, late bleeding may occur as pressure is decompressed and circulation restored. Examine the surgical site every few minutes for up to 30 minutes for signs of new bleeding.

Burn Management Protocol



Rule of Nines

Patient Assessment

STOP the burning process

1. Consider other traumatic injuries
2. Other life-threatening injuries take priority over burn management
3. Treat other injuries IAW TCCC or appropriate protocol

Trauma Assessment

M – Massive Hemorrhage
A – Airway
R – Respirations
C – Circulation
H – Hypothermia/Head Injury

Airway Patent & Adequate RR >8 and <30?

No → Assist Ventilations w/BVM Oxygen 100% if available → Refer to Airway Management Protocol

YES

Treat all other injuries before addressing burns

Evaluate degree of burn and % body surface area involved

Critical burn ?

YES → Initiate Saline Lock X 2 → Administer IV fluid per BAMC-ISR Rule of 10

NO → Initiate Saline Lock IV Fluids TKO

Dress burns with dry, sterile dressings Consider HPMK to cover burns >20%

Treat per Pain Management Protocol

For Airway or Respiratory Burns: Consider Albuterol Inhaler or other bronchodilators

Patient Warming Procedures

Monitor Urinary Output w/Foley if possible

Monitor IAW Protocol

Continue trauma assessment and treatments

BAMC-ISR Formula:
= %TBSA X 10cc/hour for adults weighing 40-80kg. For every 10kg above 80kg, increase rate by 100cc/hr.
For burns >20% TBSA, initiate fluid resuscitation ASAP.

Parkland Formula:
· The IV fluid required for the first 24 hours = 4mL/kg of LR x % area burned.
· Give half of the total fluid within the first 8 hours of the burn. -- Give the second half over the next 16 hours.

Document:
· Degree of Burn
· % of Body Burned
· Respiratory Status
· $EtCO_2$
· SpO_2
· Type of Burn
· Medical History
· Confined Space?

1. Remove clothes, flood with water ONLY if flames or smoldering is present.
2. Consider carbon monoxide poisoning if victim was within a confined space. If potential for CO poisoning exists administer oxygen 100%.
3. If shock is present consider underlying causes.
4. Note: the patient's palm represents 1% of their BSA. Use this as a reference.
5. Critical burn = · any degree >20% TBSA · 3rd degree >10% · respiratory injury · involvement of face, hands, feet, or genitalia · circumferential burns · associated injuries · electrical or deep chemical burns · underlying medical history (cardiac, diabetes) · age <10 or >50 years. Critical burns equals partial thickness burns 20% or greater.
6. Start IVs within unburned areas if possible. Burned areas may be used if needed.
7. Consider HPMK to cover burns >20%, to protect burns, and prevent hypothermia.
8. Treat other traumatic injuries prior to addressing a burn.
9. Burns above 40% TBSA should consider Airway protocol. Also, consider with 20% burns to chest.

Chemical Burns
1. Irrigate wound if possible with copious amounts of water to stop burning process and/or to remove chemical from wound.
2. If chemical is solid, brush off of skin and do not apply water.

Ocular Burns
1. Irrigate wound if possible with copious amounts of water or saline.
2. Consider administration of ocular anesthetic.

Pain Management

Basic Pain Management

Severity of pain is subjective and should be based on individuals and injuries and not this protocol alone. Any use of narcotic medications will be sedating and degrade the mission performance of patients. There is never an indication for SQ pain medication and if possible, avoid IM injections of narcotic medications due to the potential for delayed absorption. Apnea can occur at any dose of opioids and ketamine when pushed too quickly. Slow IV push is mandatory and completed over 30 seconds to 1 minute. Always closely monitor patients receiving these medications.

TCCC Application

Care Under Fire: No action required.

Tactical Field Care:

1. Able to fight*:* Administer combat wound pill pack (CWPP) pain management components (meloxicam, 15mg PO once a day and acetaminophen, 650mg bilayer caplet, PO q8hr) as soon as possible after wounding.

   Have a BVM or naloxone readily available whenever administering opiates.

2. Unable to fight but does not otherwise require IV/IO access: oral transmucosal fentanyl citrate (OTFC), 800–1,600mcg transmucosal (tape lozenge-on-a-stick to casualty's finger as an added safety measure). Reassess in 15 minutes. Add second lozenge, in other cheek, as necessary to control severe pain. Monitor for respiratory depression. **OR** ketamine 0.5mg/kg IM/IN **OR** fentanyl 0.5–1mcg/kg IN (using nasal atomizer device). Repeat dose q30min to 1 hour as necessary to control severe pain.
3. Unable to fight but IV or IO access obtained: ketamine 0.1–0.3mg/kg slow IV/IO push over 1 minute **OR** hydromorphone 0.5–1mg IV/IO **OR** fentanyl 0.5–1mcg/kg. Reassess in 10 minutes. Repeat dose q30min as necessary to control severe pain. Monitor for respiratory depression. Continue to monitor for respiratory depression and agitation. Avoid 0.3–0.8mg/kg Ketamine IV/IO dose.

Limit the use of IV pain medication to a single agent when possible, as poly-pharmacy may exponentially increase unintended side effects in a casualty.

Administer ondansetron 4–8mg IV/IO/ODT q8hr as needed for nausea/vomiting.

Tactical Evacuation: No change to tactical field care actions.

TMEP Application

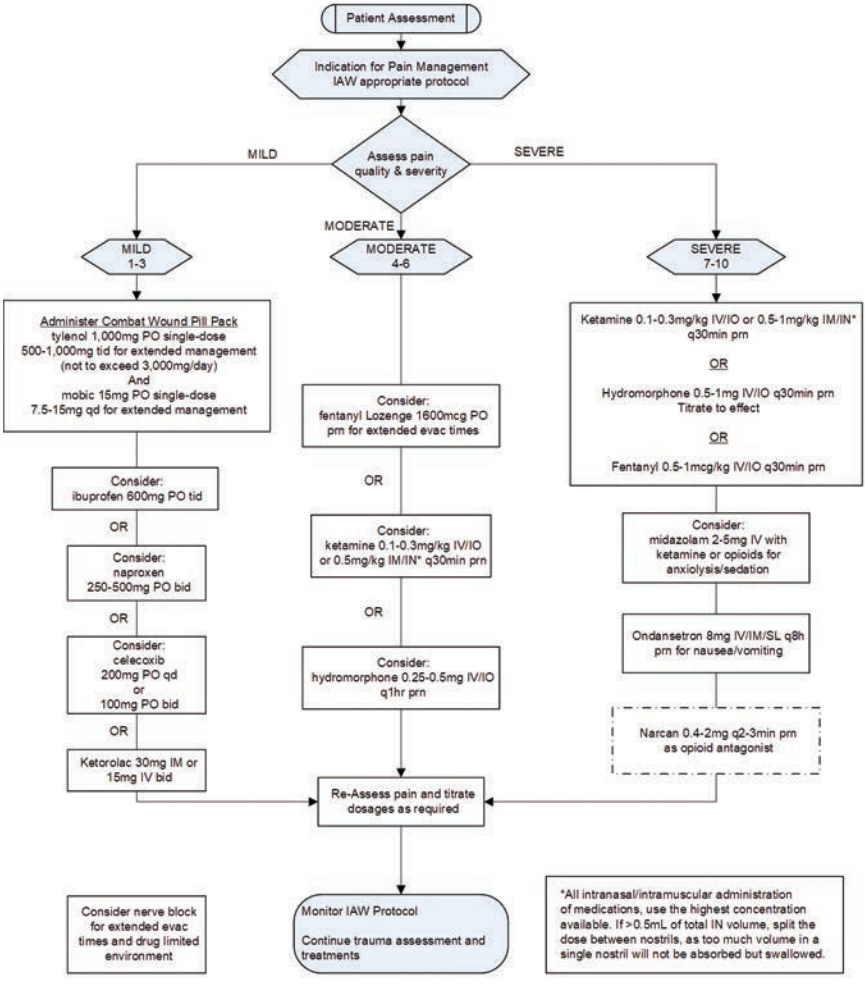
Start in sequential manner to maximize pain control with mission performance.

1. Acetaminophen 1,000mg PO TID.
2. Nonsteroidal anti-inflammatory drugs: meloxicam 15mg PO qd prn **OR** ibuprofen 800mg PO q8hr prn **OR** ketorolac 30mg IM (15mg IV) q8hr prn.
3. Narcotic Medications: oral transmucosal fentanyl citrate 800mcg PO over 15 minutes **OR** hydromorphone 0.5–1mg IV/IO **OR** ketamine 0.1–0.3mg/kg IV/IO q30min.
4. Procedural sedation with available medications.
5. Treat per *Nausea and Vomiting Protocol*.

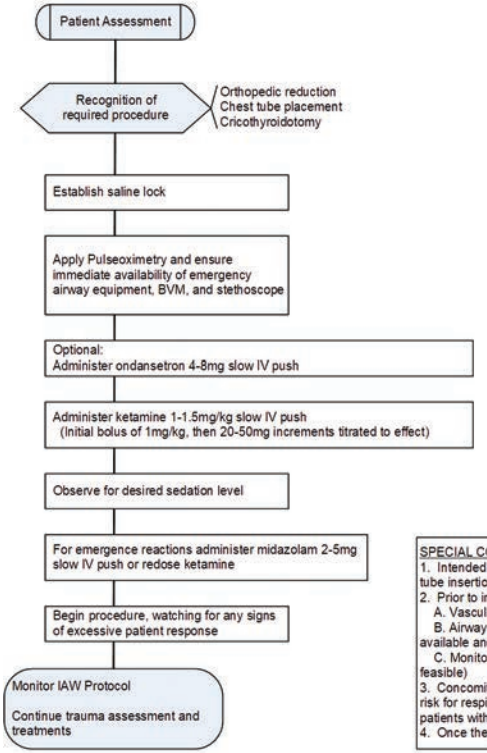
Considerations

When tactically feasible, adequately treat pain, as insufficient pain control can lead to post-traumatic stress. Pain should be assessed at its onset and reassessed frequently. Give repeat dose of pain medication when pain severity begins to increase. **Always** consider the different classes of pain medications and their side effects before administering. Any pain medication can cause apnea and the patient's respiratory status needs monitoring closely.

Pain Management Protocol



Procedural Analgesia



EQUIPMENT NEEDED:
- Saline lock
- Needle/syringe
- Medications
- Airway management equipment

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 within 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 in patients with shock or hypotension.
4. Once the protocol has been initiated monitor patient continuously.

Regional Anesthesia

Digital Nerve Block

Approach & Indications: The digital nerve block provides anesthesia to clean and repair wounds to any digit or assist with management of severe pain of the digit. Current literature classifies injectable anesthetics with epinephrine as contraindicated due to risk of vascular compromise. Follow maximum dosing and pharmacology protocols for the injectable anesthetic utilized.

Indications: Laceration or other wound cleaning and repair of digit, nail removal or trephination, or pain relief (ensure to documented detailed neurovascular exam to include intact flexor and extensor tendon exam prior to anesthetizing digit).

Technique: The procedure can be best accomplished using the transthecal (palmar/plantar) technique. Using standard sterile precautions, place the patient's hand on the procedure surface palm up. Locate the flexor tendon sheathe just proximal to the distal palmar crease. Insert the small-gauge needle at 90°, hit bone, slightly withdraw, and inject in standard fashion ensuring medication is not administered intravenously. During the injection, you can use the nondominant hand to apply pressure just proximal to the injection site, to direct the flow distally. The procedure can be performed on the digits of the feet as well using similar landmarks and methodology.

Hematoma Block

Approach & Indications: The hematoma block provides local anesthesia to assist with management of fracture reduction without the need and risks associated with procedural sedation. Subcutaneous injection of anesthetic prior to actual nerve block will lessen discomfort. Follow maximum dosing and pharmacology protocols for injectable anesthetic utilized. Use standard PPE precautions.

Indications: long bone fracture requires anesthesia to assist with reduction of fracture prior to splinting. Most commonly used for metacarpal or forearm fractures.

Technique: The hematoma block injection site is identified through palpation of the deformity and then cleaned in standard sterile fashion. The needle is then inserted generally perpendicular to the skin into the fracture site. This may be accomplished blindly through readjustments until the needle "falls" into the fracture with loss of resistance. Confirmation of needle location within the fracture site can be obtained by drawing back on the syringe plunger and aspirating hematoma. The hematoma can then be infiltrated with 8–12mL of anesthetic.

Wrist Block

Approach & Indications: The wrist block provides anesthesia to clean and repair large wounds to the hand or assist with management of severe pain or crush injury during further treatment or transfer to higher level of care. Ensure proper and accurate documentation of time and medication used to properly inform the receiving facility and providers. Follow the maximum dosing and pharmacology protocols for the injectable anesthetic utilized. Always use standard sterile precautions and withdraw prior to injection to ensure anesthetic is not administered intravenously. Review wrist and hand nerve distributions to determine appropriate single or combination of blocks indicated for the patient. Subcutaneous injection of anesthetic prior to actual nerve block will lessen discomfort. Generally, administer 5mL of anesthetic when performing block.

Indications: Multiple digit/large hand laceration or other wound cleansing and repair of digits, multiple nail removal or trephination, or pain relief (ensure to documented detailed neurovascular exam to include intact flexor and extensor tendon exam prior to anesthetizing digit).

Technique: The ulnar nerve block procedure is accomplished by inserting the needle at 90° at the proximal wrist crease and just ulnar and deep to the flexor carpi ulnaris tendon. Ensure needle is not within the ulnar artery by aspirating without blood return prior to injection. The median nerve block procedure is accomplished by inserting the needle at 90° at the proximal palmar crease in between these two tendons. The median nerve runs between the flexor carpi radialis and palmaris longus tendons. A pop is often felt when through the fascia, or withdraw the needle after hitting bone to verify position. A fan technique of anesthetic administration will ensure complete anesthesia. The radial nerve block procedure is accomplished by inserting the needle at 90° just distal due to the radial styloid in the anatomic snuff box over the radial side of the wrist.

Fascia Iliaca Block

Approach & Indications: This block allows for anesthesia of at least two of the three major nerves that supply the medial, anterior and lateral thigh with one simple injection, namely the femoral and lateral femoral cutaneous nerves. Ensure proper and accurate documentation of time and medication used to properly inform the receiving facility and providers. Subcutaneous injection of anesthetic prior to actual nerve block will lessen discomfort. Do not exceed 400mg of lidocaine with this injection or 40mL of 1% lidocaine and follow maximum dosing and pharmacology protocols for the injectable anesthetic utilized. Use standard sterile precautions.

Indications: The fascia iliac nerve block provides anesthesia to assist with management of hip fracture or dislocation reduction without the need and risks associated with procedural sedation. It is also very useful for regional pain control with femur fractures.

Technique: Draw a line between the anterior superior iliac spine (ASIS) and pubic tubercle on the side of the planned block. Divide this line into thirds. Using a blunt-tipped needle, insert the needle 1cm distal to the junction of the lateral 1/3 and 2/3 marks. Verify this is lateral to the femoral artery and expected to be lateral to the femoral nerve that is adjacent to the artery laterally. Two distinct pops should be felt during needle insertion as it penetrates the two fascia layers. Insert the needle 1–2mm past the second pop. Withdraw to ensure the needle is not located intravascularly and slowly inject the anesthetic. The medication should flow easily, if not, slightly withdraw as the needle is likely within the muscle. Inject 20–30mL of long-acting anesthetic slowly.

Austere Extended Care

Extended Evacuation in Austere Environment

Extended Austere Care: Due to the extreme nature of Special Operations, the Ranger Medic may find himself in a situation in which prompt evacuation of casualties to a surgical facility is not possible for long periods of time. In these situations, the Medic is limited to what he is carrying and the contingencies previously considered and planned for. Essentially, **extended care begins at the point in which you thought you were going to evacuate your casualties**. The Medic should make all possible attempts to make contact with higher medical capability to confirm extended care measures.

Extended Care Considerations

Principles of Extended Care: Once the Medic has identified that they have transitioned into extended care, a tactical pause must be taken. Additional factors may become priorities and to remain effective the Medic must have a plan for treatment. There are several key principles which aid in preparation and execution of extended austere care.

- Plan appropriately
- Understand resuscitation goals
- Proper pain management and understanding potential drug interactions
- Monitor/trending vitals to include UOP and physical exams
- Create an effective plan for treatment and identify possible procedures
- Performing surgical procedures, within scope of practice, in the absence of timely evacuation
- Prevent any damage done by treatments and provide effective nursing care
- Utilize telemedicine as early as possible
- Effective team dynamics and utilize a rest cycle for sustainability
- Prepare an effective handover

Extended Care Capabilities: Using the Good, Better, Best model and having a strong understanding of both physical limitations (i.e., equipment) and mental limitations (i.e., knowledge) will aid the Medic in preparing and executing effective extended care.

- Monitor vitals
- Resuscitate
- Definitive airway control
- Be able to ventilate/oxygenate
- Utilize sedation/pain control
- Perform physical exams
- Execute nursing care
- Perform surgical interventions
- Understand and execute telemedicine
- Package and prepare for evacuation

Patient Assessment: After completing the initial MARCH assessment and being alerted of extended evacuation times, the Medic must transition to completing a more comprehensive assessment and focus on additional tasks. **MARCH-E PAWS-B** and **RAVINES** are two potential options.

- **MARCH-E**yes, **P**ain, **A**ntibiotics, **W**ounds, **S**plinting, **B**urns
- **R**esuscitation/Reduce Tourniquets, **A**irway (Definitive/Sedation), **V**entilation/Oxygenation, **I**nitiate Telemedicine, **N**ursing Care, **E**nvironmental Considerations, and **S**urgical Procedures

Vital Signs: Vital signs should be assessed frequently, especially after specific therapeutic interventions, and before and after moving patients. Any change in vital signs should prompt an assessment to determine the cause and appropriate action should be taken. Documentation of vital signs in extended care will help with gaining a better understanding of where your casualty is trending.

- **Good:** BP cuff, stethoscope, pulse oximeter
- **Better:** $EtCO_2$, Foley
- **Best:** Monitor for vital signs

Airway Management: Airway assessments should be done at regular intervals to ensure patency and provide suction as needed. This is of particular importance after performing any patient movement. Remember to assess cuff pressures.

- **Good:** Supraglottic airway
- **Better:** Definitive airway management
- **Best:** Long duration sedation and definitive airway control

Extended Care Considerations (cont.)

Breathing/Respiratory Management: If ventilation support is required, place patient on SaVE 2 mini-vent or ventilate with BVM. Consider alternating between SaVE and BVM to conserve battery strength. Continue needle decompressions as indicated and change chest seals as required to ensure occlusion. Establish thoracostomy as required. If chest tube established, routinely check, reinforce, and suction as needed.

- **Good:** BMV with PEEP
- **Better:** Supplemental oxygen
- **Best:** Portable ventilator

Wound Management: Particular emphasis must be placed on several aspects of long-term wound care to achieve ideal outcomes for wound management in extended care.

- **Physical Examination:**
  - Inspection of the wound and surrounding tissues for necrosis/infection
  - Passive/active range of motion
  - Ultrasound
  - Labs
- **Irrigation/Debridement**
  - Clean water from bottles or canteens may be used to washout wounds.
- **Dressing Changes/Reassessments**
  - Tourniquets and dressings should be checked and reinforced. Convert tourniquets to pressure dressing as soon as possible.
- **Splinting/Reduction of fractures**
- **Telemedicine**

Damage Control Resuscitation (DCR): The goal is to maintain a systolic blood pressure of 90–100mmHg and patient mentation. Continue fluid resuscitation IAW appropriate protocols. A Foley catheter should be placed as soon as possible. Record I/O and shoot for 30–50mL/hr (0.5–1mg/kg/hr).

Pain Management/Sedation: It is important to have an understanding of your goals with pain management and sedation.

1. Keep the casualty alive. Do not give analgesia or sedation if there are no other priorities.
2. Sustain adequate physiology to maintain perfusion. Avoid medications that cause hypotension/bradypnea for patients with hemorrhagic shock or respiratory distress.
3. Relieve pain first.
4. Maintain safety. Agitation and anxiety may result in damage to interventions/equipment/patient
5. During painful procedures amnesia may be required. Titrate to effect and duration with a limited amount of medication, the Medic must get the most out of what he/she carries. Start low and go slow, the less blood volume means less medication to achieve desired effects. Utilize regional anesthesia when able and trained appropriately.

- **Background Pain:** the pain that is always present because of an injury or wound. Keep the patient comfortable at rest and do not impair breathing/circulation/mentation.
- **Breakthrough Pain:** acute pain from movement/manipulation. Manage as needed.
- **Procedural Pain:** associated with a procedure. Anticipate and medicate appropriately both before, during, and after the procedure.

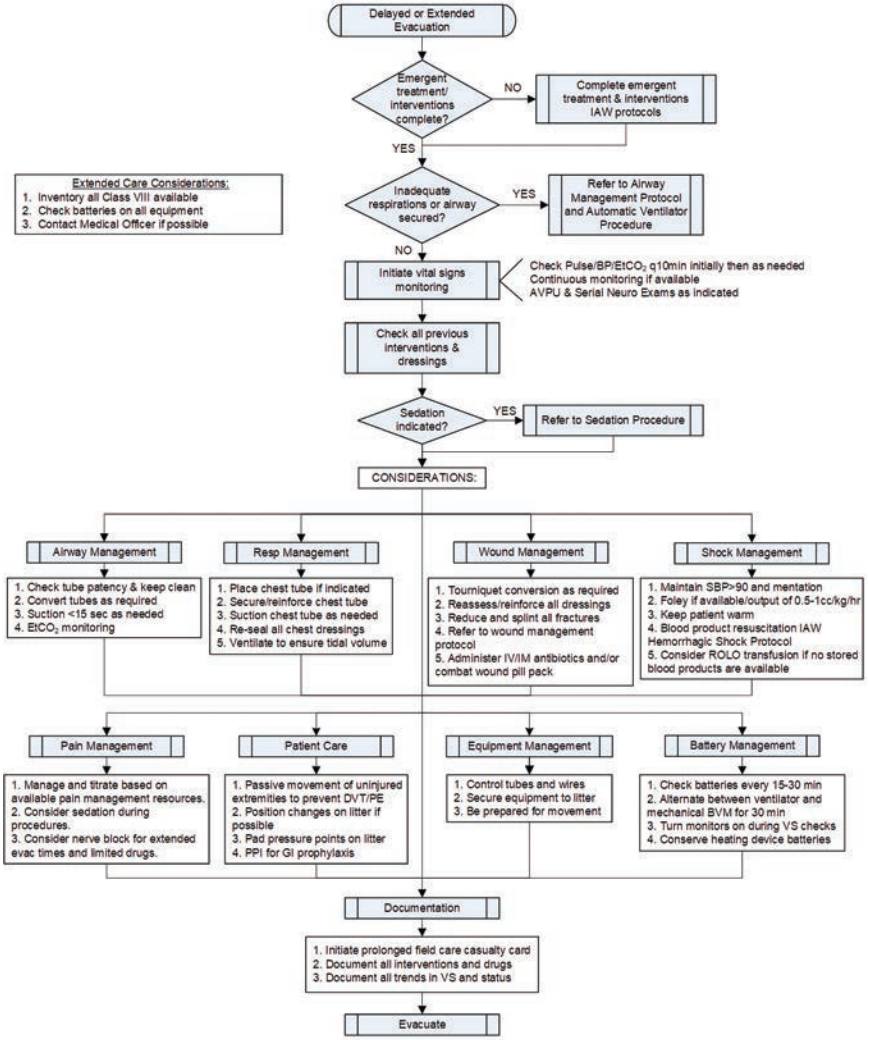
Nursing Care: Utilize passive movement of uninjured extremities to prevent DVT or PE (BPT to manage as applicable). Also, consider position change on the litter and padding of pressure points. Hypothermia management will remain a constant concern for the traumatized patient. Apply the HITMAN pneumonic when remembering nursing care:

- Hydration
- Infection
- Tubes
- Medications
- Analgesia
- Nutrition

Equipment & Battery Management: Check battery strengths every time equipment is activated. Consider alternating between manual and mechanical VS check or ventilation for periods of time. Turn on devices only when needed. Keep devices as clean and protected as possible. Ensure you train with equipment you plan on using in potential extended care scenarios. Understand how to troubleshoot your equipment.

Documentation: Maintain Consistent and Accurate Documentation. Upon eventual evacuation, your management and interventions will be critical to receiving medical facilities. Record vital signs trends and all fluids infused along with estimations of blood loss and urine output.

Austere Extended Care Protocol



Blood Transfusion

WARNINGS

1. **Confirmed O low titer** is the only universally compatible FWB type. Second choice should be nontitered O. Otherwise, transfusions of FWB must be an ABO match. All attempts should be made to transfuse blood from pre-identified ROLO donors. For female casualties, do not delay transfusion for Rh– blood if needed.
2. 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.
3. Use only collection bags designed for the collection of whole blood (WB) and administration sets designed for the administration of blood and blood components. Failure to do so may lead to fatal thromboembolic events.
4. 0.9% normal saline (NS) is the IV fluid of choice for administering with blood or blood components. Lactated Ringer's solution can be used if normal saline is unavailable. Colloids (Hextend) or dextrose-based fluids should NOT be used at any time.
5. Great care should be taken to practice aseptic technique when performing transfusions in the field to prevent subsequent infection.
6. 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.

S/Sx of Reactions

Allergic Reaction S/Sx: Diffuse, itchy rash most common. Anaphylaxis may also occur.

Anaphylactic Reaction S/Sx: Shock, hypotension, angioedema, respiratory distress

Acute Hemolytic Reaction S/Sx:

1. Acute hemolytic reaction usually has onset within 1 hour.
2. Evidence of disseminated intravascular coagulopathy (DIC) – oozing from blood draw, IV sites
3. Flushing, especially in the face
4. Fever, an increase in core temp of more than 2°F (1°C)
5. Shaking, chills (rigor)
6. Flank pain or the acute onset of pain in the chest (retrosternal), abdomen, and thighs
7. Wheezing, dyspnea
8. Anxiety, feeling of impending doom
9. Nausea and vomiting
10. Hypotension
11. Pain, inflammation, and/or warmth at the infusion site
12. Red or brown urine (hemoglobinuria): The onset of red urine during or shortly after a blood transfusion may represent hemoglobinuria (indicating an acute hemolytic reaction) or hematuria (indicating bleeding in the lower urinary tract).

Febrile Nonhemolytic Reactions S/Sx: Fever not as severe with an acute hemolytic reaction; chills; dyspnea

Transfusion-Related Acute Lung Injury (TRALI) S/Sx: Development of ARDS following transfusion. Often presents with hypoxemia, hypotension, and frothy, pink pulmonary secretions. Avoid female donors to reduce chances of TRALI.

Management of 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.

Febrile Reaction: Diphenhydramine 25–50mg PO, PR, or IV for urticaria.

Anaphylactic Reaction: Treat IAW Anaphylactic Management Protocol.

1. Epinephrine 0.3mL of 1:1,000 IM (first line) or push dose 1:100,000 epinephrine to maintain blood pressure.
2. Airway maintenance and oxygenation.
3. Resuscitate hypotensive patients with IV fluids.

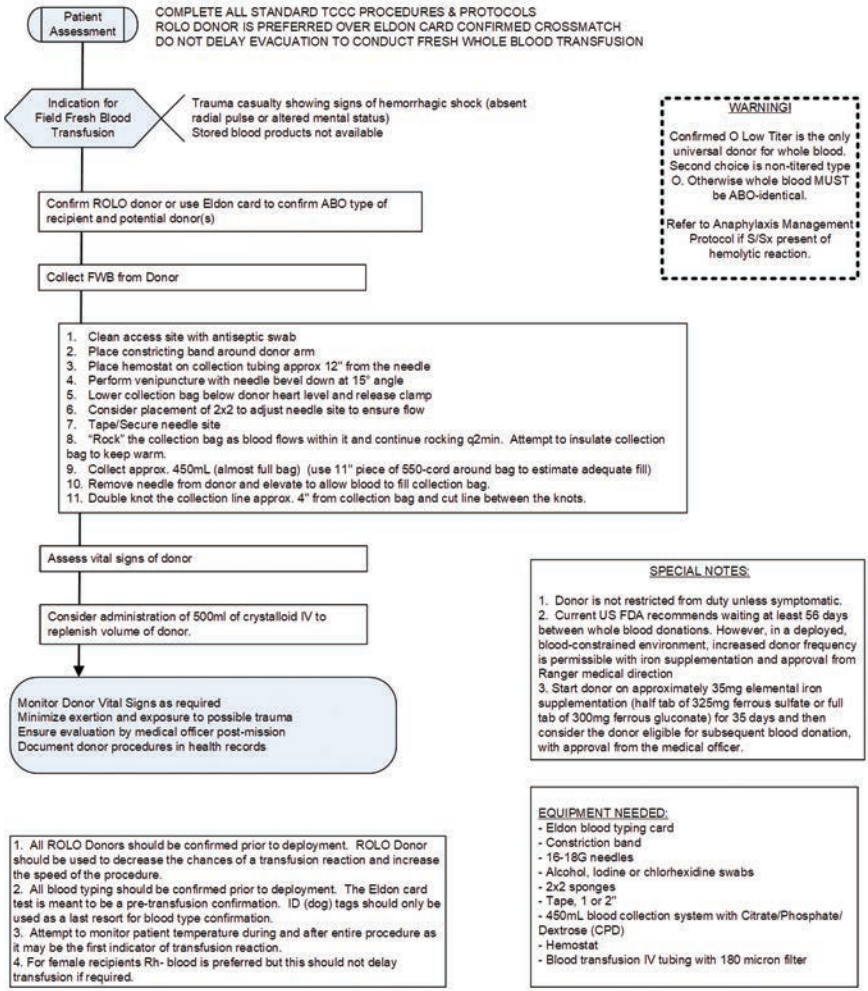
Acute Hemolytic Reaction:

1. Secure and maintain airway.
2. Begin IV infusion of crystalloids.
3. Goal of fluid replacement is to infuse 100–200mL/hr in order to support a urine output of 1–2mL/kg/hr.
4. The patient should receive a foley catheter to monitor urine output.
5. Consider using Acetaminophen 1g PO, PR, or IV (q6hr to treat discomfort associated with fevers. (Avoid the use of aspirin or other NSAIDs).
6. Administer 25–50mg of diphenhydramine IM or IV to treat the associated histamine release from AHTR. Antihistamines should not be mixed with blood or blood products.
7. 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.

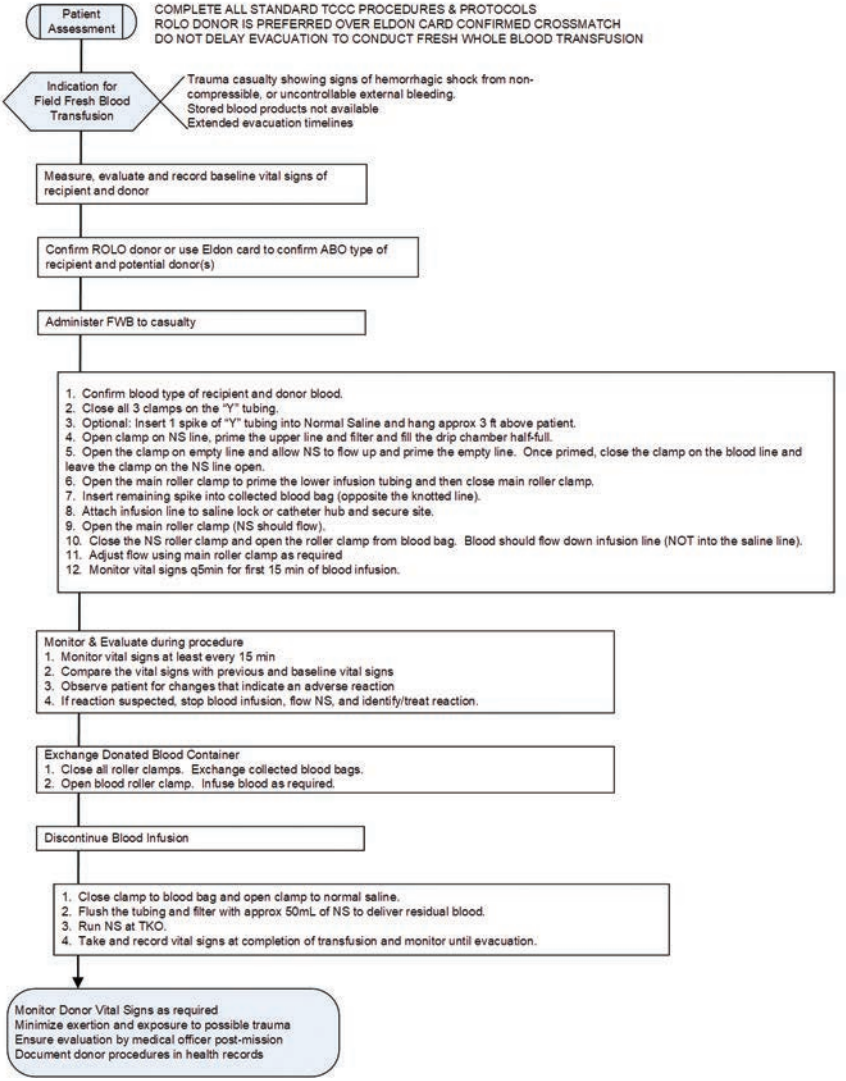
Febrile Nonhemolytic Reactions: Treat with antipyretics. Acetaminophen 1g PO, PR, or IV (avoid the use of aspirin and other NSAIDs). If symptoms abate and there is no evidence of an acute hemolytic reaction, consider restarting the transfusion.

TRALI: Secure and maintain the airway. Administer supplemental oxygen and maintain continuous pulse oximetry monitoring. Treatment may require positive pressure ventilation with a high PEEP. Prepare for surgical airway and mechanical ventilation if severe hypoxia occurs. Use suction to remove secretions.

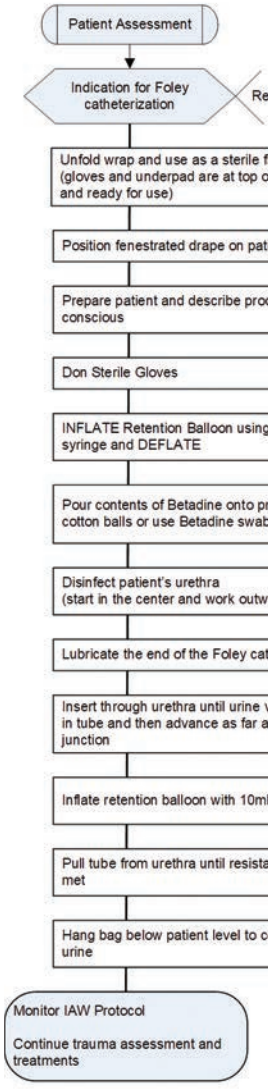
Fresh Whole Blood Transfusion (Donor Procedure)



Fresh Whole Blood Transfusion (Recipient Procedure)



Foley Catheterization Procedure



EQUIPMENT NEEDED:
- Foley catheterization set

DOCUMENTATION:
- ABC's/airway status
- Detailed assessment
- Vital signs
- Date/Time of procedure
- Amount of urine collected (hourly)
- Response to procedure
- Complications encountered

1. Inflate with 10mL of normal saline.
2. The catheter must be advanced to the Y-junction as to avoid urethral injury due to the balloon being inflated in the urethra. Care must be taken to ensure the balloon is in the bladder. You may try to irrigate the catheter with >10mL of sterile saline. If the solution does not easily return, you may not have the catheter far enough in the bladder.

Intake and output (I&O) measurements are used to determine if a patient is retaining fluid or diuresing (putting out more fluid than is being taken in). Initial Foley output is not included in this measurement. The patient retaining fluid is at risk for respiratory failure due to pulmonary edema, cardiac compromise due to congestive heart failure and increased risk of skin breakdown due to increased fluid in the tissue. I&O also gives the medic a quick snapshot of renal function and perfusion. Urinary output that averages less than 0.5mL/kg/hr is marginal and may be an indicator of decreased renal perfusion and/or function.

1. Measure and record all input, which is any fluid that goes into the patient; IV fluids, fluids by mouth, fluids via NG tube, and IV medications.

2. Measure and record all output, which is urine, emesis, liquid stool, and anything coming out of a drainage tube.

3. The output is subtracted from the input. If input is larger the patient is positive, and if output is larger the patient is negative in balance.

4. Do not over or underestimate the volumes of intake and output.

Crush Syndrome Management

Crush Syndrome Management Considerations

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.

1. The principles of hypotensive resuscitation according to TCCC **DO NOT** apply in the setting of extremity crush injury requiring extrication.
2. In the setting of a crush injury associated with noncompressible (thoracic, abdominal, pelvic) hemorrhage, aggressive fluid resuscitation may result in increased hemorrhage.
3. With extremity crush injuries, tourniquets should NOT be applied during Phase 1 unless there is hemorrhage that is not controllable by other means.
4. Be aware of development of cardiac dysrhythmias due to hyperkalemia immediately following extrication.
5. BE AWARE OF DEVELOPMENT OF CRUSH SYNDROME STARTING AS EARLY AS 4 HOURS POST INJURY.

THESE MEDICATIONS ARE NOT PART OF THE STANDARD AID BAG AND REQUIRE DEVELOPMENT OF A SEPARATE CRUSH INJURY KIT.

Phase 1: Immediate Management (while attempting to extricate)

The following management measures are to be initiated if time from initial crush to extrication exceeds 4 hours, while still trying to extricate the patient, and complete prior to extrication when crush has been > 4 hours:

1. Maintain patent airway and adequate ventilation.
2. Monitor O_2 sat with pulse oximetry and administer high-flow oxygen if indicated.
3. Give initial bolus of 1–2L of crystalloid solution **PRIOR** to attempts at extrication and continue at 1.5L/hr. In a patient making urine, physiologic isotonic fluids (plasmalyte or Ringer's lactate) are the fluid of choice to prevent worsening acidosis and worsen hyperkalemia.
4. Maintain urine output at greater than or equal to 1–2mL/kg/hr and monitor urine output volume. Place a foley whenever possible to monitor for accurate urine output.
5. Assess and reassess mental status.
6. Follow Pain Management Protocol
7. Treat with prophylactic antibiotics: ertapenem 1g IV if time and tactical situation allow.

Utilize cardiac monitoring if available to monitor for signs of hyperkalemia. Treat suspected emergent hyperkalemia accordingly. Cardiac arrest should be treated per standard ACLS protocol with addressing early hyperkalemia as likely cause with calcium, sodium bicarbonate, insulin with glucose (if available), and albuterol treatments.

Phase 2: Immediately Prior To Extrication

The following management measures are to be attempted immediately after extricating the patient:

1. **Cardiac dysrhythmias or arrest are likely immediately following extrication.**
2. CPR should be initiated if cardiac arrest develops following extrication IAW ACLS Protocol. DO NOT follow the TCCC guidelines on cardiac arrest.
3. If extrication is > 4 hours **OR** in the presence of dysrhythmias, administer 1 amp of calcium chloride or 3 amps of calcium gluconate slow IV push. Calcium should not be given in bicarbonate-containing solutions due to precipitation of calcium carbonate.
4. If arrhythmia occurs, calcium should be given repeatedly until arrhythmia resolves. Once arrhythmia has resolved, the patient should be treated with high dose albuterol, sodium bicarbonate, and insulin with glucose to shift potassium intracellularly.
5. TQ use in the Crush protocol is based on situation and time: TQ's should be placed on crushed limbs for extended crush times combined with the lack of drugs to perform proper ACLS.

Following extrication, once the patient is stabilized, be prepared to treat recurrent dysrhythmias or hyperkalemia. Monitor urine color for myoglobin. Darker urine (red, brown, or black), either consistently or worsening over time, is associated with increasing myoglobinuria and increased risk of kidney damage. Consider increasing IV fluids to goals at or above urine output goals of 100–200mL/hr. The fluid rate should be adjusted to maintain this level of UOP. Monitor for compartment syndrome of the crushed extremity with evidence of pain out of proportion, paresthesia, pallor, paresis, pulselessness, and poikilothermia.

Phase 3: Evacuate

Urgent: Evacuate to a surgical facility. If compartment syndrome develops, likelihood of loss of limb increases with time to fasciotomy by a trained medical provider.

Crush Protocol

CRUSH INJURY PATHOLOGY

The damaged cells release intracellular K+ into the serum. The resulting HYPERKALEMIA is what leads to arrhythmias and possible cardiac arrest

FLUIDS:

If available, LR or Plasmalyte (balanced crystalloids) are the preferred resuscitative fluid. Normal saline is acidic (pH 4.5-5.5) and causes K+ to shift EXTRACELLULARLY, thereby increasing the serum K+

CALCIUM

Use 1g of whatever calcium formulation you have in your kit

Calcium comes in 2 formulations: Calcium gluconate and calcium chloride.

3g CaGlu = 1g CaCl

If you have calcium gluconate, you may need more doses to abort the arrhythmia. It also may wear off faster and you may need to re-dose more frequently.

If you have calcium chloride, you need a very good IV/IO. If calcium chloride extravasates, it can cause tissue necrosis. It is also sclerotic to veins and IV's will not last as long as they usually do. If you see erythema or swelling around the IV, you need to remove it and use another site immediately

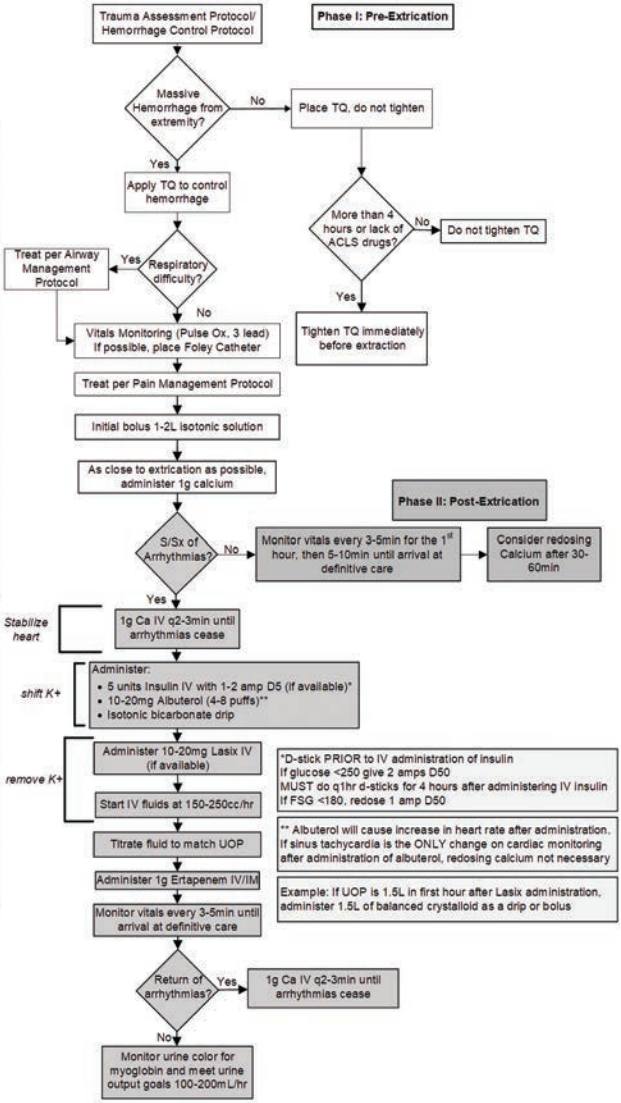
ARRHYTHMIAS:

- Peaked T-Waves
- Prolonged PR, Widen QRS complexes
- Increasing PVCs/PACs
- Junctional rhythm
- Bradycardia
- V-tach/Vfib
- Cardiac Arrest

ISOTONIC BICARBONATE DRIP:

Mix 3 amps of bicarbonate (150mEq per amp x3 = 450mEq) in 1L of sterile water OR D5W (do NOT use NS/LR/Plasmalyte)

Infuse at 150-250 cc/hr. Repeat as needed



Evacuation

SOF Aircraft Capacities

MH-60 – 2 × litter, 1 × ambulatory (optimal) **OR** 2 × litter only with auxiliary fuel tank **OR**
3 × litter (minimal en route treatment) **OR** 1 × litter and 2–3 × ambulatory.
MH-47 – 8 × litter (floor-loaded)
MH-6 – 1 × litter (floor-loaded) for emergency contingency only. Never plan an MH6 as a primary CASEVAC platform.
HH-60 – With carousel – 4 × litter; without carousel – 2 × litter, 1 × ambulatory
CV-22 – 5 × litter (floor-loaded)

General Principles of Rescue

During all rescue operations, tactical security and prevention of additional injuries (patients and rescuers) must be under constant consideration by all participants. The principles or phases of tactical rescue include security of area/force; assessment of rescue situation; gaining access; rendering emergency care; disentanglement/extrication; removal; stabilization medical care; and evacuation. Contingency planning, training, and rehearsals should always be a consideration. Consider anchoring of rolled vehicle to prevent shifting of weight. If possible, CCP should be established upwind from the site. Timing of evacuation requests must be synchronized to expected timeframes of extracting and packaging of casualties. Keep C2 informed.

Downed Aircraft Casualty Extraction Considerations

A downed aircraft can occur during any phase of tactical operation, having a dramatic effect on the operation, and should always be an assumed contingency. The immediate concern is securing the site and suppression of enemy actions. Rescuers should identify themselves as friendly when approaching a downed aircraft. Immediate casualty care is focused on coinciding extraction from burning aircraft and treatment of life-threatening injuries. Casualty collection points must be at a minimum safe distance from potential ammunition cook-off. CCP should be established upwind from site, if possible, as burning aircraft materials can be toxic. Buddy-team search parties conduct methodical searches around crash site for thrown victims. If possible, anchor the aircraft to the ground to prevent shifting or rolling. CSAR link-up and assumption of C2 should be rehearsed as contingency for all aircraft operations. N-95 masks should be included in CSAR kits to protect rescuers.

Vehicular Casualty Extraction Considerations

Vehicle rollovers, IED events, and driving accidents can occur during any phase of a tactical operation. Scene security and C2 must be established as soon as possible with the understanding that a combat engagement may continue during rescue attempts. Suppression of enemy fire remains the primary mission at all times. Ensure the safety of rescuers and casualties. Assess the scene situation to determine the need for additional assets. Recognize the kinematics that produced injuries and consider the treatments/equipment required to manage casualties. Identify and manage life-threatening conditions and defer non-life threats to later stage. Consider CS stabilization as applicable if kinematics or MOI indicate potential spine injuries. Consider threats to rescuers and casualties to include fire in vehicle, leaking fuels/products, ammunition cook-off, and other environmental conditions. Manage injuries IAW tactical trauma protocols with deference to use of conventional/civilian techniques when indicated.

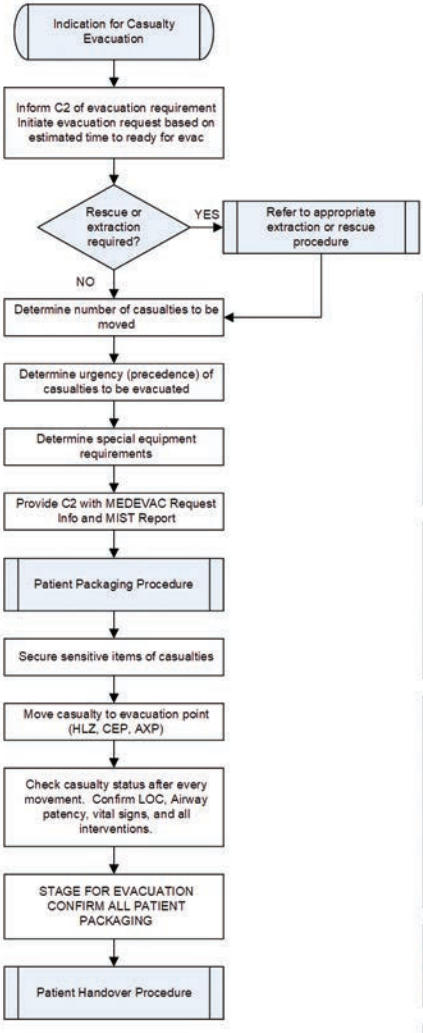
Confined Space/Building Collapse Extraction Considerations

Confined space rescues in the tactical setting include casualties who have fallen into wells, storage tanks, drainage systems or trenches. Aside from the injuries incurred on initial trauma, closed spaces may contain low amounts of oxygen or potentially hazardous gases or materials. Key information requirements are number of casualties and potential hazards to patients and rescuers.

Building collapse rescue is complex, usually involves large numbers of personnel and specialized equipment, requires knowledge of building design and will likely take an extended period of time. Security of the site is paramount. Key information requirements are the last known positions of personnel prior to the collapse. The organization of small search teams covering sectors is critical. Aside from trauma injuries involved with the collapse, rapid cardiovascular compromise is the greatest life threat as victims are extracted. Sudden cardiac arrest may occur from acidosis and hyperkalemia. Refer to the Crush Syndrome Management Protocol.

Constant awareness of the security situation, flammable materials, and additional hazards are paramount during rescue operations.

Evacuation Protocol



MH-60 CASEVAC / UH-60 MEDEVAC:
- Always approach aircraft from 3 o'clock or 9 o'clock
- Wait for Crew Chief or Flight Medic to signal you to approach aircraft.

MH-47 CASEVAC:
- Always approach aircraft from 6 o'clock
- Wait until the ramp drops and for Crew Chief or Flight Medic to signal you to approach aircraft.

MH-6 CASEVAC:
- Always approach aircraft from 3 o'clock or 9 o'clock
- Wait for the pilot to signal you to approach aircraft.

HLZ GUIDELINES:
1. To prevent further injury to patient, injury to the other personnel, and damage to the aircraft, ensure there is little to no debris on the HLZ.
2. The HLZ should be as flat/level as possible. If the surface does not meet these conditions, and advisory must be given and the aircraft must either terminate at a hover or touch down while under power.
3. Never approach the aircraft on a downhill slope.

HLZ DIMENSION REQUIREMENTS:

Size 1	80ft (25m)	Light observation A/C (OH6 or OH-58)
Size 2	125ft (35m)	Light Utility/Attack A/C (UH-1H, H-65)
Size 3	160ft (50m)	Medium Utility/Attack A/C (UH60)
Size 4	265ft (80m)	Cargo A/C (CH-47 or CH-53)

CASUALTY MARKING
RED – Urgent
GREEN – Priority
BLUE – Expectant or Routine

NOTE: Rehearse and train with receiving providers and platforms ahead of missions to identify pertinent handover procedures (radio frequencies, casualty loading procedures, MASCAL contingencies, etc.)

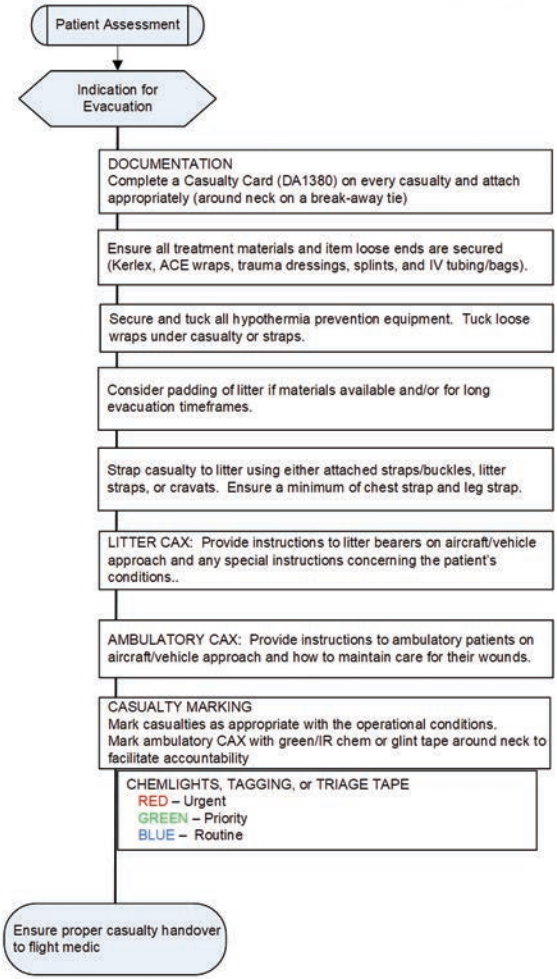
NATO MEDEVAC Request	
MEDEVAC REQUEST 9-LINE	
LINE 1: Location of Unit	HLZ GRID (MGRS):
LINE 2: CALLSIGN AND FREQUENCY AT THE PZ	CALLSIGN: FREQUENCY:
LINE 3: NUMBER AND PRECEDENCE OF CASUALTIES	A: Number of Urgent Casualties B: Number of Urgent-Surgical Casualties C: Number of Priority Casualties D: Number of Routine Casualties E: Number of Convenience Casualties
LINE 4: SPECIAL EQUIPMENT REQUIRED	A: None B: Hoist C: Extraction D: Ventilator E: Other (specify)
LINE 5: NUMBER OF CASUALTIES BY TYPE	L: Number of Litter Casualties A: Number of Ambulatory Casualties E: Number of Escorts
LINE 6: SECURITY AT PZ	N: No enemy P: Possible enemy E: Enemy in area X: Armed escort required
LINE 7: PZ MARKING	A: Panels B: Pyrotechnics C: Smoke (designate color) D: None E: Other (specify)
LINE 8: CASUALTIES BY NATIONALITY/STATUS	A: US/Coalition Military B: US/Coalition Civilian C: Non-Coalition D: Non-Coalition Civilian E: Opposing Forces/Detainee F: Child
LINE 9: DESCRIPTION OF TERRAIN (In peacetime, description of terrain)	N: Nuclear B: Biological C: Chemical In peacetime: Brief description of significant obstacles on approach/departure headings and type of predominant terrain for the HLZ

NOTE: Lines 1–5 required to initiate MEDEVAC spin up

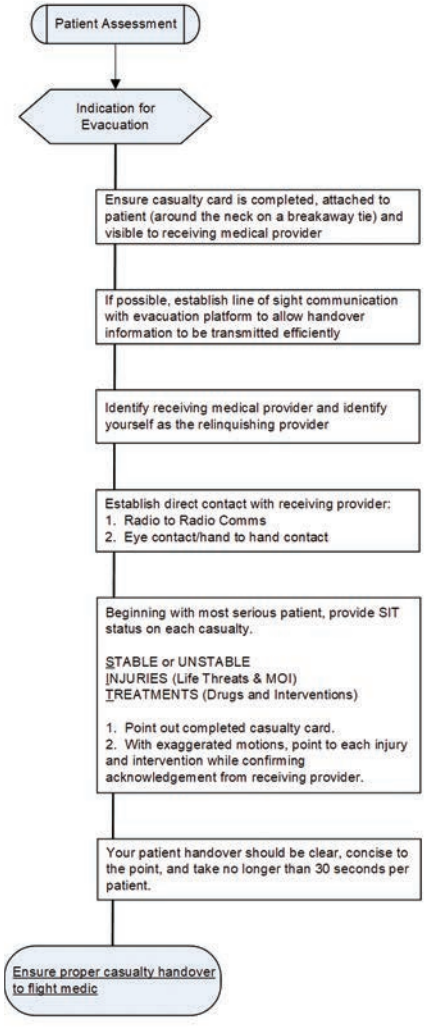
MIST REPORT	
M – MECHANISM OF INJURY AND TIME OF INJURY (IF KNOWN)	Mechanism of Injury and time of injury (if known)
I – INJURY **OR** ILLNESS	Injury **OR** Illness
S – SYMPTOMS AND VITAL SIGNS	**A –** Airway status **B –** Breathing rate **C –** Pulse rate **D –** Conscious/Unconscious **E –** Other signs
T – TREATMENT GIVEN	Such as Tourniquet/Time Applied Drugs administered

SIT REPORT (used when communicating with PSG/1SG or patient handoff to MEDEVAC)	
S	STABLE/UNSTABLE
I	NOTABLE INJURIES
T	TREATMENTS RENDERED (Emphasis on medications, fluids, or procedures that cannot be seen by subsequent Medics/providers)
D	DRUGS ADMINISTERED

Evacuation Patient Packaging



Evacuation Patient Handover



EQUIPMENT NEEDED:
- Casualty card
- Communications equipment

MINIMUM PATIENT HANDOVER INFORMATION:

Stable vs Unstable: With one arm, give a thumbs UP/DOWN and an exaggerated arm motion.

Injuries/MOI: Quick summary of life threatening injuries and MOI (GSW, blast, fall, etc.).

Treatments / Drugs Administered: Interventions and type, dose, route of any narcotics, antibiotics or fluids administered, emphasizing treatments that cannot be seen by receiving provider.

STANDARD PATIENT HANDOVER INFORMATION:

Mechanism of Injury: Quick summary of how the casualty was injured.

Stable vs Unstable: With one arm, give a thumbs UP/DOWN and an exaggerated arm motion.

Drugs Administered: Type, dose, route of any pertinent medications administered

Pertinent Vital Signs: Last pertinent VS and any trends identified.

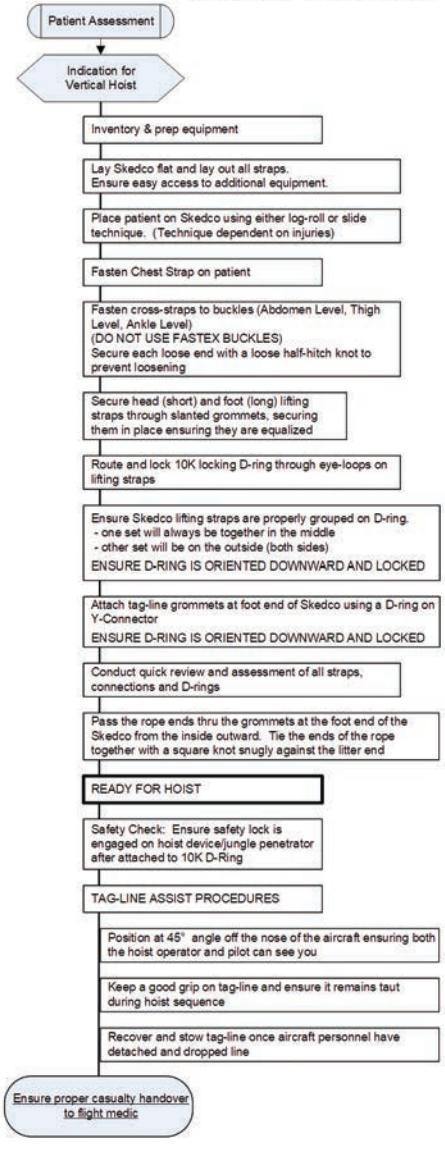
Interventions: Identify and describe results or complications.

Fluids Given: Relate type, amount and time.

HANDOVER INFORMATION FLOW:
Due to excessive noise, it is key to have the casualty card completed. The flight medic will not be able to hear everything that is said.

NOTE: Rehearse and train with receiving providers and platforms ahead of missions to identify pertinent handover procedures (radio frequencies, casualty loading procedures, MASCAL contingencies, etc.)

Skedco Horizontal Hoist Procedure



EQUIPMENT NEEDED:
- SKEDCO Litter (Full-size ONLY)
- 2x Horizontal lifting straps (one long/foot end and one short/foot end)
- 10,000 lbs D-ring
- Tag-line carabiners and Y-connector

HAND & ARM SIGNALS:
Hoist Up: With one arm, give a thumbs UP and an exaggerated upward arm motion.
Hoist Down: With one arm, give a thumbs DOWN and an exaggerated downward arm motion.
Stop Hoist: With one arm, make a fist and hold arm straight out.
Emergency During Hoist: Arm held directly out 90 degrees to side of body moving continuously to and from body.
Deploy Hoist: One arm held straight up and one arm held straight out 90 degrees to side of body (3 O'clock position).

CAUTIONS:
1. Never attempt to grab the hoist cable when it is in mid air. Always wait for the cable to touch the ground and discharge its static charge.
2. Wear gloves when controlling the tag line.
3. Shield the casualty from rotor wash.
4. Ensure all locking D-rings are oriented in a gate down position to prevent gravity and vibrations from unscrewing the threaded lock.
5. Do not drag or grab or maneuver the Skedco using the hoist straps to prevent fraying or damage.
6. Avoid nylon on nylon friction points.

Skedco Vertical Hoist Procedure

Patient Assessment

↓

Indication for Vertical Hoist

Inventory & prep equipment

Lay Skedco flat and lay out all straps.
Ensure easy access to additional equipment.

Place patient on Skedco using either log-roll or slide technique. (Technique dependent on injuries)

Fasten Chest Strap on patient

Fasten cross-straps to buckles (Abdomen Level, Thigh Level, Ankle Level)
(DO NOT USE FASTEX BUCKLES)
Secure each loose end with a loose half-hitch knot to prevent loosening

Using 30' 3/8" rope, tie a Figure-Eight Loop knot in the middle of rope leaving equal length working ends of rope

Pass each end of the rope through grommets at the head end of the Skedco pulling the Figure-Eight Loop knot against the litter.

Continue feeding unused rope through grommets and carrying handles all the way to the foot end of the Skedco. Ensure that both ends remain equal in length.

Pass the rope ends thru the grommets at the foot end of the Skedco from the inside outward. Tie the ends of the rope together with a square knot snugly against the litter end

Bring ends of rope and over the end of the Skedco. Pass thru lower carrying handles and secure with another square knot. Safety each end with an over hand knot.

Attach 10K D-Ring to the loop of the Figure-Eight Loop knot

READY FOR HOIST

Safety Check: Ensure safety lock is engaged on hoist device/jungle penetrator after attached to 10K D-Ring

TAG-LINE ASSIST PROCEDURES

- Attach Tag-line to carrying handles on patient's right side
- Keep a good grip on tag-line and ensure it remains taut during hoist sequence
- Recover and stow tag-line once aircraft personnel have detached and dropped line

Ensure proper casualty handover to flight medic

EQUIPMENT NEEDED:
- SKEDCO Litter (Full-size ONLY)
- 30' 3/8" rope
- 10,000 lbs D-ring
- Tag-line with carabiners and Y-connector

HAND & ARM SIGNALS:
Hoist Up: With one arm, give a thumbs UP and an exaggerated upward arm motion.
Hoist Down: With one arm, give a thumbs DOWN and an exaggerated downward arm motion.
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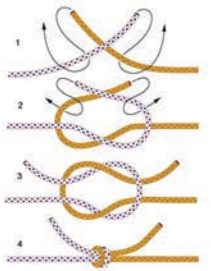


CBRN

The goals of CBRN trauma medicine are to limit and minimize exposure/contamination, treat the immediate life threats, and administer appropriate antidotes or countermeasures. Assessment and treatment of CBRN casualties follow the modified MARCH algorithm (MARCH)^2. Combat the mentality of a CBRN patient dipped in agent as a "candied apple." Instead, think of these patients as stepping in a mud puddle.

Massive hemorrhage, **M**ask check – control life-threatening bleeding.

Airway, Administer **A**ntidotes (ATNAA, CANA) – establish and maintain a patent airway.

Respiration, **R**apid Spot Decontamination (RSDL) – decompress suspected tension pneumothorax, seal sucking chest wounds, and support ventilation/oxygenation as required.

Circulation, Administer **C**ountermeasures – establish IV/IO access and administer blood products 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.

Use **CRESS** to quickly determine the agent of concern, conduct triage and recognize symptoms.
C – Consciousness (unconscious, convulsing, altered)
R – Respirations (present, labored, absent)
E – Eyes (pupil size, PERRLA)
S – Secretions (absent, normal, increased)
S – Skin (diaphoretic, cyanotic, dry, hot)

CBRN casualties present unique challenges and the Medic must constantly ask what is killing the casualty now. These patients can suffer from trauma, poisoning, or both trauma and poisoning. Always treat the most immediate life threat.

TCCC Application

Hot Zone: Depending on the agent, consider any area with agent to be the same as receiving effective fire. Always wear multiple sets of nitrile gloves when operating in a CBRN environment. Treatments in this zone are limited to (MAR)^2. Prevention of additional casualties, Medic safety, and removing the patient from the area are the highest priorities. Check and find massive hemorrhage. Only expose on the casualty what is needed to save a life. Use the DRY-WET-DRY technique and RSDL for decontamination.

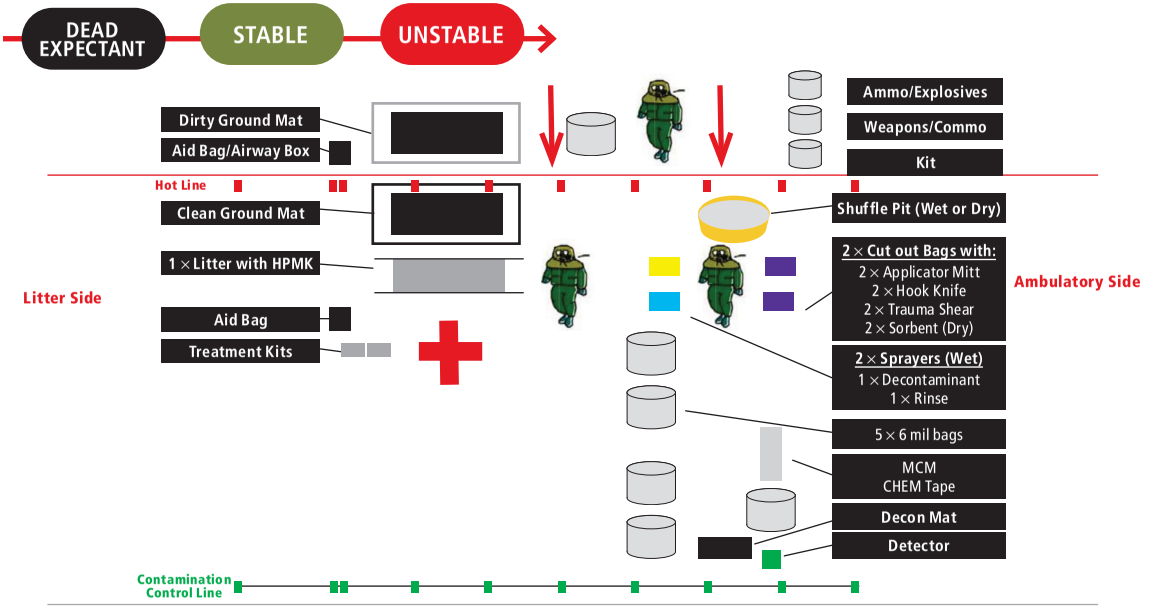
Warm Zone: These treatments begin when moved to the dirty CCP, are in conjunction with decontamination, and consist of (CHE)^2. All hot zone treatments should be reassessed and possibly replaced with clean ones. Use the command "Expose to treat" in order to quickly communicate to any assistants the immediate need to decontaminate the head/face and chest to facilitate mask removal and sternal IO placement. This allows ventilatory support and rapid dosing of countermeasures. Removing contamination by any means available may mean the difference between life and death, as this limits continued dosing. **DO NOT** perform any unnecessary procedures in the warm zone. Only address immediate threats to life that cannot wait for decontamination to be completed. The warm zone is for DECON, not medical care.

Trauma Assessment Principles

Hot Zone: Tourniquets placed over a CBRN suit are prone to fail. Check the casualty's mask an ensure it is in place. Assess the patient's airway and determine if it makes sense to unmask the casualty to provide and airway in a contaminated environment. If the Medic is breathing filtered air the casualty should be too. Use a Resuscitator Device Individual Chemical (RDIC) as needed. Administer Antidotes based on the presumed agent. Use ATNAA/CANA for nerve agent and CyanoKit for cyanide once removed from the exposure. Assess respiratory changes and determine if they are due to an agent or trauma. Rapid spot decontamination for any visible agent, around breaches in the suit, and any exposed skin. Use the DRY-WET-DRY technique and RSDL or soap and water for decontamination.

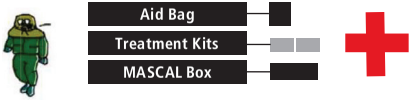
Warm Zone: Administer countermeasures if required – IV/IO drips, suction, and ventilatory support. Respiratory difficulty due to poisoning should be treated with ventilatory support if required. Treatment with nebulized albuterol, solumedrol 125mg IV, and/or racemic epinephrine should wait until the cold zone. Assess circulation and provide resuscitation if required. Nerve agent poisonings may require atropine drips for treatment. Preventing hypothermia is critical and decontamination should occur quickly as the patients will be exposed and wet. Manage head wounds as required.

Schematic – DIRTY CCP



Notes:

- Triage flows from left to right in the hot zone
- Casualty flow moves from top to bottom in this diagram
- Medical Personnel, at least one designated clean and one designated dirty



TICS/TIMS
Toxic Inhalation/Eye Exposure Box

This kit is meant to be carried as an adjunct in aid bag as mission dictates the threat to personnel. The surplus of drugs is meant to provide continuous care and re-dosing as symptoms persist. Be mindful that nebulizers do not work if they are not kept upright. Collapsible and bendable airway tubes may be needed to provide nebulizer treatment to a casualty that is prone. If you use the Omron Nebulizer, read the directions for use and maintenance before you pack it in your aid bag.

- **1ea Pelican 1150 Case**
  1ea Toxic Inhalation SOP Quick Ref Card
  1ea Omron Micro Air Nebulizer w/batteries
  1ea Extension Tubing
  1pkg (5 vials) 5mL 4% Lidocaine HCl 40mg/mL
  1ea 8.4% Sodium Bicarbonate 50mEq/mL – Dilute 1:1 with Normal Saline for use
  15ea bullets 2.5mg Albuterol in 3mL
  4ea vials Dexamethasone IV 20mg/5mL
  5ea 3mL NS Pre-Filled Syringes
  3ea 18g Hard Needles
  2ea Neomycin or Gentamicin Ophthalmic Oint.
  2ea Tetracaine Ophthalmic

- **Eye treatment not in case, carried in Aid Bag:**
  1ea 1,000mL bag of NS or Lactated Ringer's
  2ea Morgan Lens
  1ea Morgan Lens Admin Set

- **Carried on Vehicle**
  2ea D Cylinders of O_2
  5ea NRB Masks
  5ea Nebulizer Masks

- **Supplemental items:**
  1ea Peak Flow Meter
  1ea Capno Check

Toxic Industrial Chemicals/Materials Inhalation Injury Treatment SOP

Administration via Nebulizer (in order)

1. 1 Albuterol bullet, 2.5mg in 3mL, by nebulizer
2. 1mL 4% lidocaine w/1mL normal saline or 2mL 2% lidocaine w/o NS by nebulizer (for cough/pain suppression)
3. Administration via IV/IO:
   - Dexamethasone: 8mg q6hr (Preferred) Or
   - 125mg Solumedrol IV/IM q6hr

If no resolution of symptoms (efficacy is unproven by research) attempt
- 1mL 8.4% Sodium Bicarbonate w/1mL normal saline by nebulizer. Do not use undiluted 8.4% Sodium Bicarbonate
  – for acidic inhalation
  – do not mix with other drugs

TIC/TIMS
Eye Injury Treatment SOP

1. Tetracaine eye drops for pain
2. 20 min NaCl flush with Morgan Lens
3. Neomycin eye drops prevent eyelids sticking shut
4. Allow eyes to drain. Avoid tight bandaging.

Chemical Casualty Triage Table				
AGENT	**URGENT**	**PRIORITY**	**ROUTINE**	**EXPECTANT**
NERVE	Symptoms in two or more organ systems, i.e., respiratory, GI, skeletal (seizure activity) (NOT including miosis or rhinorrhea) OR serious CNS involvement, unconscious, seizing, or apneic	Recovering from moderate/ severe exposure, asymptomatic liquid exposure	Walking and talking after vapor exposure, consider miosis or residual effects on RTD	Loss of vital signs
VESICANT	Acute airway problems (coughing, hoarseness, secretions), agent in wounds	Liquid burn greater than 1% of BSA or critical areas,* eye involvement, pulmonary symptoms with an onset greater than 4 hours after exposure	Liquid burn LESS than 1% BSA (no critical areas*)	Severe pulmonary edema or clinical signs of respiratory compromise within 4 hours after exposure
PULMONARY	Acute airway problems (coughing, hoarseness, secretions, wheezing)	Onset of symptoms greater than 4 hours after exposure	8 hours since exposure with no signs	Laryngeal obstructions or bronchospasms and/or severe pulmonary edema within 4 hours of exposure
CYANIDE	Serious cardiopulmonary symptoms (bradypnea or hypotensive), serious CNS involvement, unconscious, seizing, or apneic	Recovering from mild exposure or post-treatment	Walking and talking after vapor exposure	Coexposure with other toxicants (pulmonary edema, miosis, vesicant exposure area of 1% or more), signs of anoxic encephalopathy

NOTE: Triage category will increase for trauma + poisoning.
*critical areas = face, eyes, hands, groin

CBRN – Nerve Agents

Nerve agents are considered the primary agents of threat to the US military because of their high toxicity and effectiveness through multiple routes of entry. They are absorbed through the eyes, respiratory tract, and skin. Nerve agents are generally referred to a group of chemicals known as organophosphates. These compounds inhibit acetylcholinesterase (AChE) thus having acetylcholine (ACh) accumulating in the body causing multiple organ overstimulation. This produces a cholinergic crisis from the excessive amounts of ACH: Muscarinic effects of smooth muscle contraction in airways, GI tract, pupils (miosis); glandular effects from eyes, nose, mouth, sweat, airways and GI tract; effect on vagus nerve causing bradycardia; nicotinic effects of skeletal muscles with fasciculations seizures, fatigue, and flaccid paralysis (late sign); preganglionic effects of tachycardia, hypertension.

LD_{50} or LCT_{50}: The amount of solid, liquid, or vapor sufficient to kill the average person.

Persistent, last longer than 24 hours; nonpersistent, gone in 24 hours or less

Tabun (GA), Sarin (GB), Soman (GD), G, and VX

S/Sx: Mild to moderate vapor exposure S/Sx: CNS-slowness in thinking and decision making. HEENT-miosis, blurred or dim vision, rhinorrhea, salivation. Respiratory-SOB, chest tightness.

Large vapor exposure S/Sx: CNS-LOC, seizures, flaccid paralysis. Respiratory-apnea GI-involuntary NVD, abdominal pain.

Liquid on skin exposure: Small-local effects such as sweating and fasciculations. Medium-systemic effects, potential miosis. Large – CNS and respiratory effects such as respiratory failure, LOC, seizures, apnea, flaccid paralysis, miosis

MANAGEMENT: 1 × ATNAA for any patient with miosis. Mild-1 × ATNAA (self-aid) or 3 × ATNAA (buddy-aid). Moderate/Severe-3 × ATNAA plus 1 × CANA injector even if seizure activity is not evident. Atropine 6mg IM or 8mg IV/IO should be repeated q 3–5 mins until the drying of secretions is noted. One additional dose of 2 PAM CL should be given 1 hour after the initial 3 doses if patient is still symptomatic.

Severe nerve agent casualties may need more than 2–3 CANA auto injectors to relieve seizure activity.

DISPOSITION: Refer to chemical casualty triage table

SPECIAL CONSIDERATIONS: Heart rate should not be a distinguishing sign due to its ability to be normal, tachycardia, or bradycardia. Once removed from exposure vapor nerve agent effects do not worsen.

Packaging: The Antidote Treatment Nerve Agent Auto injector (ATNAA) (NSN: 6505-01-362-7427) is an auto injector with 2mg of atropine and 600mg of 2PAM CL combined.

The Convulsant Antidote for Nerve Agents (CANA) (NSN: 6505-01-274-0951) contains 10mg of diazepam.

CBRN – Vesicant Agents

Blister or vesicant agents are second only to nerve agents as a concern to the US Military. These are a concern as there are large stockpiles of them; they are easily manufactured; and they are both incapacitating and lethal. The severity of vesicant agents will, in part, be affected by the environmental conditions at the time of exposure. Warm, humid conditions increase the severity of blister agents damage and shorten the time of symptom onset. Cold weather may slow the onset and lessen blister severity. M8 Chemical Detection paper will turn red in the presence of liquid mustard. Precursors and impure agents are also hazardous and are easily manufactured.

Mustards-Sulfur, Mustard (H) or (HD) and Nitrogen Mustard (HN_1, HN_2, HN_3)

S/Sx: Skin: erythema, small vesicles, bullae, direct coagulation necrosis, and skin sloughing with high dose. Eyes: conjunctivitis with epithelial necrosis, subcorneal edema, and sloughing. Airway: hoarseness, cough, throat, nasal irritation. Severe patients can have laryngospasms.

MANAGEMENT: Immediate decontamination by any means available (contact time should be less than 2 minutes) and symptomatic management.

DISPOSITION: Refer to chemical casualty triage table.

SPECIAL CONSIDERATIONS: Sulfur mustard is a very potent, persistent agent that produces relatively few deaths but will require a lengthy convalescence of personnel affected. Liquid mustard maybe seen as amber (HD) or dark brown (H) oily liquid that has an odor comparable to onions or garlic. Liquid mustard absorption can be enhanced by thin epithelial barriers, heat, moisture, and oils on the skin. The fluid in mustard blisters does not contain mustard. The LD_{50} of mustard liquid is equivalent to 3–7g (about 1 teaspoon). $H_{1\text{-}3}$ will have shorter latent periods and more severe systemic effects.

Arsenicals-Lewisite (L), MD, ED, PD

S/Sx: Similar to HD with the distinct differences being pain within seconds to minutes after contact, "Lewisite shock" will have capillary leakage, pulmonary edema (ARDS), hypotension, circulatory failure.

MANAGEMENT: Immediate decontamination by any means available and symptomatic management. British Anti-Lewisite 3mg/kg IM × 1 for exposure with immediate pain.

DISPOSITION: Refer to chemical casualty triage table.

Oxime-Phosgene (CX)

S/Sx: urticaria with immediate pain. Produces skin lesions similar to acid burns. Blanching or erythematous ringing of contact site and wheal formation.

MANAGEMENT: Immediate decontamination by any means available and symptomatic management.

DISPOSITION: Refer to chemical casualty triage table.

CBRN – Cyanide Agents

Hydrogen Cyanide (AC), Cyanogen Chloride (CK)

S/Sx: Rapid symptom onset, seizures, respiratory arrest, incontinence, normal pupils or mydriasis.

MANAGEMENT: Remove from exposure area, restore ventilation, and if symptomatic give 1 CyanoKit. May be redosed every 5 minutes for persistent symptoms. If not available, use sodium nitrite 300mg of 3% solution IV over 5–20 minutes.

DISPOSITION: Refer to chemical casualty triage table.

SPECIAL CONSIDERATIONS: Cyanide is classified as a blood agent which can affect all systems in the body. Decontamination is usually not required due to the patients "off-gassing." Cyanide can affect people by inhalation, ingestion, or percutaneous routes. Hydrogen cyanide (AC) can smell like bitter almonds or peach pits, but most people cannot detect the odor. Cyanogen chloride can be a pungent, biting odor, which can irritate the eyes, nose, and respiratory tract. The onset of symptoms from cyanide is within seconds of exposure. The differences between nerve agent symptoms and cyanide symptoms are the lack of secretions and normal pupils or mydriasis, whereas nerve agent poisonings have copious secretions and meiosis. Any nitrate given within minutes, with mechanical ventilation, can be very effective in improving patient health.

CBRN – Pulmonary Agents

Lung-damaging agents are not commonly mentioned as major chemical threats. However, troops may be exposed to these threats through enemy actions or mitigating side effects such as explosions/fires involving vehicles or manufacturing areas, industrial hazards or accidents, or various burning materials.

The 4-hour rule states that if a patient shows breathing difficulty within 4 hours of exposure, prognosis is poor, versus patients who do not become symptomatic until after 4 hours.

24 hours is the minimum time for observation and no physical exertion after an exposure to a pulmonary agent.

Agents that are liquids at room tend to give off vapors that can become trapped in clothing. Thus, the agent then begins to "off-gas," which could affect personnel without respiratory protection. Therefore, decontaminating a patient with exposure to one of these agents is still needed. Always wear multiple pairs of nitrile gloves when conducting decontamination. DECON with either RSDL or soap and water. Use the **DRY-WET-DRY** technique for DECON.

Irrigate the patient's eyes to a pH 7.0 and provide tetracaine for pain relief.

Treat respiratory symptoms with nebulized albuterol 3mL 0.083% and solumedrol 125mg IV × 1. Consider nebulized racemic epinephrine for no respiratory improvement. Aggressive airway and respiratory support with PPV and suctioning may be required.

Ammonia (NH_3)

S/Sx: Mild exposure: eye complaints, hoarseness, strider, cough, SOB, chest pain, wheezing; moderate-severe exposure: hypoxia, chemical pneumonia, hemorrhage

MANAGEMENT: Remove from exposure, decontaminate, and consider advanced airway protocol

DISPOSITION: Refer to chemical casualty triage table

Sulfur Mustard (HD)

S/Sx: Mild exposure: eye complaints, hoarseness, strider, cough, SOB, chest pain, wheezing; moderate-severe exposure: hypoxia, chemical pneumonia, hemorrhage

MANAGEMENT: British anti-Lewisite 3mg/kg IM × 1 for vesicant exposure and immediate pain. Respiratory treatments.

DISPOSITION: Refer to chemical casualty triage table

Chlorine

S/Sx: Mild-suffocation, choking sensation, ocular and/or nasal irritation, chest tightness, cough, exertional dyspnea; moderate: aforementioned S/Sx plus hoarseness, stridor, pulmonary edema within 2–4 hours; severe: dyspnea at rest, can cause pulmonary edema in 30–60 seconds, copious airway secretions, sudden death may occur with laryngospasms

MANAGEMENT: Remove from exposure, decontaminate, and respiratory treatments.

DISPOSITION: Refer to chemical casualty triage table.

Peripheral Acting Agents (Phosgene or CG, Perfluoroisobutylene or PFIB, HC Smoke, Nitrogen Oxides)

S/Sx: Mild: cough, SOB, chest tightness; moderate: ocular irritation and aforementioned; severe: dyspnea at rest, onset of pulmonary edema in 30 seconds to 4 hours, copious upper airway secretions, sudden death may occur with laryngospasms

MANAGEMENT: Remove from exposure, decontaminate, respiratory/airway treatments.

DISPOSITION: Refer to chemical casualty triage table.

SPECIAL CONSIDERATIONS: Phosgene can be found in foam plastics, herbicides, pesticides, and dyes. It can be present in the burning objects like plastics, degreasers, and paint strippers. PFIB can be found in "Teflon" or burning military vehicles. Nitrogen oxides can be found in arc welding areas specifically with enclosed areas and diesel engine exhaust.

CBRN

MARCH	SIGNS AND SYMPTOMS OF NERVE AGENTS	
M – Massive hemorrhage/Mask check: always treat these situations as CUF. Apply TQs, patient's mask, and move from danger area. **A – Airway/Antidote: always ensure early and proper airway management with quick antidote administration** **R – Respirations/Rapid DECON: positive pressure ventilations and rapid spot DECON** **C – Circulation/Counter measures: start IV/IO drips if needed** **H – Hypothermia/Head injury**	**MUSCARINIC** • **Diarrhea** • **Urination** • **Miosis** • **Bronchorrhea/ Bronchospasms** • **Bradycardia** • **Emesis** • **Lacrimation** • **Salivation/Secretions/ Sweating**	**NICOTINIC** • **Mydriasis** • **Tachycardia** • **Weakness** • **Hypertension** • **Fasciculations**

PPE AND DECON CONSIDERATIONS

- Use of mask always required.
- Wearing a **minimum of two (2) pairs of nitrile exam gloves** will provide needed protection IOT put hands on patient – as always ensure that you protect yourself first.
- Ensure patient is masked or has protected airway to prevent inhalation injuries
- When removing clothing and equipment ensure they are bagged and disposed of properly
- **DECON with RSDL**, to include wounds and eyes if needed, soap and water also works well with most CBRN agents and precursors. DRY-WET-DRY for DECON.
- Place bleach in suction reservoir (if able) to ensure that body fluids are DECONed as well

NERVE AGENTS (G and V SERIES AGENTS)

MARCH	PPE AND DECON CONSIDERATIONS
M – Massive hemorrhage/Mask check: ensure the patient has good mask seal **A –** Airway/Antidote: ATNAA and CANAA **R –** Respirations/Rapid DECON: positive pressure ventilations and rapid DECON with physical removal of clothing and any liquids on skin **C –** Circulation/Counter measures: atropine and 2-Pam drips **H –** Hypothermia/Head injury	• **WEAR MASK**. • CBRN gloves needed IOT put hands on patient. • Ensure patient is masked or has protected airway to prevent inhalation injuries • **DECON with RSDL**, to include wounds and eyes if needed. Soap and water also work well.
IMMEDIATE CONSIDERATIONS	**PFC CONSIDERATIONS**
• Miosis is a highly variable sign of contamination and does not dictate treatment • Suction will be needed for excess secretions • Patients with mild S/Sx should receive 1 × ATNAA (self-aid) and 2 × ATNAA (buddy-aid) • Patients with severe S/Sx should receive 3 × ATNAA and 1 × CANA • BPT treat q3–5min with atropine auto injectors • If no CANA, can treat with Versed 10mg IM for seizures	• Atropine drip = Draw air from 250mL bag of saline and inject 50mL of 20/8 atropine. Mark bag with "Atropine 300mL/20mg". Set drip rate to 300mL/hr (or 1gtt/sec with 15gtt set line). Once atropinization has been achieved reduce to 10–20% of original dose. • 2-PAM 500mg bolus, a drip rate should be started 30 minutes after original 1200mg dose (ATNAA) **AND** symptoms persist. Add 20mL/1g 2-PAM to 250mL bag of saline. Set drip rate to 270mL/hr (or 1gtt/sec with 15gtt drop set).

VESICANTS MUSTARD (H) and LEWISITE (L)

MARCH	PPE AND DECON CONSIDERATIONS
M – Massive hemorrhage/Mask check: ensure the patient has good mask seal **A –** Airway/Antidote: no antidote for vesicant, however, ensure good and early airway management **R –** Respirations/Rapid DECON: positive pressure ventilations and rapid spot DECON **C –** Circulation/Countermeasures: start IV **H –** Hypothermia/Head injury: treat this patient like a burn patient for hypothermia	• Mask recommended. • Wear a **minimum of two (2) pairs of nitrile exam** gloves IOT put hands on patient • Ensure patient is masked or has protected airway to prevent inhalation injuries • **DECON with RSDL**, to include wounds and eyes if needed. Soap and water also work well. • **DRY-WET-DRY**
IMMEDIATE CONSIDERATIONS	**PFC CONSIDERATIONS**
• Patients with severe pulmonary symptoms within 4–6 hours OR TBSA of more than 50% should be considered expectant • Maintain 30–50mL/hr UOP • Manage airway aggressively if evidence of upper airway burns or fluid accumulation: nebulized albuterol – 3mL (0.083%), Consider: nebulized racemic epinephrine: 0.5mL of 2.25% solution in 3mL NS, Solu-Medrol 125mg IM/IV • Flush eyes with saline/water to pH 7.0, tetracaine 2gtt OU • Treat vesicant exposure (with immediate pain) with British anti-Lewisite (BAL; dimercaprol) – 3mg/kg IM	• 20% TBSA burned: 2 injections Pegfilgrastim 6mg SQ day 1/7. • Significant absorption of sulfur mustard can cause injury to bone marrow, lymph nodes, and spleen causing a drop in white blood cells (beginning on days 3–5). • Acute respiratory distress syndrome (ARDS) may develop hours to days post exposure • Severe eye lesions need to be treated with ophthalmic steroid/antibiotic combination: Tobrex is current standard • Pulmonary toilet for pseudomembranous formation • Silverlon Bandage/Silvadene Cream

TOXIC INDUSTRIAL CHEMICALS/MATERIALS (CHLORINE/PHOSGENE/CYANOGENS)

MARCH	PPE AND DECON CONSIDERATIONS
M – Massive hemorrhage/Mask check: ensure the patient has good mask seal **A –** Airway/Antidote: no antidote for chlorine or phosgene; however, ensure good and early airway management, O_2 ASAP and Cyanokit for cyanide if available **R –** Respirations/Rapid DECON: positive pressure ventilations and rapid DECON with physical removal of clothing and any liquids on skin **C –** Circulation/Countermeasures: circulatory support **H –** Hypothermia/Head injury	• As always use of mask recommended. • Wearing a **minimum of two (2) pairs of nitrile exam** gloves will provide needed protection IOT put hands on patient. • Ensure patient is masked or has protected airway to prevent inhalation injuries • **DECON with RSDL**, to include wounds and eyes if needed. Soap and water also work well.
IMMEDIATE CONSIDERATIONS	**PFC CONSIDERATIONS**
• One immediate finding is CNS depression due to hypoxia; however, cyanogens will cause a drop in BP so ensure proper circulatory support. Give CyanoKit (× 2 if inadequate response to first) • 92% O_2 (titrate to effect) with positive pressure ventilations due to pulmonary edema, supportive care • Manage airway aggressively if evidence of upper airway burns or fluid accumulation: nebulized albuterol 3mL (0.083%); consider nebulized racemic epinephrine 2.25% in 15–30mL, Solu-Medrol 125mg IM/IV. • Flush eyes with saline/water to pH 7.0, tetracaine 2gtt OU.	• Multiple patients: (may run out of CyanoKit, use sodium nitrite). Consider sodium nitrite: 300mg of a 3% solution (10mL of a 3% solution) over 5–20 minutes • Absolute bedrest 36 hours • Monitor patient for ARDS, may be delayed up to 72 hours • If patient survives first 48 hours, recovery is likely

RADIATION POISONING

MARCH	PPE AND DECON CONSIDERATIONS
M – Massive hemorrhage/Mask check: ensure the patient has good mask seal **A –** Airway/Antidote: As needed **R –** Respirations/Rapid DECON: Rapid DECON with physical removal of clothing and any particulates on skin **C –** Circulation/Countermeasures: Prussian Blue, zinc/calcium DTPA for internal contamination **H –** Hypothermia/Head injury	• Airway protection as needed based on isotope. • Wearing one (1) pair of nitrile gloves will provide needed protection IOT put hands on patient. • Ensure patient is masked or has protected airway to prevent inhalation injuries (goggles and mask would suffice). • DECON with tape or baby wipes and removal of clothing. • Wounds should be irrigated to less than 2 × background. • **Time, distance,** and **shielding** are the three major factors in the amount of radiation the patient will receive. Doubling patient's distance from the source with quarter amount of radiation received.
IMMEDIATE CONSIDERATIONS	**PFC CONSIDERATIONS**
• Time to emesis is key to dosage and patient outcome (< 1 hour is expectant, 1–4 hours is immediate/delayed, > 4 hours minimal). • Dosage should be kept as low as reasonably possible. • BPT suction airway post vomiting. • Removal of any foreign objects should be done so with instruments only and placed as far from personnel as reasonably possible.	• Supportive care
λ Gamma Emitters **Industry Use, of Terrorist Interest. RDD or RED** **Cobalt 60** Chelating agent: DTPA calcium or zinc, 1g in 5mL in 250mL of NS over 30 minutes **Cesium 137** Chelating agent: Prussian Blue (Radiogardase), 3g tid **β Beta Emitters** **Strontium 90** Aluminum hydroxide 10% Calcium chloride suspension IV: 200mg to 1g every 1–3 days, slow 1mL/min Calcium gluconate PO: 10g powder in 30mL water **Iridium 192** DTPA calcium or zinc, 1g in 5mL in 250mL of NS over 30 minutes for internal contamination **Tritium H3** Beer. Increase diuresis **α Alpha Emitters** **Uranium 235, 238** Sodium bicarbonate oral or IV **Americium 241/Plutonium 239** DTPA calcium or zinc, 1g in 5mL in 250mL of NS over 30 minutes	**Radiation Pearls** • Radiation Exposure ➢ From existing sources or small-scale criticality incident ➢ Detection, dosimetry, conduct bioassay post mission with medical evaluation ➢ Radioactive gasses may be present in reprocessing facility or at a damaged nuclear reactor ➢ Reverse isolation for severely irradiated casualties • Corrosive liquids and gasses ➢ Uranium hexafluoride can off gas hydrogen fluoride gas ➢ Nitric acid used in reprocessing • Heavy metal toxicity **Acute Radiation Syndrome (ARS)** Whole body dose of greater than 100cGy or 100 rad Hematopoietic syndrome > 200–300cGy Gastrointestinal syndrome > 600cGy Neurovascular syndrome > 1200cGy ARS symptoms do not manifest immediately, our role involves treating immediate life threats and administration of chelating agents and decontamination. Dose estimation determines prognosis. We have the ability to perform blood collection for later biodosimetry. We do not have cytokines. Initiate stem cell banking recall for sick personnel. Prolonged evacuation times may necessitate the treatment of ARS.

Chemical Agent Treatment Guide			
AGENT	**SIGNS & SYMPTOMS**	**MANAGEMENT**	**DECONTAMINATION**
Nerve GA, GB, GD, GF, VX	**Mild:** miosis, rhinorrhea, slight difficulty breathing, sweating nausea, vomiting **Severe:** LOC, apnea, convulsions, copious secretions, flaccid paralysis	ATNAA CANA ABCDD	RSDL, M291, soap & water, water in large amounts, 0.5% hypochlorite
Vesicants Mustard-HD, H Lewisite-L Phosgene Oxime-CX	Erythema, blisters, conjunctivitis, cough	Immediate decontamination, symptomatic management	RSDL, M291, soap & water, water in large amounts, 0.5% hypochlorite
Pulmonary C, CG	Eye & airway irritation, delayed onset SOB or chest tightness, pulmonary edema	ABCDD, oxygen with or without positive airway pressure, rest	**Vapor:** fresh air **Liquid:** water irrigation
Cyanide AC, CK	Seizures, respiratory, and cardiac arrest	ABCDD, inhaled amyl nitrite, IV sodium nitrite, sodium thiosulfate, hydroxocobalamin	Usually not needed
Riot CS, CN	Burning and pain on mucous membranes, skin & eyes; respiratory discomfort	Usually none, effects are self-limiting	Water, alkaline soap

Acronyms: ABCDD: airway, breathing, circulation, drugs, decontamination; ATNAA: antidote treatment nerve agent autoinjector; CANA: convulsant antidote for nerve agent; LOC: loss of consciousness; RSDL: reactive skin decontamination lotion; SOB: shortness of breath.

NOTES

SECTION 3

TACTICAL MEDICAL EMERGENCY PROTOCOLS (TMEPs) & SICK CALL

Medical Patient Assessment

Documentation of all healthcare provided is inherent with any form of care provided by Ranger Medical personnel. Ranger Medics will document any and all assessments, healthcare, treatments, or procedures as appropriate to the situation and setting. In the nontactical situation, healthcare will be documented on an SF 600, MHS Genesis electronic note or trauma run sheet. In the tactical situation, care will be documented on the Ranger Casualty Card, DA5767 (TCCC Card), or may be maintained in a notebook until subsequent annotation to the appropriate format. Referral to, communication with, or review by a primary provider is required for all patients and notes.

SOAP Note Format

Pertinent Information (to side of SOAP)

A simple list of allergies, current medications, and vital signs.

EXAMPLE:
NKDA
Azithromycin
P – 68
B/P – 118/72
R – 16
T – 99.2

Work-Up Results (if applicable)

A simple list of findings from any <u>previous</u> labs, x-rays, or tests including the date done.

EXAMPLE:
CXR-WNL
(09 Sep 10)

Patient Information (on form)

NAME (L, F, MI)
SSN
DOB
UNIT
SEX
Contact Number
Student Status
(if applicable)

Chief Complaint

C/C: One sentence identifying patient age, gender, race, and occupation and using the patient's words describing their primary problem.

EXAMPLE:
C/C: 21 years old male Caucasian Ranger c/o dry cough × 7 d

S – Subjective

S: Description of problem based on patient's history. Do not put words in their mouth, but ask specific questions regarding their complaint. Use OPQRST and AMPLE as a guideline in your questions and notes. Identify any pertinent social or family history as related to the complaint. Give a simple logical timeline and description followed by pertinent positives and negatives based on the review of systems that relate to their complaint. Include any previous self-treatments or medical treatments from previous encounters.

EXAMPLE:
S: Nonproductive cough started 7 days ago upon return from leave in Mexico, treated with a Z-Pak by MO with no improvement. No PMHx of pneumonia or bronchitis. Nonsmoker. ROS – NO hemoptysis, fever, dyspnea, wheezing, malaise

O – Objective/Observations

O: Description of your pertinent vital sign findings, mental status, observations, and examinations with pertinent positives and negatives. Record the results or outcomes of any labs, imaging, test, or procedures done as part of this visit.

EXAMPLE:
O: A&OX3, (-) fever, VS – WNL
Normal lung sounds (-) rales, (-) rhonchi, (-) crackles
(-) cervical lymphadenopathy
Nonproductive cough and nasal congestion witnessed

A – Assessment

A: Sum up your assessment or diagnosis based on the subjective and objective/observations. Paint a textual picture what you are thinking the condition is and why. A single-word diagnosis is not required as long as you explain your rationale in your decision. Provide a differential diagnosis to explain why you think it is not another diagnosis.

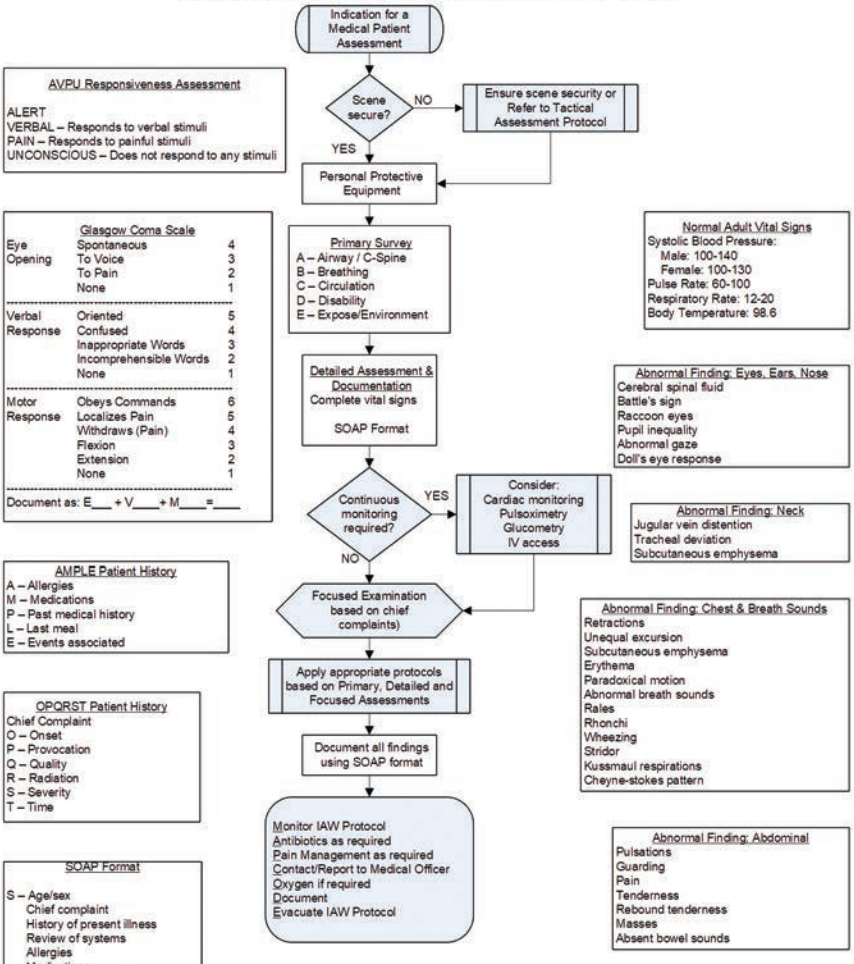
EXAMPLE:
A: Viral URI – given nonproductive cough, congestion, rhinorrhea, VS-WNL, unremarkable exam, and no evidence of serious bacterial infection, viral URI is most likely.
Dx: Pneumonia – doubt given with no dyspnea, no fever, VS WNL, no concerning findings on auscultation.
GERD – doubt given sudden onset and no reflux symptoms.
Asthma – doubt given no PMHx, no wheezing on exam

P – Plan of Action

P: Provide the details of the course of treatment for today. Include any immediate or future work-up requirements (lab, x-ray, tests). Include instructions to patient if condition worsens or does not improve within a specified time period or if patient is to return for follow-up. Include any modification or profile to duty/training status.

EXAMPLE:
A: Stop taking azithromycin
Pseudoephedrine 1 q12hr × 7 days, Acetaminophen q6hr PRN
If cough persists > 72hr, RTC for CXR, PFT, and consider trial of albuterol
PT at own pace/distance × 5 days

Medical Patient Assessment Protocol



Abdominal Pain
(Includes Surgical Abdomen, GERD, Dyspepsia)

DEFINITION: Common causes in young healthy adults include appendicitis, cholecystitis, pancreatitis, perforated ulcer, and diverticulitis. Consider constipation/fecal impaction as a potential cause of abdominal pain.

S/Sx: Epigastric burning pain, present bowel sounds, nausea and/or vomiting, absence of rebound tenderness, if diarrhea is present, treat per *Gastroenteritis Protocol.*

MANAGEMENT:
1. Famotidine 20mg PO bid **OR** rabeprazole 20mg PO qd **OR** proton pump inhibitor of choice.
2. Increase PO hydration.
3. Avoid triggers (acidic/spicy foods/tobacco); wait 3 hours between eating and lying down.
4. Antacid of choice (antacids will mask other S/Sx). Treat per *Nausea/Vomiting Protocol* as required.

Note: Determine pregnancy status of females with abdominal pain to evaluate for ectopic pregnancy. Follow appropriate protocol only after ruling out ectopic pregnancy.

DISPOSITION: Observation and reevaluation; *Priority* evacuation if symptoms not controlled by this management within 12 hours.

Acute Surgical Abdomen

S/Sx Suggesting Urgent Evacuation: Severe, persistent, or worsening abdominal pain is the key sign; rigid abdomen, rebound abdominal tenderness, fever, absence of bowel sounds, focal percussive tenderness, uncontrollable vomiting, presence of bloody vomitus or stools, presence of black tarry stools, presence of coffee ground vomitus, positive findings of Murphy's, McBurney's, or Grey-Turner sign.

MANAGEMENT:
1. Start IV with crystalloid, 1L bolus, followed by crystalloid 150mL/hr.
2. Keep NPO except for medications or PO hydration.
3. Ertapenem 1g IV qd **OR** ceftriaxone 1g IV qd, **PLUS** metronidazole 500mg PO q8hr.
4. Treat per *Pain Protocol.*
5. Treat per *Nausea and Vomiting Protocol*

DISPOSITION: *Urgent* evacuation to a surgical facility.

Allergic Rhinitis / Hay Fever

DEFINITION: Inflammation of the nasal passages due to environmental allergy.

S/Sx: Clear nasal drainage; pale, boggy or inflamed nasal mucosa; with or without complaints of nasal congestion; watery or red eyes; sneezing; normal temperature; history of environmental allergy.

MANAGEMENT:
1. Fluticasone 1 spray each nare bid +/– loratadine 10mg PO qd **OR** fexofenadrine 180mg PO qd **OR** cetirizine 5–10mg PO qd **AND/OR** if no previous available, then diphenhydramine 25–50mg PO q6hr if tactically feasible (drowsiness is a side-effect).
2. Increase oral fluid intake.
3. If prolonged management, consider fluticasone 2 sprays in each nostril daily. Nasal saline spray may be very helpful in clearing upper airway secretions.

DISPOSITION: Evacuation usually not required

Altitude Medical Emergencies

Altitude Illnesses

Acute Mountain Sickness (AMS): Typically occurs at altitudes > 8,000 ft (2,500 meters). Onset typically occurs 6–12 hours after ascent but can occur as quickly as 3 hours after ascent. The key to prevention is prophylactic acetazolamide and a combination of slow, graded ascent and staged ascent. A slow, graded ascent is no more than 1,650 ft/day (500 meter) when above 10,000 ft (3,000 meters), and limit sleeping altitude to 1,000 ft above previous night's altitude. A staged ascent is spending 2–3 days at moderate altitude 8,000–10,000 ft (2,500–3,000 meters).

High Altitude Cerebral Edema (HACE): Rare below 11,500 ft. Headache is common at altitude. Ataxia and altered mental status at altitude are HACE until proven otherwise.

High Altitude Pulmonary Edema (HAPE): Caused by the hypoxia of altitude, HAPE is the most common cause of death from altitude illness. Usually occurs above 8,000 ft. Respiratory distress at high altitude is HAPE until proven otherwise.

HACE AND HAPE MAY COEXIST IN THE SAME PATIENT!

Signs/Symptoms

S/Sx: 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). *AMS Diagnosis:* recent ascent > 8,000 ft (2,500 meter), plus a headache AND at least of the following: anorexia, nausea, vomiting, insomnia, dizziness, lightheadedness, lassitude, weakness, or fatigue. No correlation with fitness level (likely genetic predisposition).

HACE: Unsteady, wide, and unbalanced (ataxic) gait and altered mental status are hallmark signs.

HAPE: Dyspnea at rest is the hallmark sign. Other symptoms may include cough, crackles upon auscultation, tachypnea, tachycardia, fever, central cyanosis, or decreased physical exercise tolerance. Measure SpO_2% and compare to other people around. If measured SpO_2% is less than others' and the patient has symptoms, then descent must be initiated.

Initial Management & Extended Management

1. Halt ascent. Immediately descend at least 1,500 ft for HACE, HAPE, or refractory AMS if tactically feasible.
2. **If AMS Symptoms Present:** Acetazolamide 250mg PO bid **UNLESS PATIENT IS ALLERGIC TO SULFA** or is already taking as prophylaxis. Dexamethasone 4mg PO/IV/IM q6hr if patient is allergic to sulfa. If dexamethasone is administered, no further ascent until asymptomatic for 18 hours after last dexamethasone dose. Descend if symptoms worsen.
3. **If HACE Symptoms Present: Ataxia or Altered Mental Status:** Dexamethasone 10mg IV/IM STAT, then 4mg IV/IM q6hr. Individuals with HACE should not be left alone and especially not be allowed to descend alone. Administer supplemental oxygen, if available.
4. **If HAPE Symptoms Present: Shortness of Breath at Rest:** Nifedipine 10mg PO/SL STAT; then 20mg q6hr if blood pressure is stable. For extended management, consider sildenafil 50mg q8hr **OR** Tadalafil 10mg q12hr (**do not use** in HACE; the drop in blood pressure will worsen the symptoms of this disease). Administer supplemental oxygen, if available. Consider salmeterol 2 inhalations q12hr. **OR** albuterol 2 inhalations q6hr.
5. Minimize patient exertion during descent for HAPE since this will exacerbate symptoms.
6. Treat per *Pain Management Protocol* **but** avoid the use of narcotics since they may depress respiratory drive and worsen high altitude illness. 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 2 psi (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*.

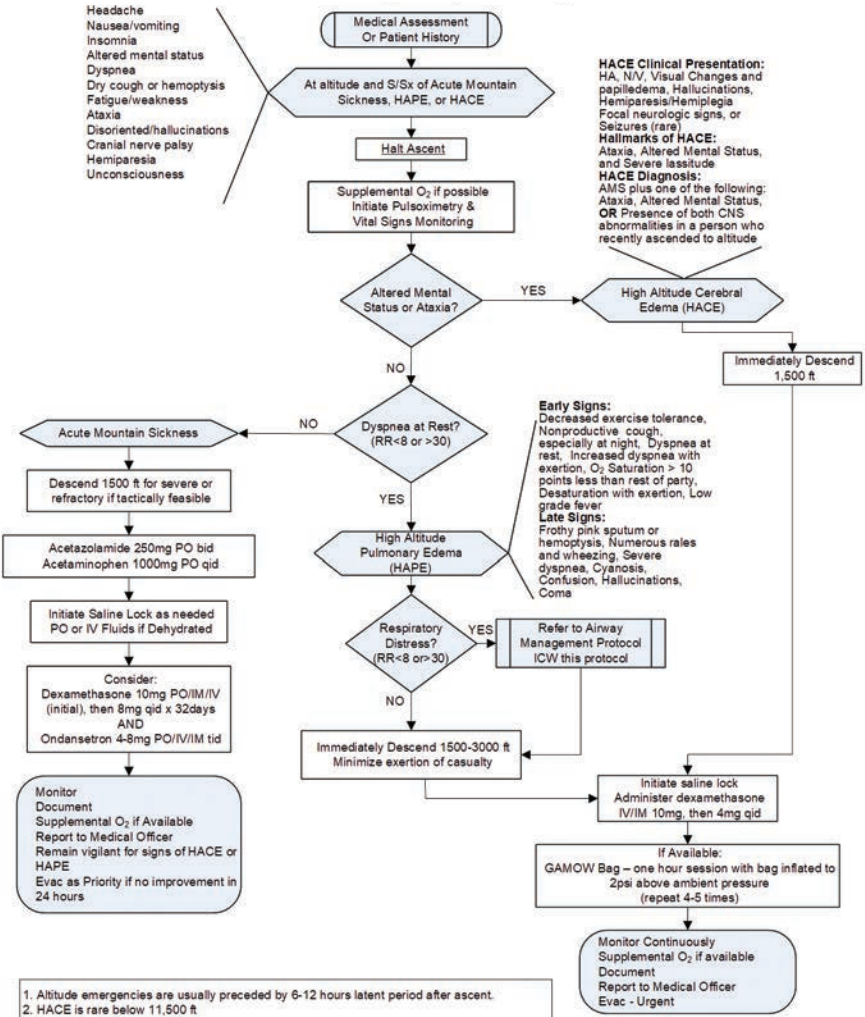
DISPOSITION: Most cases of AMS are relatively mild, resolve in 2–3 days, and do not require evacuation. Avoid vigorous activity for 3–5 days. *Priority* evacuation for AMS patients who worsen despite therapy. *Urgent* evacuation for patients with suspected HACE or HAPE. Individuals who have recovered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

Prophylaxis & Pretreatment

AMS Emergency Rapid Ascent/HAF Insertion at Altitude > 11,500 ft: With prior medical officer approval, consider pretreatment of unit personnel with acetazolamide 125mg PO bid **OR** dexamethasone 4mg PO/IV/IM q6hr (for operations < 48 hours). Dexamethasone prevents symptoms but does not help with acclimation.

AMS Prevention/Pretreatment: Acetazolamide 125mg PO bid, started 24 hours before ascent to altitude > 8,000 ft. Takes 8 hours after the first dose to have efficacy. Cease pretreatment after 2–3 days at target altitude or during descent. If true sulfa allergy, do not use acetazolamide and supplement with dexamethasone. If sulfa ABX allergy, continue to use acetazolamide with medical officer approval. For personnel who have a history of previous HAPE, nifedipine, acetazolamide, sildenafil, tadalafil, salmeterol, and albuterol may be used (individually or in combination).

Altitude Medical Emergency Management Protocol



1. Altitude emergencies are usually preceded by 6-12 hours latent period after ascent.
2. HACE is rare below 11,500 ft.
3. HAPE usually occurs >9,000 ft and typically 2-4 days after arriving at high altitude.
4. Any respiratory distress at high altitude should be assumed as HAPE until proven otherwise.
5. Do not reascend until asymptomatic for 18 hours and/or until cleared by a medical officer
6. Consider prophylactic Acetazolamide (125-250 mg PO bid) OR Dexamethasone 4 mg PO qid beginning 24 hours out (or minimum 8 hours if TST) if mission is planned at/above 10,000 ft or if drastic rapid ascent (HAF) with medical officer approval. Note that frequent urination will disrupt sleep cycle and may cause dehydration.

Anaphylaxis Reaction Emergencies

Anaphylactic shock is a life-threatening medical emergency that is caused by a generalized allergic reaction affecting the cardiovascular, respiratory, cutaneous, and gastrointestinal systems. It is a severe immune-mediated reaction that occurs when a previously sensitized patient is reexposed to an offending allergen such as: bee/wasp stings, penicillin or other drug allergies (especially when given IM/SC/IV), seafood (especially shrimp/shellfish), and nuts of various types. Allergens may produce an allergic reaction by being ingested, inhaled, injected, or absorbed through the skin/mucous membranes. Shock is produced by the release of histamine that causes "leaky" vessels resulting in hives/edema and hypotension; it also causes bronchospasm/wheezing. This produces both a volume problem and a vascular resistance problem. Anaphylactic shock differs from less severe allergic reactions in that it is characterized by hypotension and obstructed airflow (upper and/or lower) that can be life-threatening.

Signs/Symptoms

S/Sx: Wheezing (bronchospasm), dyspnea, stridor (laryngeal edema), angioedema, urticaria (hives), hypotension, tachycardia. Clinical observation is the only diagnostic test. Use rapidity of onset and constellation of symptoms to suggest the diagnosis. A prior history of similar symptoms may be the only other clue. Observe closely with frequent assessment/reassessment of mental status, vital signs, and pulse oximetry. Anaphylaxis is likely if ANY of the following three criteria are met:

- Acute onset (minutes to several hours) with involvement of skin and or mucosal tissue (hives, pruritus, swollen lips/tongue) plus 1 of the following: respiratory compromise (e.g., dyspnea, wheezing, stridor or other signs of bronchospasm) or cardiovascular compromise (eg, decreased blood pressure, syncope).
- Two or more of the following that occur quickly (minutes to several hours) after exposure to a likely allergen: involvement of skin-mucosa, respiratory compromise, reduced blood pressure, persistent GI symptoms (e.g., vomiting, abdominal pain).
- Reduced blood pressure (systolic < 90 for adult) after exposure to a known allergen for the patient.

Initial Management & Extended Management

For patients with S/Sx of airway involvement and/or circulatory collapse:

Epinephrine is the mainstay of therapy. Administer Epi-Pen **OR** epinephrine 0.3–0.5mg (0.5mL of 1:1,000 IM into the anterolateral thigh. **DO NOT USE INTRAVENOUSLY.** Repeat epinephrine q5min prn. Administer oxygen with pulse oximetry monitoring. If severe respiratory distress exists, aggressive airway management with bag-valve-mask and airway adjuncts (oral and nasopharyngeal airways). Control airway early if no response to epinephrine. Initiate IV normal saline TKO (saline lock). Administer 500–1000cc crystalloid or colloid bolus for hypotension then titrate to establish systolic blood pressure > 90mmHg or palpable radial pulse if BP cuff not available. Although epinephrine is the treatment for true anaphylaxis, consider treating concurrent symptoms with the following medications. Administer diphenhydramine 50mg IV/IM/PO for skin findings/puritisis. Administer dexamethasone 10mg IV/IM/PO for repeat anaphylaxic reactions. If wheezing is present after epinephrine administration, consider Albuterol, 2–3 puffs q5min, repeat up to 3 times. Consider additional H2 blocker (famotidine 20mg PO bid) as 3–5 day course of additional antihistamine.

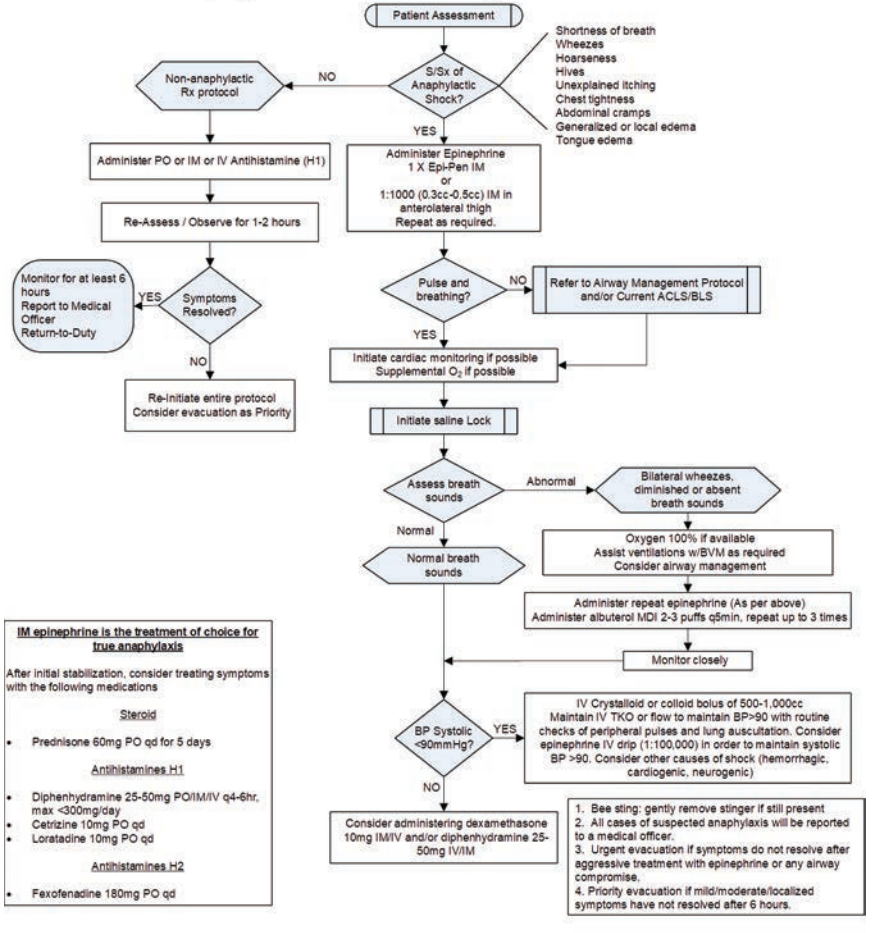
Considerations

Immediate definitive airway if impending airway obstruction from angioedema is suspected. Delay may lead to complete obstruction, difficult intubation and cricothyroidotomy. Give 6–8L O_2/min via face mask if required or up to 100% if airway controlled. **Albuterol** metered dose inhaler (2–3 puffs) for bronchospasm. Place patient in recumbent position and elevate lower extremities.

Crystalloid (saline) fluid bolus IV titrated to restore and maintain blood pressure. Recurrence of symptoms may occur in up to 20% of patients (generally within 6 hours but recurrences up to 72 hours following initial resolution of symptoms have been reported).

Apply ice to minimize any local reaction sites. If due to bee/wasp sting(s), carefully remove all stingers. Avoid applying pressure to venom sac while stinger is inserted in patient.

Anaphylactic Shock Management Protocol



Asthma
(Reactive Airway Disease)

DEFINITION: Inflammatory disorder of the airway with bronchiolar hyperresponsiveness and narrowing of the distal airways; acute exacerbation seen with change in environment or level of allergen or irritant.

S/Sx: Wheezing, dyspnea, difficulty with speaking in full sentences, chest tightness, decreased oxygen saturation, respiratory distress

MANAGEMENT:

1. Initiate pulse oximetry monitoring.
2. Albuterol (metered dose inhaler – works best when used with spacer), 2–3 puffs q5min, up to 3 times and assess.
3. If there is no response to albuterol, initiate urgent evacuation and continue albuterol MDI 4 puff q10min **AND/OR** consider epinephrine 0.5mg (0.5mL of 1:1,000 solution) IM **(DO NOT INJECT INTRAVENOUSLY)**.
4. May repeat one dose in 5–10 minutes.
5. Initiate IV access with saline lock.
6. Dexamethasone 10mg IV/IM **OR** methylprednisolone 125mg IV/IM.
7. Administer oxygen if $SpO_2 < 92\%$.
8. If there is fever, pleuritic chest pain and productive cough, treat per *Bronchitis/Pneumonia Protocol*.
9. If airway compromise, refer to *Airway Management Protocol*.
10. If available, administer medications via nebulizer (albuterol 2.5mg tid over 5–15 minutes).
11. Clinical consideration: pair with fluticasone with provider consult.

DISPOSITION: If the patient responds to management, observe for 4–6 hours, especially if epinephrine was administered. Return-to-duty if there is no wheezing or dyspnea and normal oxygen saturation. Continue albuterol (2 puffs q6hr) and reevaluate in 24 hours. Continue prednisone 60mg qd × 4 days.

Consider fluticasone 250mg/salmeterol 50mg (Advair) 1 puff bid × 14 days. *Urgent* evacuation if no response to treatment. *Urgent* evacuation if symptoms persist.

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

Barotrauma

DEFINITION: Physical damage to body tissues caused by difference in pressure between an air space inside or beside the body and surrounding fluid.

S/Sx: Pain/pressure in the ear(s), sinuses, teeth; pulmonary overinflation syndrome may present with chest pain, dyspnea, mediastinal emphysema, subcutaneous emphysema, pneumothorax, and arterial gas embolism (AGE).

MANAGEMENT: Middle ear – If a tympanic membrane rupture is present or suspected:

1. Protect the ear from water, diving, flying, or further trauma, **DO NOT** use ear drops.
2. Pseudoephedrine 60mg PO q4–6hr prn **AND/OR** oxymetazoline 2–3 sprays each nostril bid (no longer than 3 days). Refer to higher level of care when feasible. Consider moxifloxacin 400mg PO qd only if gross contamination is suspected. Paranasal sinus barotraumas – pseudoephedrine 60mg PO q4–6hr prn.
3. Pulmonary barotraumas to include subcutaneous emphysema – If no respiratory distress, monitor patient closely. Use pulse oximetry if available. If respiratory distress occurs – Treat per *Spontaneous Pneumothorax Protocol*.
4. If arterial gas embolus is suspected, administer 100% oxygen and 1L normal saline IV 150mL/hr. *Urgent* evacuation to recompression chamber. If an unpressurized airframe is used, avoid altitude exposure greater than 1,000 ft.
5. Treat per *Pain Management Protocol.* (Avoid narcotics if recompression is anticipated.)

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

SPECIAL CONSIDERATIONS:

1. Pulmonary overinflation 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.

Behavioral Emergency Management
(Includes Psychosis, Depression, Suicidal Impulses)

Behavioral Conditions

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

S/Sx: Acute behavioral changes include withdrawal, depression, aggression, confusion, or other behavioral patterns atypical for the individual.

Psychosis is an acute change in mental status characterized by altered sensory perceptions that are not congruent with reality: auditory and/or visual hallucinations; may include violent or paranoid behavior; disorganized speech patterns are common; may include severe withdrawal from associates.

Initial Management & Extended 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. Give contents of 1 sugar packet sublingually to treat for possible hypoglycemia.
5. Take core temperature. If temperature is below 95°F, treat per *Hypothermia Protocol.* If temperature is above 101°F, treat per *Meningitis Protocol.* If temperature is above 103°F, treat per *Meningitis and Hyperthermia Protocols*
6. For acute agitation, combativeness, or violent behavior, restrain patient with at least four individuals and give midazolam 5mg IM **OR** diazepam 10mg IM. Repeat after 30 minutes prn.
7. If sedated or restrained, maintain constant vigilance for a change in the hemodynamic status or loss of airway reflexes.
8. Evacuate *urgent* as tactically feasible.

AMSIT Patient History

Appearance, Behavior, & Speech (ill or distressed, posture & body language, willingness to talk, manner, evidence of emotions, attention span, speech patterns)
Mood & Affect (anger, fear, anxiety, elation, intensity and changes in mood)
Sensorium (oriented to time and place, recent and remote events, concentration and calculation)
Intellectual Function (education, vocabulary use, appropriate for age)
Thought (logical, reasonable, speed, hallucinations, self-image, insight awareness)

Glasgow Coma Scale

Eye Opening		Verbal Response	
Spontaneous	4	Oriented	5
To Voice	3	Confused	4
To Pain	2	Inappropriate Words	3
None	1	Incomprehensible Words	2
		None	1

Motor Response	
Obeys Commands	6
Localizes Pain	5
Withdraws (Pain)	4
Flexion	3
Extension	2
None	1

Document as: E ____ + V ____ + M ____ = _____

Neurological Assessment

Mental Status
- Orientation
- Affect
- Speech (content & process)

Cranial Nerves
- I Olfactory (identify an odor or distinguish between 2 odors)
- II Optic (visual acuity test)
- III Oculomotor (assess 6 cardinal eye movements & pupillary reaction)
- IV Trochlear (assess 6 cardinal eye movements)
- V Trigeminal (facial sensitivity & biting/clinching teeth)
- VI Abducens (eye movement looking left and right)
- VII Facial (smile, frown, raise brows, and taste)
- VIII Vestibulocochlear (hearing-rubbing fingers & equilibrium)
- IX Acoustic (gag reflex and identify tastes)
- X Vagus (gag reflex and speech)
- XI Spinal accessory (head movement and shoulder shrugging)
- XII Hypoglossal (stick out tongue and move left and right)

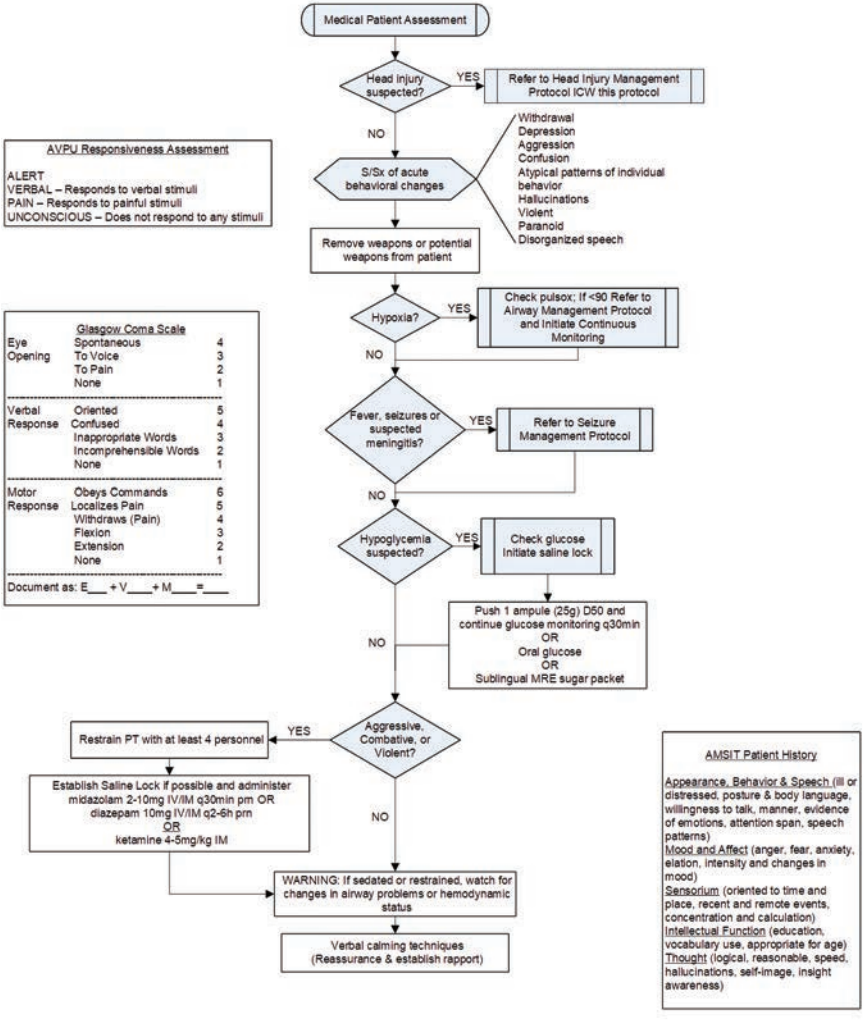
Motor Status
- Posture
- Strength in basic muscle movements
- Resistance to passive movement
- Tremors or involuntary movements

Sensation Status
- Senses light touch
- Senses pain or pricks
- Senses temperature
- Senses vibration (tuning fork)

Coordination
- Gait and stance Finger to nose Heel to shin

Reflexes
- Deep tendon reflexes (biceps, triceps, knees, ankles)
- Plantar reflexes

Behavioral Emergency Management Protocol



Assessment & Management of Suicidal Risk

Suicide

Suicide remains a serious public health problem, with more than 47,000 people taking their lives every year (CDC, 2019). Suicide was the tenth leading cause of death for all ages in 2016 and the second leading cause of death for persons aged 24 and younger. Among military members and veterans, suicide and other forms of suicidal self-directed violence have steadily increased over the past decade. According to estimates from the National Veteran Suicide Prevention Annual Report (2019), veterans account for approximately 13.5% of deaths by suicide among US adults. While even the most accurate suicide data do not predict suicide in a given individual, thorough clinical assessment informed by demographic and other suicide-related associations may improve risk-appropriate management. The following protocol represents the VA/DoD Clinical Practice Guidelines for the assessment and management of suicidal risk.

Table 1: Warning Signs

Warning Signs: Observations that signal an increase in the probability that person intends to engage in suicidal behavior in the immediate future (i.e. minutes and days). Warning signs present tangible evidence to the clinician that a person is at heightened risk for suicide in the short term. Warning signs may be experienced in the absence of risk factors.

Direct Warning Signs portend the highest likelihood of suicidal behaviors occurring in the near future:

Suicidal Communication: Writing or talking about suicide, wish to die, or death (threatening to hurt or kill self) or intention to act on those ideas.

Preparations for Suicide: Evidence or expression of suicide intent, and/or taking steps towards implementation of a plan. Makes arrangements to divest responsibility for dependent others (children, pets, elders), or making other preparations such as updating wills, making financial arrangements for paying bills, saying goodbye to loved ones, etc.

Seeking Access or Recent Use of Lethal Means: Owning or planning to acquire weapons, medications, toxins, or other lethal means.

Other Indirect Warning Signs presentation(s) or behavioral expressions that may indicate increased suicide risk and urgency in a patient at risk for suicide:

Substance abuse: Increasing or excessive substance use (alcohol, drugs, smoking)

Hopelessness: Expresses feeling that nothing can be done to improve the situation

Purposelessness: Express no sense of purpose, no reason for living, decreased self-esteem

Anger: Rage, seeking revenge

Recklessness: Engaging impulsively in risky behavior

Feeling trapped: Expressing feelings of being trapped with no way out

Social withdrawal: Withdrawing from family, friends, society

Anxiety: Agitation, irritability, angry outbursts, feeling like wants to “jump out of my skin”

Mood changes: Dramatic changes in mood, lack of interest in usual activities/friends

Sleep: Insomnia, unable to sleep or sleeping all the time

Guilt or shame: Expressing overwhelming self-blame or remorse

Assessment & Management of Suicidal Risk (cont.)

Table 2: Risk Factors

Acute Risk Factors: Acute (of brief duration) and stressful episodes, illnesses, or life events. While not usually internally derived, these events can build on and challenge a person's coping skills.

Chronic Risk Factors (Preexisting): Relatively enduring or stable factors that may increase a person's susceptibility to suicidal behaviors, such as genetic and neurobiological factors, gender, personality, culture, socioeconomic background, and level of isolation.

Psychological Factors:

- Suicide of relative, someone famous, or peer
- Suicide bereavement
- Loss of loved one (grief)
- Loss of relationships (divorce, separation)
- Loss of status/respect/rank (public humiliation, being bullied or abused, failure work/task)

Social Factors:

Stressful Life Events (acute experiences)

- Breakups and other threats to prized relationships
- Other events (e.g. fired, arrested, evicted, assaulted)
- Chronic stressors (ongoing difficulties)

Financial Problems

- Unemployment, underemployment
- Unstable housing, homeless
- Excessive debt, poor finances (foreclosure, alimony, child support)

Legal Problems (difficulties)

- DUI/DWI, lawsuit, criminal offense, incarceration

Lack of Social Support

- Poor interpersonal relationships (partner, parent, children)
- Geographic isolation from support
- Recent change in level of care (discharge from inpatient psychiatry)

Medical Conditions:

- History of traumatic brain injury
- Terminal disease
- HIV/AIDS
- New diagnosis of major illness
- Having a medical condition
- Worsening of chronic illness
- Intoxication
- Substance withdrawal (alcohol, opiates, cocaine, etc.)
- Use of prescription medication with warning for increased risk of suicide
- Chronic pain
- Mood or affective disorder (major depression, bipolar disorder)
- Personality disorder (especially borderline)
- Schizophrenia
- Anxiety
- PTSD
- Panic disorder
- Substance use disorder
- Eating disorder
- Insomnia or other sleep disorder

Military Specific:

- Disciplinary actions (UCMJ) – Reduction in rank
- Career-threatening change in fitness for duty
- Perceived sense of injustice or betrayal (unit/command)
- Command/leadership stress, isolation from unit
- Transferring duty station
- Administrative separation from service/unit
- Adverse deployment experience

Preexisting & Nonmodifiable:

- Gender (male)
- Race (white)
- Marital status (divorce, separate, widowed)
- Family history of suicide/attempt or mental illness
- Child maltreatment (physical/psychological/sexual)
- Sexual trauma
- Lower education level
- Same-sex orientation (LGBT)
- Cultural or religious beliefs

Assessment & Management of Suicidal Risk (cont.)

Table 3: Protective Factors

Capacities, qualities, environmental, and personal resources that increase resilience; drive an individual toward growth, stability, and/or health and/or to increase coping with different life.

Social Context Support System

Strong interpersonal bonds to family/unit members and community support

- Employed
- Intact marriage
- Child-rearing responsibilities
- Responsibilities/duties to others
- A reasonably safe and stable environment

Positive Personal Traits

- Help seeking
- Good impulse control
- Good skills in problem-solving, coping and conflict resolution
- Sense of belonging, sense of identity, and good self-esteem
- Cultural, spiritual, and religious beliefs about the meaning and value of life
- Optimistic outlook – Identification of future goals
- Constructive use of leisure time (enjoyable activities)
- Resilience

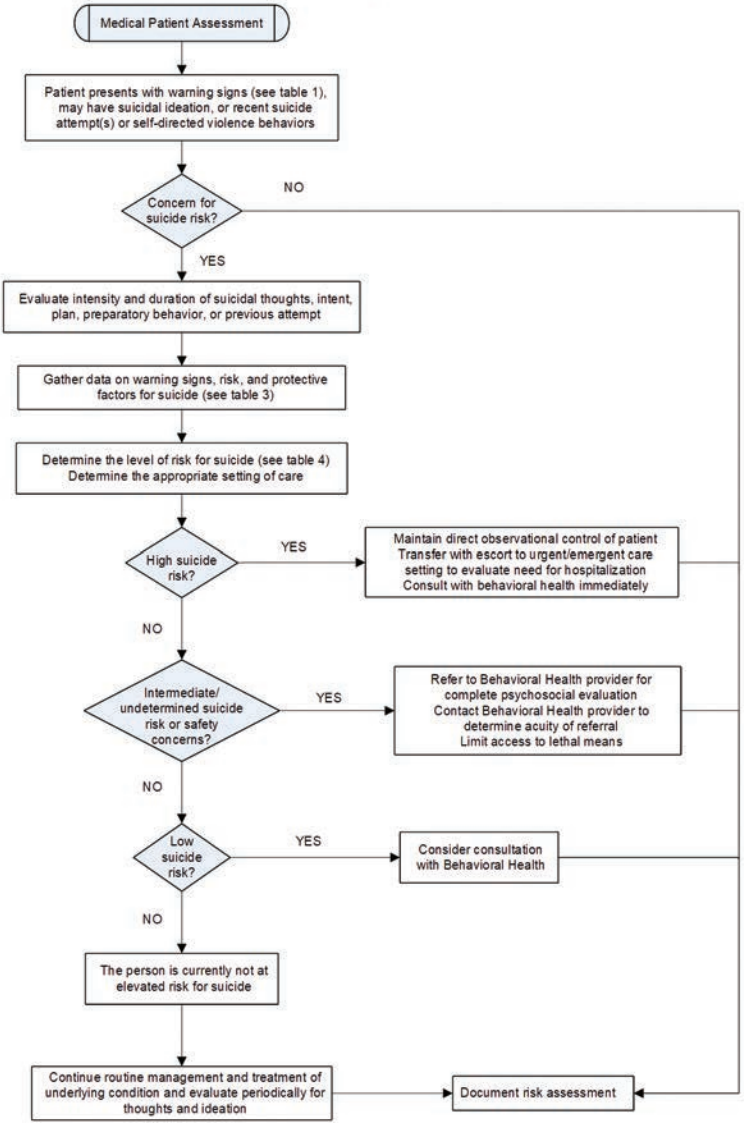
Access to Healthcare

- Support through ongoing medical and mental healthcare relationships
- Effective clinical care for mental, physical, and substance use disorders
- Good treatment engagement and sense of the importance of health and wellness

Table 4: Level of Risk for Suicide

Risk for Suicide Attempt	Indicators for Suicide Risk	Contributing Factors
High Risk	• Persistent suicidal ideation or thoughts • Strong intention to act or plan • Not able to control impulse **OR** • Recent suicide attempt	• Acute state of psychiatric disorder or acute psychiatric symptoms • Acute precipitating event(s) • Inadequate protective factors
Intermediate Risk	• Current suicidal ideation or thoughts • No intention to act • Able to control the impulse • No recent attempt or preparatory behavior or rehearsal of act	• Existence of warning signs or risk factors **AND** • Limited protective factors
Low Risk	• Recent suicidal ideation or thoughts • No intention to act or plan • Able to control the impulse • No planning or rehearsing a suicide act • No previous attempt	• Existence of protective factors **AND** • Limited risk factors

Assessment & Management of Suicidal Risk Protocol



Leader's Suicide Risk Assessment Tool (L-SRAT)

L-SRAT Instructions

The L-SRAT is not a formally researched test. When a Leader uses the L-SRAT out of concern about a specific Ranger, the leader should consult with a behavioral health (BH) professional. The L-SRAT is not a substitute for direct input from a BH professional regarding potential suicide risk concerns. The L-SRAT also is not a substitute for leader judgment in responding to crisis situations. Rather, it provides a structure to assist leaders to seek and communicate important information to BH professionals about specific known suicide risk factors. The L-SRAT also provides specific recommendations to pursue key suicide risk mitigation actions.

Leader should fill out an L-SRAT if a Ranger is:

1. Considered "High" risk but especially if he/she is experiencing occupational problems, discipline/legal problems, financial problems, relationship problems, substance misuse, suicidal thoughts/actions and/or is in possession of a firearm.
2. Admitted for inpatient behavioral health hospitalization (on or off post).
3. Involved in an incident reported on the blotter that is related to an L-SRAT risk factor.
4. Referred for administrative chapter that requires behavioral health review IAW Army Regulation.
5. Leader has concern about a Ranger's suicide risk. If there are immediate safety concerns, escort the Ranger to Embedded Behavioral Health or the Emergency Department.

The L-SRAT is not intended to be used like an "interview" based solely on how a Ranger responds. It should be filled out based on a leader's knowledge and information obtained from the Ranger, other members in the chain of command, and available support resources (e.g., Behavioral Health, Armed Forces Community Services, etc.). Caution should be used to prevent unnecessary disclosure of the Ranger's personal information gathered with the L-SRAT so store completed L-SRAT forms in a secure manner such as in the Ranger's personnel file.

How is the L-SRAT filled out?

1. Start with the **"Identified suicide risk factors"** column of the L-SRAT and review the first Risk Factor.
2. If the Risk Factor is PRESENT then record it and review the Mitigating Actions in the corresponding **"Initial unit action to mitigate suicide risk"** column.
   a. For each Mitigating Action, record **"Completed"** or **"Not Completed"**:
      i. If the Mitigating Action has been completed then fill in the date of completion in the **"Date"** column.
      ii. If the Mitigating Action has not been completed then fill in the no later than (NLT) target date for the Mitigating Action to be completed.
      iii. If the Mitigating Action is not applicable in the Ranger's situation then leave the "Date" column blank.
   b. When utilizing a mentor, use discretion and select an individual who is mature with a demonstrated ability to provide effective mentorship in the particular area of concern. In addition, consider the input from the Ranger on selecting the mentor to increase the Ranger's investment in the mentoring relationship.
   c. When referring a Ranger to Behavioral Health, give the BH professional a copy of the completed L-SRAT.
3. If the Risk Factor is ABSENT record *"No"* and enter *"N/A"* for the Mitigating Actions.
4. Repeat until responses are recorded for all Risk Factors and Mitigating Actions.
5. Once all of the Risk Factors and Mitigating Actions have been recorded, contact your Ranger Embedded Behavioral Health Provider, Physician or PA. BH professionals should make final determinations about suicide risk. Sharing the L-SRAT information with the BH professional will enhance the ability of the BH professional to make an appropriate risk determination. However, regardless of the risk level estimate assessed at the time, the Ranger's risk factors may change at any point based on external stressors or intervening events.

Leader's Suicide Risk Assessment Tool (L-SRAT) (cont.)

Ranger: **Leader/Unit/Contact Info:** **Date:**

Identified suicide risk factor	Present?	Initial unit action to mitigate suicide risk	Completed?	Date	Notes (Optional)
1) Discipline/Legal Problems: Is the Ranger currently under military or civilian investigation for any suspected violations or pending UCMJ/Article 15 action, administrative separation/ elimination, or bar to reenlistment?		a) Ensure adequate contact between the Ranger and support assets (IG, JAG/TDS, Chaplain).			
		b) Ensure the Ranger receives written criteria, unit plan of support, and minimum of weekly feedback for how to meet requirements/standards until the Ranger achieves the requirements/standards identified.			
		c) If applicable, ensure the Ranger has full awareness of Command's intention to initiate administrative separation/elimination.			
		d) If pending separation/elimination, provide the Ranger with full access to transition services.			
2) Occupational Problems: Is the Ranger pending any adverse action (e.g., flag, reduction in rank, removal from position of responsibility, poor performance review, or non-selection for promotion or attendance to schools, etc.) or receiving repeated corrective counseling statements without alterations in problematic behavior?		a) Ensure the Ranger receives written criteria, unit plan of support, and minimum of weekly feedback for how to meet requirements/standards until the Ranger achieves the requirements/standards identified.			
		b) Ensure contact between the Ranger and a unit mentor familiar with the Ranger's individual situation until the Ranger achieves the benchmarks set up by the mentor.			
3) Firearms: Does the Ranger have a privately owned firearm?		a) Continue to support privately owned firearm safety training and measures such as gun locks, safes, storing ammunition separately from firearm, etc.			
		b) Offer storage location outside the home for privately owned firearm.			
4) Relationship Problems: Is the Ranger pending and/or planning a divorce/break-up or experiencing other relationship problems (e.g., frequent arguments with spouse/partner, isolation from family, or loss of child custody, etc.)?		a) Ensure contact between the Ranger and a unit mentor who has been through similar relationship problems until the Ranger achieves the benchmarks set up by the mentor.			
		b) Ensure the Ranger has adequate opportunity to attend behavioral health appointments, couples therapy, or meet with the Chaplain.			
5) Financial Problems: Does the Ranger have significant difficulties paying bills or demonstrate obvious signs of poorly considered purchase(s) (e.g., car, home, etc.) well outside known estimated income?		a) Ensure contact between the Ranger and a unit mentor familiar with the Ranger's individual situation until the Ranger achieves the benchmarks set up by the mentor.			
		b) Ensure the Ranger has adequate opportunity to attend financial guidance appointments at the Armed Forces Community Services (AFCS).			
		c) Refer the Ranger to the servicing Legal Assistance Office for assistance with potential financial relief and stay of court proceedings under the Servicemember's Civil Relief Act.			
6) Substance Misuse: Does the Ranger have a history of alcohol or drug related incidents and/or testing positive on a urinalysis?		a) Refer the Ranger to Substance Use Disorder Clinical Care (SUDCC; formerly ASAP) at time of incident and collaborate with SUDCC Providers on the treatment plan.			
		b) Contact SUDCC Providers about recommendations for further evaluation, care, or specialty referrals if there are indicators of ongoing substance misuse or rehabilitation failure.			
7) Suicidal Thoughts/Actions: Has the Ranger expressed suicidal thoughts, attempted suicide, or been hospitalized on a psychiatric ward within the past 2 years, or has the Ranger attempted suicide or been hospitalized on a psychiatric ward multiple times in his/her life?		a) Contact the Embedded Behavioral Health (EBH) Team Leader, BH Officer, or assigned Battalion BH Provider about recommendations for evaluation, care, or specialty referrals.			
		b) Ensure the Ranger has adequate opportunity to attend behavioral health treatment appointments.			
		c) Follow current Safety Precautions recommended by Behavioral Health Providers.			

ATTENTION: This tool does not in any way replace the importance of involving a professional who is credentialed to assess for suicide risk, rather it can assist in the risk assessment process. If you have immediate safety concerns about a Ranger, escort him/her to Embedded Behavioral Health during business hours or the Emergency Department after business hours.

Bronchitis

DEFINITION: Inflammation of trachea, bronchi, and bronchioles resulting from upper respiratory tract infection (URI) or chemical irritants; viruses are the most common cause.

S/Sx: Preceding URI symptoms, cough (initially unproductive, then productive), fatigue, +/– fever > 100.4, +/– dyspnea, injected pharynx, may have wheezing or unremarkable lung sounds, sputum (color does not differentiate between viral or bacterial)

MANAGEMENT:

1. Increase PO fluids.
2. Acetaminophen 1,000mg PO q6hr prn fever and Ibuprofen 800mg PO q8hr.
3. Treat symptoms with antitussive, decongestants, expectorant, as needed.
4. If wheezing present, Albuterol MDI 2 puffs q4–6hr.
5. Ensure smoking cessation and enforce hydration. Consider throat lozenges for accompanying pharyngitis. Consider O_2 if SpO_2 < 92%. If symptoms worsen or persist, consider treatment as per *Pneumonia Protocol*.

DISPOSITION: Evacuation usually not required. *Observation or Routine evacuation* as necessary. *Urgent* evacuation for severe dyspnea or hypoxia.

SPECIAL CONSIDERATIONS: Consider high altitude pulmonary edema (HAPE) at high altitudes. Consider pulmonary embolism (PE) and pneumothorax (fever and productive cough are atypical for these). Acute bronchitis is a common and generally self-limiting condition that usually does not require antibiotics. Cough may linger for several weeks.

Cellulitis / Cutaneous Abscess

DEFINITION: Acute superficial bacterial skin infection due to trauma, scratching or other lesions. 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.

S/Sx: Local warmth; painful, erythematous, swollen, tender area; induration, regional lymphadenopathy, Fever may or may not be present; Typically, erythema spreads without treatment; 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** and URGENT evacuation to a surgical facility; Fluctuant, tender, well-defined mass indicates abscess formation.

MANAGEMENT:

1. Clean and dress wound and surrounding area.
2. Use a pen to mark the demarcation border of the infection and reevaluate in 24 hours.
3. **Antibiotics**: Mild: doxycycline 100mg PO bid + amoxicilin 250mg bid **OR** trimethoprim-sulfamethoxazole (DS) 1–2 tabs bid × 5 days. Moderate: cephalexin 500mg PO qid × 7 days **OR** clindamycin 450mg PO tid × 7 days for first-line failure/concern for MRSA. For human/animal bite, use amoxicillin/clavulanic acid 875mg PO bid for 7–10 days.
4. If no other antibiotics available, then moxifloxacin 400mg PO qd for 10 days.
5. Limit activity until infection resolves.
6. Add ertapenem 1g IV/IM qd if worsening at 48 hours or no improvement after 48 hours of treatment and seek evac/higher care and look for abscess.
7. Treat per *Pain Management Protocol.* **Cellulitis will not resolve if there is an abscess present.**
8. **IF ABSCESS IS PRESENT:** Incise and drain (I&D) if the environment permits:
   a. Establish sterile incision site with Chlorhexidine or comparable antiseptic.
   b. Local anesthesia using Lidocaine.
   c. Incise the length of the abscess cavity, but no further.
   d. Incision should be parallel to skin tension lines if possible.
   e. irrigate with adequate crystalloid solution or potable water.
   f. Pack the wound loosely with iodoform or dampened gauze, if available. On subsequent dressings, you can wick the wound. Bandage site and perform wound checks daily. **DO NOT SUTURE THE SITE**.
   g. Abscess < 5cm in size do not require packing and studies show packing increases post procedural pain, pain at 48 hours, and more commonly require narcotics for pain control.
9. Duration of treatment should only be 5 days, reassessed and extended if the cellulitis is slow to resolve (*J of Infection* Vol 81, issue 4 Oct 2020).
10. a. TMP/SMX (trimethoprim/sulfamethoxazole) dose is 1–2 DS tabs twice daily, effective against MRSA.
    b. Doxycycline does not have very good strep coverage, recommendation is to use doxy + amoxicillin.
    c. Cephalexin is effective against group A Strep and MSSA but not against MRSA coverage.

DISPOSITION: Reevaluate daily and watch for progression of erythema while on antibiotics. Cellulitis in critical areas (head, neck, hand, joint involvement, perineal) requires *Priority* evacuation. Use of IV antibiotics requires *Priority* evacuation or medical officer consultation. Instruct patient to keep area covered and avoid close contact to prevent spreading infection to others or swimming to worsen infection.

SPECIAL CONSIDERATIONS: If abscess formation occurs, only attempt I&D in the tactical setting IF:

- **a. Patient is compromising mission due to inability to perform.**
- **b. Delay I&D until mission completion is not possible.**
- **c. The abscess is clearly well demarcated and superficial.**
- **d. Local anesthesia and antiseptic are available.**

Chest Pain

****Refer to Current ACLS Protocols if tactically feasible and if ACLS equipment and drugs are available.** This protocol assumes no access to ACLS medications or monitoring/defibrillation equipment. Do not delay evacuation if tactically feasible.

DEFINITION: Possible myocardial infarction or reason to rule out cardiac-related chest pain.

S/Sx (Cardiac): 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.

The following are signs and symptoms suspicious for myocardial infarction as the etiology for chest pain: Substernal chest pain that may radiate to the left arm, neck, or jaw; Pain described as pressure or squeezing; Pain exacerbated with exertion and relieved with rest; Associated dyspnea, diaphoresis (sweating), nausea, lightheadedness, or syncope; Tachycardia, irregular heart rhythm, or severe bradycardia; Bilateral rales/crackles in the lungs on auscultation; Significant hypertension or hypotension.

MANAGEMENT:

1. Aspirin 324mg PO (nonenteric coated) – chew to speed absorption.
2. Oxygen (if indicated) and pulse oximetry monitoring.
3. If available, Nitroglycerin 0.4mg SL initially, repeat q5min for total of 3 doses if not contraindicated (not hypotensive and not taking medications to treat erectile dysfunction)
4. IV access with saline lock. Administer 250–500mL crystalloid solution as needed to correct hypotension with frequent reassessment.
5. After above, treat per *Pain Management Protocol*.
6. Avoid all physical exertion. Allow the patient to rest in a position of comfort. Frequently reassess the patient including hemodynamic status.

DISPOSITION: *Urgent* evacuation. Evacuation platform should include ACLS certified medical personnel and the equipment, supplies, and medications necessary for ACLS care. 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.

SPECIAL CONSIDERATIONS/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 famotidine 20mg PO bid may be useful if evacuation will be delayed.
2. Severe chest pain following forceful vomiting may indicate esophageal rupture. Administer IV crystalloid solution 150cc/hr and Ertapenem 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, 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 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.*

Compartment Syndrome

DEFINITION: A progressive ischemic injury to tissue and muscle that results from increased pressure within a closed compartment of the body. A serious complication following wound closures, deep contusions, and long bone fractures resulting in necrotic tissue, nerve and vascular damage. May be seen in shrapnel wounds within 48–96 hours of trauma.

S/Sx: Pain that is disproportionate from original injury; persistent deep ache or burning pain; paresthesia (onset 30 minutes to 2 hours due to ischemic nerve dysfunction; muscle weakness in affected area; tense with swollen shiny skin; pain with passive stretch of muscles; tense compartment with firm feeling, decreased sensation and muscle weakness (onset generally over 24 hours; pain with pressure over the compartment area; feeling of pressure in affected area; late symptoms are diminished sensation distal to compartment area and diminished or absent pulses distal of to the injury.

MANAGEMENT:

1. Remove any constricting clothing, splints or bandages.
2. Closed or partially closed wounds should opened, irrigated, and dressed with wound remaining open.
3. Manage pain as per *Pain Management Protocol*.
4. Gain IV access.
5. Ertapenem 1g IV qd **OR** ceftriaxone 2g IV qd **OR** moxifloxacin 400mg PO qd.
6. Fasciotomy only if properly trained and online medical direction.

DISPOSITION: *Urgent evacuation to a surgical facility.*

Conjunctivitis

DEFINITION: Eye conjunctiva inflammation due to allergic, viral, or bacterial cause.

S/Sx: All causes (burning, irritation, tearing); **allergic** (bilateral, serous or mucoid discharge, itching, redness, accompanying sneezing); **viral** (bilateral or unilateral, redness, watery discharge, conjunctiva swelling, tender preauricular node, sandy/gritty/foreign body sensation, associated URI); **bacterial** (bilateral or unilateral, eye injection, mucopurulent or purulent discharge)

MANAGEMENT:

1. Remove contact lens if worn.
2. Assess for visual acuity and document before/after all treatments.
3. Tetracaine 0.5%, 2 drops in the affected eye one-time only for exam and pain relief. **DO NOT** dispense to patient.
4. Check for foreign body to include eyelid eversion of upper and lower lids and assess using fluorescein stain for abrasion/ulcer. Irrigate with normal saline prn.
   a. (Allergy): Attempt initial treatment with Artificial Tears, then if no resolution × 2 days naphazoline 2 drops q6hr × 3 days **OR** naphazoline/pheniramine 1 drop q6hr prn × 3 days.
   b. (Viral): Natural Tears and treat per upper respiratory tract infection/common cold.
   c. (Bacterial): Erythromycin 0.5% ophth oint q4hr × 3–5 days **OR** fluoroquinolone ophth drops – 1 drop in the affected eye q6hr while awake for 5 days.
5. Treat per *Pain Management Protocol* (rare).
6. Reassess q24hr until resolved.

DISPOSITION: Generally, does not require evacuation. Evacuate Routine if S/Sx do not resolve with treatment.

Constipation / Fecal Impact

DEFINITION: Infrequent, hard, dry stools.

S/Sx: Recent history of infrequent passage of hard, dry stools or straining during defecation; abdominal pain, which is typically poorly localized with cramping; if pain becomes severe and is associated with nausea/vomiting and complete lack of flatus or stools, consider a bowel obstruction.

MANAGEMENT:
Generally, dietary modification to include increased fiber intake will resolve simple constipation conditions. First line is 30g dietary fiber daily along with 80–120oz of water.

1. 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.
2. Polyethylene glycol 17g in 4–8oz 2–3 times a day. Can increase to every 4 hours if needed. Ensure patient is well-hydrated. Expect results in 2–3 days. Increase or decrease frequency of Polyethylene glycol to goal of soft, spongy consistency.
3. If no relief, bisacodyl (Dulcolax) 10mg PO tid prn **OR** docusate 100mg PO bid.
4. If above measures fail, perform digital rectal examination to check for fecal impaction. If fecal impaction is present, perform digital disimpaction, if trained.
5. Treat per *Pain Management Protocol* (***no narcotics – they cause constipation***). With all treatments, increase PO fluid and fiber (fruits, bran, and vegetables) intake (both episodically and continuing lifestyle).

DISPOSITION: Evacuation is usually not required for this condition. *Routine* evacuation if no response to therapy.

SPECIAL CONSIDERATIONS: Differential diagnosis include acute appendicitis, volvulus, ruptured diverticulum, bowel obstruction, pancreatitis, or parasitic infections. Acute onset, severe

Contact Dermatitis

DEFINITION: Skin reaction to external substance (plants, chemicals, topical medications, metals).

S/Sx: Acute onset of skin erythema and intense itching (pruritis); may see edema, papules, vesicles, bullae, discharge, and/or crusting may be visible.

MANAGEMENT:
1. Remove offending agent and evaluate pattern.
2. Change clothes when possible and bag original clothes until they can be machine washed.
3. Wash area with mild soap and water.
4. Apply cold wet compress to affected area to help decrease itching.
5. If available, apply triamcinolone cream 0.1% (**OR** if on face, 1% hydrocortisone cream) to the affected area **OR** if suspected poison ivy/oak/sumac, then Zanfel cream bid.
6. Give diphenhydramine 25–50mg PO q6hr prn itching, if tactically feasible. (Sedation may occur.)
7. In severe cases (hands/feet/face/genital or > 30% BSA), prednisone 60mg PO daily × 5 days burst or taper dose down every 3 days for 14- to 21-day course **OR** dexamethasone 10mg IM qd for 5 days **OR** methylprednisolone 125mg IM × 5 days.

DISPOSITION: *Priority* evacuation for severe symptoms: intraoral or eye involvement, or > 50% BSA involvement. *Routine* evacuation for any cases not showing improvement < 24 hours after steroids. Monitor for secondary infection; treat per *Cellulitis Protocol* if suspected on the basis of increasing pain, redness, or purulent crusting.

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.

Corneal Abrasions / Corneal Ulcers

DEFINITION: A traumatic disruption of the epithelial covering of the cornea with three major concerns: intense eye pain, corneal ulcer (vision-threatening infection), and potential for ruptured globe.

S/Sx: History of eye trauma or contact lens wear; severe eye pain; tearing; blurred vision; light sensitivity; fluorescein stain positive; white or gray spot on cornea for corneal ulcer (usually need tangential penlight exam to see); for sudden onset of eye pain after trauma in a patient with LASIK surgery, consider LASIK flap dislocation.

MANAGEMENT:

1. Remove contact lens if worn.
2. Assess for visual acuity and document before/after all treatments.
3. Tetracaine 0.5%, 2 drops in the affected eye one time only for exam and pain relief. **DO NOT** dispense to patient.
4. Check for foreign body to include eyelid eversion of both upper and lower lids and assess using fluorescein stain for abrasion/ulcer. Irrigate with normal saline prn.
5. Moxifloxacin 0.5% drops (1 drop qid) **OR** erythromycin 0.5% ophth oint q4hr × 3–5 days (inadequate coverage for contact lens wearers) **OR** fluoroquinolone ophth drops – 1 drop in the affected eye q6hr while awake for 5d **OR** bacitracin ointment qid – all applied until the corneal epithelium is healed.
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 grey spot at abrasion site). **DO NOT PATCH.**
9. Assess using fluorescein stains daily — abrasions should get progressively smaller. Continue antibiotic drops until 24 hours after cornea becomes fluorescein negative (no bright yellow spot).
10. PO analgesics PRN IAW *Pain Management Protocol.*
11. **IF CORNEAL ULCER PRESENT:** Fluoroquinolone 1 drop in the affected eye q6hr while awake for 5 days. *Urgent* evacuation to ophthalmologist. Moxifloxacin 400mg PO once a day may be added if evacuation is delayed or the victim's pain is becoming worse.

DISPOSITION: Reassess q24hr to ensure improvement. Evacuation may not be needed for corneal abrasion if improving with treatment.

Priority evacuation for Corneal Ulcer. *Urgent* evacuation for LASIK flap dislocation.

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. Consider Herpes Simplex or Fungal infections as well and contact a medical officer.

Cough

DEFINITION: Usually viral etiology but may also occur with high altitude pulmonary edema (HAPE) and pneumonia.

S/Sx: Cough with or without scant sputum production; often accompanied by other signs and symptoms of upper respiratory tract infection (i.e. sore throat and rhinorrhea).

MANAGEMENT:

1. If associated with upper respiratory infection S/Sx, treat per protocol.
2. If absence of fever and URI S/Sx, treat per *Bronchitis Protocol*.
3. If fever, tachycardia. tachypnea, shortness of breath, treat per *Pneumonia Protocol*.
4. If at altitude, treat per *Altitude Medical Emergency Protocol*.

DISPOSITION: Correlate signs/symptoms to medical condition and manage by appropriate protocol.

DIFFERENTIAL: Causes of chronic cough include GERD, asthma, and PND.

Deep Venous Thrombosis (DVT)

DEFINITION: Potentially life-threatening condition in which a clot is present in the large veins of a leg and may dislodge and localize in the pulmonary system, a pulmonary embolism.

S/Sx: History of recent trauma, air travel, altitude exposure, birth control pills, or family history of DVT; asymmetric pain and swelling in a lower extremity (often the calf muscles); warmth over affected area; increased pain in the affected calf muscles with dorsiflexion of the foot; palpable venous "cord."

MANAGEMENT:

1. Monitor patient with pulse oximetry (sudden decrease in oxygen saturation or new chest pain/shortness of breath suggests a pulmonary embolism).
2. Elevate the limb slightly, especially if the patient is experiencing swelling or pain, to reduce edema and promote venous return. Avoid excessive manipulation or pressure on the affected limb, which could potentially dislodge the thrombus (blood clot) and lead to a pulmonary embolism (PE).
3. For associated respiratory distress (tachypnea, tachycardia, dyspnea, chest pain) consider pulmonary embolus and treat per *Chest Pain Protocol.*

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

SPECIAL CONSIDERATIONS: May be confused with a ruptured Baker's cyst in a tactical setting.

Dehydration

DEFINITION: Inadequate fluid intake exacerbated by physical exertion or illness.

S/Sx: Lightheadedness (worse with sudden standing); mild headache (especially in the morning); dry mucosa; decreased urinary frequency and volume; dark urine (tea colored); degradation in performance

MANAGEMENT:

1. Assess for underlying condition and treat as per appropriate protocol in conjunction with this protocol.
2. Increase oral fluids if tolerated.
3. If available, use carbohydrate/electrolyte drink mixes for fluid replacement diluted to a 1:4 solution.
4. Avoid fluids containing caffeine.
5. If unable to tolerate PO fluids, use an initial bolus of 1L crystalloid IV, followed by repeat attempt at PO hydration. If still unable to tolerate PO hydration, repeat 1L bolus of crystalloid IV.
6. Treat per *Nausea/Vomiting Protocol* as needed.

DISPOSITION: Monitor closely for recurrence of dehydration. *Priority* evacuation if dehydration persists after treatment.

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.

Dengue Fever

DEFINITION: A flaviviral disease transmitted by the *Aedes aegypti* and *albopictus* mosquitoes.

S/Sx: Can be dormant for 1–7 days. Patients will have high fever with at least two of the following: severe HA, severe retro-orbital PN, arthralgias, myalgias, rash, or petechiae. **Hemorrhagic manifestations may include purpura/ecchymosis, epistaxis, gum bleeding, blood in emesis, urine, or stool, or vaginal bleeding.**

MANAGEMENT: Refer to higher medical care if suspected DF. Management is mostly supportive focusing mostly on maintaining blood pressure and perfusion. Initiate Tylenol 1,000mg q6hr.

DISPOSITION: *Urgent* evacuation for suspected DF, dengue hemorrhagic fever (DHF), or dengue shock syndrome (DSS).

SPECIAL CONSIDERATIONS: Most commonly found in tropical Asia, Central and South America, and the Caribbean Dengue is the leading mosquito-borne infection. The *Aedes* prefers to feed in the daytime. Their bites can go unnoticed. One mosquito can infect multiple people. Dengue can be transmitted by blood transfusions and organ transplants but no recorded person-to-person transmission. Someone can be infected with any of the dengue viruses and never develop DF. There is no vaccine or chemoprophylaxis for any of the dengue viruses. The primary means of prevention is eliminating the mosquito breeding habits, wearing clothing properly, using insect repellent, and mosquito nets. If a person has been infected with the dengue virus previously and is exposed again, they are at risk for either DHF or DSS, which could be fatal.

Dental Pain

DEFINITION: Most common causes are deep decay, fractures of tooth crown/root, acute periapical (root end) abscesses, or pericoronitis (pain associated with an impacted wisdom tooth).

S/Sx: Intermittent or continuous pain (usually intense), heat or cold sensitivity; visibly broken/cracked tooth; severe pain on percussion; intraoral swelling/abscess; partially erupted wisdom tooth.

MANAGEMENT:

1. Treat per *Pain Management Protocol.* Consider application of clove oil–soaked gauze for pain relief.
2. If signs and symptoms of infection are present, administer amoxicillin/clavulanic acid 875mg PO bid for 7 days **OR** ceftriaxone 1g IV/IM qd × 7 days **OR** if previous unavailable, then azithromycin 500mg PO initially followed by 250mg PO qd × 4 days.
3. If gums appear swollen and red, encourage increased oral hygiene and warm saline rinses bid. Consider local or regional anesthesia if trained.

DISPOSITION: Evacuation usually not necessary. *Routine* evacuation if not responding to therapy or requiring IV antibiotics.

Determination of Death

DEFINITION: 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. It is assumed that personnel do not have access to ECG, or other monitoring equipment to evaluate heart rhythm, or deliver countershocks.

S/Sx: Obvious death – persons who, in addition to absence of respiration, cardiac activity and neurologic reflexes have one or more of the following: decapitation; massive crushing and/or penetrating injury with evisceration of the heart, lung, or brain; incineration; decomposition of body tissue; rigor mortis or post-mortem lividity.

MANAGEMENT:

1. In the setting of obvious death, resuscitative efforts should not be initiated.
2. If resuscitative efforts have been initiated, discontinuation should be considered: 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: There is persistent absence of pulse and respirations despite assuring airway and ventilation as well as administration of resuscitative fluids and medications; no response to deep pain above or below the clavicles; absence of SpO_2 and $EtCO_2$, from a correctly placed endotracheal tube or alternative airway.
3. If there is any question as to the discontinuation of resuscitative efforts, continue ACLS/ALS treatment protocol and then a medical officer should be contacted for guidance.
4. In traumatic arrest, consider and as tactically feasible, conduct bilateral finger thoracostomy and airway maneuver or advanced airway placement with re-evaluation prior to discontinuing resuscitation.

DISPOSITION: Evacuation of the remains when tactically feasible. In the event of return of spontaneous circulation, *Urgent* evacuation.

SPECIAL CONSIDERATIONS: Patients that are struck by lightning, have hypothermia, cold-water drowning, or intermittent pulses may require extended cardiopulmonary resuscitation.

Electrocution

DEFINITION: Death or serious injury caused by electric shock, electric current passing through the body. Injury can occur through both direct electrocution and from blast/blunt trauma injuries.

MANAGEMENT: Follow *Tactical Trauma Assessment Protocol* with additional key notes outlined in this Protocol. Lightning strikes deliver direct current (DC) electrocution and domestic electrocution is classically alternating current (AC). Maximal injury due to DC is usually cardiac and respiratory arrest, and AC injury can cause ventricular fibrillation. Fixed and dilated pupils are often due to transient autonomic disturbance, but be sure to rule out closed head injury first. Rhabdomyolysis and compartment syndrome can develop. For lightning strike casualties conduct reverse triage as apnea/asystole is commonly transient and can resolve with BLS/ACLS support until return of respirations and pulse.

DISPOSITION: Evacuate any patients with systemic symptoms to higher level of care.

Envenomation – Arthropod
(Spider & Scorpion)

DEFINITION: Toxic envenomations from arthropods are generally not life threatening, but can cause conditions requiring treatment and potential hospitalization. Most suspected "spider bites" are MRSA abscesses. Assume abscess unless the spider bite was witnessed.

Black Widow:

S/Sx: Pinching bite followed by local swelling and burning; large muscle group spasms/tremors; abdominal pain and/or rigidity within 60 minutes (may mimic appendicitis or acute surgical abdomen); nausea and vomiting; diaphoresis; hypertension; tachycardia.

MANAGEMENT:

1. Treat per *Pain Management Protocol (narcotic analgesia).*
2. Midazolam 2–5mg IV/IM for relief of muscle spasm.
3. Diphenhydramine 25–50mg q6hr prn PO/IV.
4. In cases of suspected black widow spider bites, consider other causes for acute abdominal pain.

Brown Recluse:

S/Sx: Local pain and ulceration at site within 2–8 hours with surrounding erythema; Hemorrhagic vesicle progressing to slowly enlarging eschar; fever, chills, nausea, joint pain.

MANAGEMENT:

1. Elevate bite site.
2. Avoid strenuous activity.
3. Treat per *Pain Management Protocol (narcotic analgesia).*
4. Diphenhydramine 25–50mg q6hr prn PO/IV.
5. Monitor and treat per *Cellulitis Protocol*.

Scorpion:

S/Sx: Local pain, swelling, and erythema; nausea and vomiting; paresthesia; tongue fasciculations; sympathetic (tachycardia, hypertension, hyperthermia) or parasympathetic (hypotension, bradycardia, hypersalivation, incontinence) overdrive can develop; seizures; agitation; blurry vision/rotary eye movements.

MANAGEMENT:

1. Treat per *Pain Management Protocol.*
2. Treat per *Nausea and Vomiting Protocol.*
3. Supportive care as necessary per appropriate protocol.
4. Diphenhydramine 25–50mg q6hr prn PO/IV.
5. Apply ice or cold water.

DISPOSITION: *Urgent* evacuation for development of abdominal rigidity, development of systemic signs, or for anaphylaxis. *Routine evacuation for tissue necrosis of brown recluse bite. Evacuation typically not required for localized insect stings and scorpion bites.*

Envenomation – Insect, Hymenoptera
(Bee, Wasp, Hornet)

DEFINITION: Toxic envenomations from bees, wasps, and hornets are all capable of causing life-threatening anaphylaxis, especially in personnel with known hypersensitivity. Personnel with known reactions should maintain their own epinephrine administration kit (Epi-Pen).

S/Sx: Pain; swelling/edema; puncture site(s) from stinger or fangs; warmth; erythema; signs of anaphylaxis

MANAGEMENT: If signs and symptoms of anaphylaxis present, treat per *Anaphylaxis Protocol.*

Hymenoptera (Bee, Wasp, Hornet):

1. Remove stinger by scraping from side.
2. Apply ice or cold water.
3. Apply topical 1% hydrocortisone cream.
4. Apply topical lidocaine.
5. Ibuprofen 800mg PO tid × 7 days.
6. Diphenhydramine 25–50mg q6hr prn PO/IV.

DISPOSITION: *Urgent* evacuation for development of systemic signs or for anaphylaxis. Evacuation typically not required for localized insect stings and scorpion bites.

SPECIAL CONSIDERATIONS: Tactical medics must always be aware of unit personnel with known insect hypersensitivities.

Envenomation – Marine

DEFINITION: Marine envenomation results from stings by jellyfish, fire corals, stingrays, sea urchins, bristle worms, fish spines, and sea snakes. All of these envenomations are more likely to occur in intertidal regions, reefs, and surf zones.

Jellyfish Sting: Contact with jellyfish tentacles causes immediate, intense sharp and burning pain, followed by local, linear erythematous eruption; Severe stings can cause anaphylactic reaction, hematuria, vomiting, syncope, hypotension, or paralysis; (Envenomation by fire coral is similar to jellyfish, but less severe and rarely causes complications. Pain symptoms usually resolve within 12 hours).

Bristleworm Sting: Is caused by contact with bristle-like setae on feet of animal. Contact is like brushing against a cactus plant and may result in many fine bristles embedded in the skin. Causes painful inflammation, which is almost never serious.

Stingray Puncture: Spine on tail contains retroserrated teeth, with a venom gland along the groove. Envenomation causes immediate, intense pain at site of injury out of proportion to what it looks like, edema. Pain tends to peak 30–60 minutes after puncture and can last for several days. Rare systemic symptoms include limb paralysis, hypotension, and bradycardia.

Sea Urchin Puncture: Frequently cause multiple deep puncture wounds when stepped on. Puncture and envenomation cause immediate, intense pain, erythema, and local swelling. If more than 15–20 punctures are present, then severe systemic symptoms can occur.

Fish Spine Puncture: First symptom is usually immediate localized pain out of proportion to clinical manifestations, lasting minutes to hours. Puncture wound is usually cyanotic, with surrounding erythema and edema. Pain is often noted in proximal lymph nodes.

Symptoms can progress to delirium, malaise, nausea, vomiting, and elevated temperature. Infrequently leads to shock and death.

Sea Snake Bite: Fang and teeth marks consist of small puncture wounds and may number from 1 to 20. Latent period of 10 minutes to several hours between bite and onset of symptoms. May initially present with mental status changes, including euphoria, anxiety or restlessness. Progresses to dry throat, nausea, vomiting, generalized weakness and paralysis, leading to respiratory distress/failure.

Blue Ringed Octopus Bite: Bite is painless and may go unnoticed. Patient may become paralyzed with respiratory distress. Symptoms are usually rapid in onset and extremely variable in severity.

Sting Management (Jellyfish, Sea Wasp):
1. Remove stinger, tentacles, etc. if possible with gloved hand, forceps or tape.
2. Immediately flush with dilute acetic acid (vinegar). Alternative flush is isopropyl alcohol and seawater. Do not use fresh water.
3. Topical lidocaine.
4. Topical steroids.
5. Follow *Pain Management Protocol.*

Bite Management (Sea Snakes, Blue-Ringed Octopus):
1. Treat as a snake envenomation.

Puncture Management (Sea Urchin, Stingray, Fish Spines, Bristleworms):
1. Remove all penetrating foreign bodies with gloved hand, forceps or tape.
2. Irrigation with cold seawater.
3. Soak the affected area in non-scalding water (110–115 degrees) for 30–90 minutes to inactivate toxins.
4. Ultrasound (preferred imaging) or x-ray (if available for retained foreign body).
5. Antibiotics for deep puncture wounds: Moxifloxacin 400mg qd.
6. Follow *Pain Management Protocol.*

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

Envenomation – Snake

DEFINITION: Snake bites and actual envenomation is rare. More care should be taken to avoid snakes and potential bites than the likelihood of an actual envenomation.

Crotalidae (Pit Vipers, Rattlesnake, Moccasin, Bush Master):
S/Sx: Sudden pain; erythema; ecchymosis; hemorrhagic bullae; bleeding from site; metallic taste; hypotension/shock; swelling/edema.

Elapids (Coral Snake, Sea Snake, Mamba, Cobra, Taipan, Kraits):
S/Sx: Cranial nerve dysfunction (i.e., ptosis, difficulty swallowing); paresthesia; fasciculations; weakness; altered mental status

MANAGEMENT:
1. If signs and symptoms of anaphylaxis present, treat per *Anaphylaxis Protocol.*
2. General supportive care as necessary through emergency protocols.
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. Initiate saline lock in unaffected extremity.
   d. Monitor and record vital signs and extent of edema every 15–30 minutes.
   e. IV crystalloid for hypotension as necessary.
   f. Immobilize affected limb in neutral position.
   g. A compression wrap (proximal to distal) may be helpful with an elapidae (neurotoxic) snake (cobra, mamba, coral snake), but is not indicated with crotalidae (pit viper) bites.
   h. 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 are ineffective in snakebites.

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

SPECIAL CONSIDERATIONS:
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.

Epistaxis

DEFINITION: Anterior or Posterior Nosebleed

S/Sx: Nosebleed, often previous history of nosebleeds

MANAGEMENT:
1. Clear nares/airway by having patient sit up and lean forward and blow nose.
2. Oxymetazoline nasal spray 2 squirts in each nostril.
3. Pinch anterior area of nose firmly for full 10 minutes **WITHOUT RELEASING PRESSURE.**
4. Assess for continued bleeding and have patient clear/blow nose.
5. If bleeding continues, pack with Afrin-soaked gauze bilaterally along floor of nasal cavity × 24 hours.
6. Once bleeding has stopped (after 30 minutes), remove the Afrin nasal sponge and apply Bactroban to the affected nostril bid – tid × 7 days.
7. Clear clots and other material from airway (if required) by having patient sit up, lean forward, and blow his/her nose.
8. If bleeding continues, pack with TXA-soaked gauze bilaterally along floor of nasal cavity × 30 minutes then execute step 6).
9. **IF BLEEDING CONTINUES despite packing or rebleeding occurs after 24 hours:** Prepare 14 French Foley catheter. (Tip is cut to minimize distal irritation). Advance catheter along floor of nose (straight in) until visible in mouth. Fill balloon with 5mL of normal saline. Retract catheter until well opposed to posterior nasopharynx. Add an additional 5mL of normal saline to balloon. Clamp in place without using excessive anterior pressure. Moxifloxacin 400mg PO qd until packing is removed. **Leave balloon and packing in place for 72 hours.**

DISPOSITION: Evacuation may not be required if epistaxis is mild, anterior, and resolves with treatment. *Urgent* evacuation for severe epistaxis not responding to therapy or if Foley catheter is used.

SPECIAL CONSIDERATIONS:
1. Common at high altitude and in desert environments due to mucosal drying. Administer petroleum-based lubricant to internal nasal passages for prevention.
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.

Flank Pain
(Includes Renal Colic, Pyelonephritis, Kidney Stones)

DEFINITION: Flank pain possibly caused by renal colic, pyelonephritis, or kidney stones.

S/Sx: Flank Pain; urinary tract infection (dysuria and/or polyuria); back pain; nausea/vomiting; costovertebral angle tenderness; fever; hematuria.

MANAGEMENT:
1. Treat per *Pain Management Protocol with* ***ketorolac if kidney stone suspected.***
2. Treat per *Nausea and Vomiting Protocol*.
3. Treat per *Dehydration Protocol.*
4. If fever present treat with antibiotics and evacuate:
   a. Trimethoprim-sulfamethoxazole 1 tab PO bid **OR** amoxicillin/clavulanic acid 875mg PO bid.
   b. Ceftriaxone 1g bid IV/IM **OR** ertapenem 1g IV/IM if unable to tolerate PO or unresponsive to oral treatment.

DISPOSITION: *Priority* evacuation

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

Frostbite & Frostnip

DEFINITION:

Frostnip: superficial freezing of the skin, a precursor to frostbite, that produces reversible skin changes that usually resolve with warming. FROSTBITE: occurs when tissue freezes and crystals form in the extracellular space between cells.

S/Sx: Edema; tenderness; loss of sensation (often loss of previous painful sensation); inability to move or flex affected areas; blisters (clear-fluid blisters indicate less severe/hemorrhagic blisters indicate a deeper, more severe injury); skin color may be pale, yellowish, or waxy-looking; frozen area will feel solid or wooden and may have a lifeless appearance.

MANAGEMENT:

1. Prevent additional freezing and/or progression of injury.
2. **DO NOT** attempt rewarming or thawing if there is a chance that refreezing will occur.
3. Treat per *Pain Management Protocol* prior to attempting rewarming. FROSTNIP:
   a. Administer passive re warming with warming devices such as warm blankets, insulated ready-heat, or HPMK.
   b. Manage mild to moderate pain as per *Pain Management Protocol*.
   c. After rewarming, assess every 6 hours for tissue damage or signs of infection. Give NSAIDs prn × 5 days.

Frostbite:

1. Administer passive rewarming with warming devices as above **OR** if available, preferred is rapid rewarming in 104–108°F (40°C) water.
2. Gain IV access.
3. Administer warmed crystalloid fluids (1,000–1,500mL) to reduce blood viscosity and capillary sludging.
4. For pain, treat with narcotics or for severe pain as per *Pain Management Protocol*.
5. Clean and dress any blisters that have burst while avoiding bursting any intact blisters.
6. Splint fingers/toes and separate digits with nonadherent gauze.
7. Elevate extremities to reduce edema.
8. Initiate NSAID regimen until evacuated.

DISPOSITION: *Urgent* evacuation if risk of refreezing or rewarming is not an option. *Priority* evacuation for frostbite. Frostnip generally will not require evacuation if resolved (any indication of infection or tissue damage should be evacuated as *routine*.

SPECIAL CONSIDERATIONS:

1. Ensure complete differential diagnosis from hypothermia (hypothermia may occur in conjunction with frostbite and should be managed first).
2. Do not allow patient any type of tobacco product.
3. Do not rub or massage injured tissue in the re-warming process.
4. Rangers are more susceptible to cold at high altitudes or windy conditions below 32°F.

Fungal Skin Infection

DEFINITION: Dermatophyte (tinea) infections are common worldwide and are common causes of tinea corporis, tinea pedis, tinea cruris, and tinea capitis.

Tinea Corporis: A dermatophyte infection of the skin that occurs predominantly on the core (body surfaces other than the feet, groin, face, scalp hair, and beard hair), also known as ringworm. Tinea corporis is typically acquired by skin-to-skin contact. **S/Sx:** Initially: Pruritic, circular or oval, erythematous, scaling patch or plaque that spreads centrifugally. An annular, raised border, plaque appears after a few days in a "ringed appearance." **Treatment:** Apply terbinafine or Itraconazole once to twice per day × 1–3 weeks.

Tinea Pedis: An infection of the skin that occurs on the feet (also known as athlete's foot). Tinea pedis is typically acquired by direct skin contact, usually from showers or locker rooms. **S/Sx:** Pruritus; erythematous erosions or scales between toes, soles, medial, or lateral aspect of the foot. **Treatment:** Apply topical terbinafine 1% once to twice daily × 4 weeks.

Tinea Cruris: A dermatophyte infection of the skin that occurs in the crural fold (also known as jock itch). Tinea cruris is typically associated with an active tinea pedis infection. **S/Sx:** Initially begins with an erythematous patch on the proximal medial thigh, then spreads centrifugally with slightly elevated erythematous, sharply demarcated borders with tiny vesicles possibly present. The infection may spread to the perineum, gluteal cleft, buttocks, but sparing the scrotum in males. **Treatment:** Apply terbinafine or Itraconazole once to twice per day × 1–3 weeks.

Tinea Capitis: A dermatophyte infection of the skin that occurs in the scalp. Tinea capitis is typically associated with direct contact from an infected person or object (i.e., hat or comb). **S/Sx:** Pruritis and scaly patches present on scalp. **Treatment:** Oral systemic antifungal therapy (griseofulvin, terbinafine, fluconazole, or itraconazole). Topical antifungal creams are ineffective.

SPECIAL CONSIDERATIONS: Dermatophyte infections that do not resolve with topical antifungal creams should be treated with oral systemic antifungals. Consult a medical provider for any dermatophyte infections that do not respond to topical antifungal creams. A boggy, pustular area on the scalp (kerion) can develop secondary to tinea capitis. Do not confuse with abscess and do not I&D. Treatment is oral antifungals in consultation with a medical provider. Note: fungal infections can be complicated and diverse in nature, so consult a medical provider if you are unsure of the nature of the infection.

Gastroenteritis
(Diarrhea/Nausea/Vomiting)

DEFINITION: Usually due to an acute viral infection of the GI tract, but bacteria or parasite infections are common in deployed environments.

S/Sx: Acute onset of nausea, vomiting, and diarrhea; fever may or may not be present; abdominal cramping, discomfort, or distension may or may not be present; possible S/Sx of dehydration.

MANAGEMENT:
1. 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*.
2. Treat per *Nausea and Vomiting Protocol and/or Dehydration Protocol*.
3. Either allow diarrhea to pass for 24 hours **OR** if diarrhea has already persisted for > 24 hours, then consider administering loperamide 4mg PO initially, then 2mg PO after every loose bowel movement with a maximum dose of 16mg per day (do not use loperamide in the presence of fever or bloody stools).
4. If bloody diarrhea, fever > 100.4°F at onset/development or persists > 48 hours after initial treatment, azithromycin 500mg PO qd for 3 days or ciprofloxacin 500mg PO bid for 3–5 days.
5. Bloody diarrhea should remit within 2–3 days of starting antibiotics. Consider metronidazole 500mg PO tid for 5 days if persist and consider advanced workup or evacuation.

DISPOSITION: *Urgent* evacuation if grossly bloody stools or circulatory compromise. *Priority* evacuation if dehydration occurs despite above therapy. *Routine* evacuation if diarrhea persists after 3 days of therapy or if it develops while already on antibiotics.

SPECIAL CONSIDERATIONS:
1. Antibiotics are generally not needed for routine bacterial causes.
2. Emerging fluoroquinolone resistance among enteropathogenic *E. Coli* and *Campylobacter* and recent black box warning 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.
6. Azithromycin is considered treatment of choice for traveler's diarrhea.

Headache

DEFINITION: Headache

S/Sx: Headache; if the headache is atypical for the patient or "thunderclap/worst HA of life" or neurological exam changes, check for elevated blood pressure (if possible), fever, neck rigidity, visual symptoms, mental status changes, weakness, and dehydration.

MANAGEMENT:

1. Perform full neurological exam and document.
2. If history of trauma or blast proximity, treat per *Concussion/mTBI Protocol*.
3. If the patient has fever, signs of altered mental status while not at altitude, nuchal rigidity, photophobia, or petechial rash, then assess per *Meningitis Protocol.*
4. If at altitude, treat per *Altitude Medical Emergency Protocol.*
5. If atypical or "thunderclap/worst HA of life," evacuate urgent for CT scan to rule out life-threatening intracranial pathology.
6. If headache is accompanied by nausea and/or vomiting, treat per *Nausea and Vomiting Protocol*.
7. Treat per *Pain Management Protocol.*
8. If dehydration is suspected, treat per *Dehydration Protocol*.
9. Oxygen can be attempted to treat cluster headache.

DISPOSITION: Evacuation is usually not required if the headache responds to therapy. 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 "thunderclap/it's the worst headache of 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.

SPECIAL CONSIDERATIONS: The number of differential diagnoses for the acute headache is large and includes disorders that encompass the spectrum of minor to severe underlying disorders.

Headache
(Migraine Origin)

DEFINITION: Chronic episodic headache disorder capable of altering daily function lasting 4–72 hours.

S/Sx: Prior history of diagnosed migraines; Headache that begins with mild pain that escalates into a unilateral and throbbing pain lasting 4–72 hours; no immediate history of head trauma or blast exposure; headache intensified with physical movement; may have accompanying nausea, vomiting, photophobia, phonophobia; may be preceded by an aura of visual disturbances, sensory disruption in arms or face, and speech difficulties.

MANAGEMENT:

1. Perform a complete neurological exam to exclude other etiologies (If patient is compliant enough) and refer to appropriate protocol if indicated.
2. If suspected migraine, move to a dark, cool, quiet environment (if possible).
3. Initiate treatment with available triptan: Rizatriptan 5–10mg PO (may repeat 1 dose in 2hr prn) **OR** Sumatriptan 6mg subcutaneous (may repeat 1 dose in 2 hours prn).
4. Acetaminophen 1,000mg q6hr **AND** aspirin 325mg q6hr **AND** caffeine 200mg q6hr (single combined drug option is Excedrin Migraine).
5. Consider prevention or management of nausea and vomiting with promethazine 25mg IV/IM/PO q6hr prn **AND** diphenhydramine 25–50mg IV/IM/PO q6hr prn.
6. Encourage sleep, hydration, and light meals if possible.

DISPOSITION: Priority evacuation if condition does not improve with continual repeat treatments, condition worsens, a single episode is persistent greater than 24 hours, or individual becomes a risk to the mission.

SPECIAL CONSIDERATIONS:

1. Do not assume new headache with neurologic abnormalities is a migraine. Treat per stroke/ACLS guidelines or *Meningitis Protocol* based on clinical scenario.
2. Generally avoid the use of narcotics, but if primary management is unresolved with intense pain that is compromising mission, consider *IAW Pain Management Protocol*.
3. NSAIDs are generally ineffective but may provide some relief if no other options are available.
4. Migraine-prone individuals should be identified before deployment.

HIV Post-Exposure Prophylaxis

HIGH-RISK EXPOSURES: Percutaneous injury (needle stick or other contaminated penetrating injury); exposure or exchange of body fluids with persons at high risk for HIV; transfusion of blood products that have not undergone standard US blood bank or equivalent testing for transmissible diseases; 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. Immediately wash area with soap and water to clean area and minimize exposure.
2. Use a rapid HIV test kit (if available) 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.
   d. Initiate antiretroviral triple therapy according to the following priority of drugs. **Choose only 1 of the following drug treatment options:** Tenofovir disoproxil 300mg/emtricitabine 200mg (Truvada) qd **PLUS** raltegravir (Isentress) 400mg bid **OR** dolutegravir (Tivicay) 50mg qd. The alternative regimen is: tenofovir disoproxil 300mg/emtricitabine 200mg qd **PLUS** darunavir (Prezista) 800mg **AND** ritonavir (Norvir) 100mg qd.
4. For GI side-effects of medication, treat per *Nausea and Vomiting Protocol.*
5. Maintain hydration and nutrition status.

DISPOSITION: *Urgent* evacuation if a significant exposure occurs and highly active antiretroviral therapy (HAART) is not available. *Routine* evacuation if HAART is available and Rapid HIV Test is positive. 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

SPECIAL CONSIDERATIONS:

1. Initiation of the 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.

POSTEXPOSURE PROPHYLAXIS HOTLINE: CALL 1-888-448-4911 24/7 WITH ANY QUESTIONS

Hyperthermia

Heat Injuries

Heat injuries fall into a continuum of heat cramps to heat exhaustion to heat stroke. While the mechanism of heat cramps is not fully understood, there is convincing evidence to suggest it is the result of sodium depletion or overhydration. Heat exhaustion and heat stroke represent a spectrum of disorders, which range in intensity and the severity of tissue damage. The pathophysiology of heat exhaustion and heat stroke are so similar that they may represent a continuum of disease rather than separate, distinct diseases and both are characterized by sodium and water depletion. Heat cramps, heat exhaustion, and heat stroke are all illnesses related to a failure of the body to maintain fluid and electrolyte balance to the challenge of adapting to added heat loads. These conditions may develop over several days, allowing adequate time for effective intervention. The maintenance of adequate diet and fluid intake is essential. The use of dietary supplements can lead to dehydration and increased likelihood of heat injury. When faced with increased heat loads, the body is dependent on sweating to maintain a constant body temperature. The sources of the heat load may be external (a hot day), internal (a road march with 50 pounds of gear), or both (a road march in the desert sun). If the heat load exceeds the body's ability to lose heat, a heat injury will result.

Heat Cramps

The term "heat cramps" is actually a misnomer, as muscle cramping more likely results from sodium depletion during intense activity, not heat. In fact, cooling of a fatigued muscle is often a contributing factor. Heat cramps typically occur in individuals undergoing prolonged, intense activity in a hot and humid environment. Heat cramps are brief, intermittent, and very painful but can be largely prevented by maintaining an adequate salt and fluid balance prior to and during exertion.

S/Sx: Painful, tonic contractions of skeletal muscles frequently preceded by palpable or visible fasciculation. Fatigue, dizziness, nausea, and vomiting are common.

MANAGEMENT: Obtain hydration and diet history to guide management and identify likely electrolyte cause. Use iSTAT or similar point of care lab testing device to evaluate electrolytes if available. Oral electrolyte rehydration and foods are the initial management of choice. IV crystalloid solution is indicated if more rapid treatment is needed. Mild stretching and massage of the contracting muscle will provide some relief to the intense discomfort. May return to activity after symptoms resolve but patient is at risk for return of heat cramps or other heat injury.

Heat Exhaustion/Stroke

Heat exhaustion is the most common heat illness. Although heat exhaustion in a military setting often manifests after extreme exertion, in reality, it likely develops over several days and is a result of cardiovascular strain as the body tries to maintain normothermia in a hot environment. Heat exhaustion occurs when the demands for blood flow (to the skin for temperature control through convection and sweating, to the muscles for work, and other vital organs) exceed the cardiac output. A body that has developed a state of salt depletion over several days, in combination with extreme exertion, is at risk for heat exhaustion. Recent upper respiratory infection can be both predictive and prognostic of a heat stroke.

S/Sx: Profound fatigue, chills, nausea/vomiting, tingling of the lips, shortness of breath, orthostatic dizziness, headache, syncope, hyperirritability, anxiety, piloerection, heat cramps, heat sensations in head and upper torso. Casualty may or may not feel thirsty. Tachypnea, tachycardia, orthostatic hypotension may be present. Core temperature may be normal or greater than 104ºF. Heat stroke can be defined as a heat injury with central neurological symptoms such as altered mental status or seizures.

MANAGEMENT: Heat Exhaustion: Reduce the load on the heart with rest and cooling. Place casualty in shade and remove heavy clothing. Apply cool water to the skin, if available. Correct water and electrolyte depletion by administering oral or IV fluids. IV fluids replenish the volume and correct symptoms quickly. Patients with resting tachycardia or orthostatic hypotension should initially receive up to 1–2L boluses of crystalloid solution and monitored for these vital signs to correct. If patient can tolerate oral fluids, use an oral electrolyte solution or sports drink. SM should limit activity for minimum of 24 hours and ease into return in activity in slow stepwise approach.

MANAGEMENT: Heat Stroke: Heat stroke is a true emergency and needs to be managed by rapid active cooling (ice bath immersion or rotation of ice sheets). In a patient with an undefined heat injury and temperature > 104º, or hyperthermia and altered mental status treat as heat stroke per the protocol. Do not rely solely on temperature to diagnose but have a high index of suspicion with appropriate risk factors and clinical setting and treat presumptively.

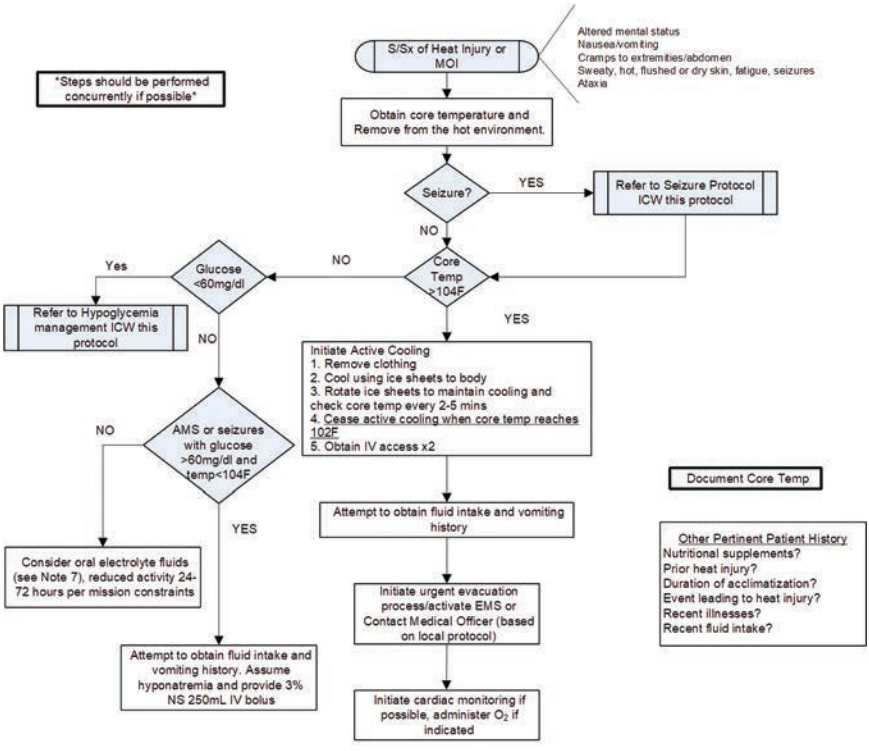
Hyponatremia

In addition to these standard heat injuries, hyponatremia, or emergently low serum sodium, may be classified as a heat injury. Hyponatremia in our population most commonly occurs due to excessive free water intake that overwhelms the body's ability to maintain a normal serum electrolyte concentration. This excessive free water leads to a dilution of the serum sodium and can have central nervous system effects such as seizures or altered mental status.

Treat all apparent heat injuries with primary concern for heat stroke. After treating or ruling out heat stroke, evaluate and treat as indicated for hypoglycemia. In a patient thought to have a heat injury due to environmental factors with altered mental status or seizures with a core temperature < 104°F and normal or treated glucose level, attempt to gain history of excessive free water intake or recurrent clear vomiting. With a negative evaluation for heat stroke and hypoglycemia in patient with altered mental status or seizures, treat for presumptive hyponatremia. Treatment includes continuing emergent evacuation and administering a single 250mL hypertonic saline (3%) bolus. Ensure large-bore IV access for administration and be cognizant of venous extravasation and risk with hypertonic saline.

***Please see CPG for the Prevention, Diagnosis, and Management of Exertional Heat Illness for special considerations.

Hyperthermia (Heat) Management Protocol



1. Evac as early as possible
2. Treat presumptively as heat stroke while working through protocol and evaluation
3. Can initiate up to 2L IVF bolus for heat stroke while awaiting evacuation
4. Fluids should never be stored or administered if below 32° C.
5. Seizure likely due to hyponatremia, treat accordingly
6. Hyponatremia patient often has history of excessive fluid intake and repeated clear vomiting
7. Document initial and serial core temps and times
8. Ensure patency of IV and large vein access for 3% NS due to increased extravasation risk
9. All heat related patients must be documented and reported to a medical officer.
10. Key documentation includes: PT Hx and Hx leading up to the event; medications or supplements ingested; last meal type and time; any cardiac dysrhythmias.
11. A recent upper respiratory infection can be both predictive and prognostic of a heat stroke.
12. DO NOT delay evacuation process to render treatment – treat en route.
13. Oral electrolyte fluids include drip drop or 1:1 dilution with sports drinks.
14. Titrate rehydration to establish normal urinary frequency and volume, restoration of pale urine color, restoration of normal skin turgor, and restoration of mucosal moisture.
15. All heat injury patients will be documented and reviewed by a medical officer.

Hypothermia Management

Hypothermia

Hypothermia, acidosis, and coagulopathy constitute the "triad of death" in trauma patients. The understanding of hypothermic coagulopathy with increased mortality is critical. Prevention of hypothermia must be emphasized in combat operations and casualty management and all levels of care. Hypothermia occurs regardless of the ambient temperature; hypothermia can, and does, occur in both hot and cold climates. Prevention of hypothermia is much easier than treatment of hypothermia; therefore, prevention of heat loss should start as soon as possible after the injury. Keep in mind that hypothermia becomes a cardiac event as much as a temperature event.

TCCC Application

Care Under Fire: No specific action.

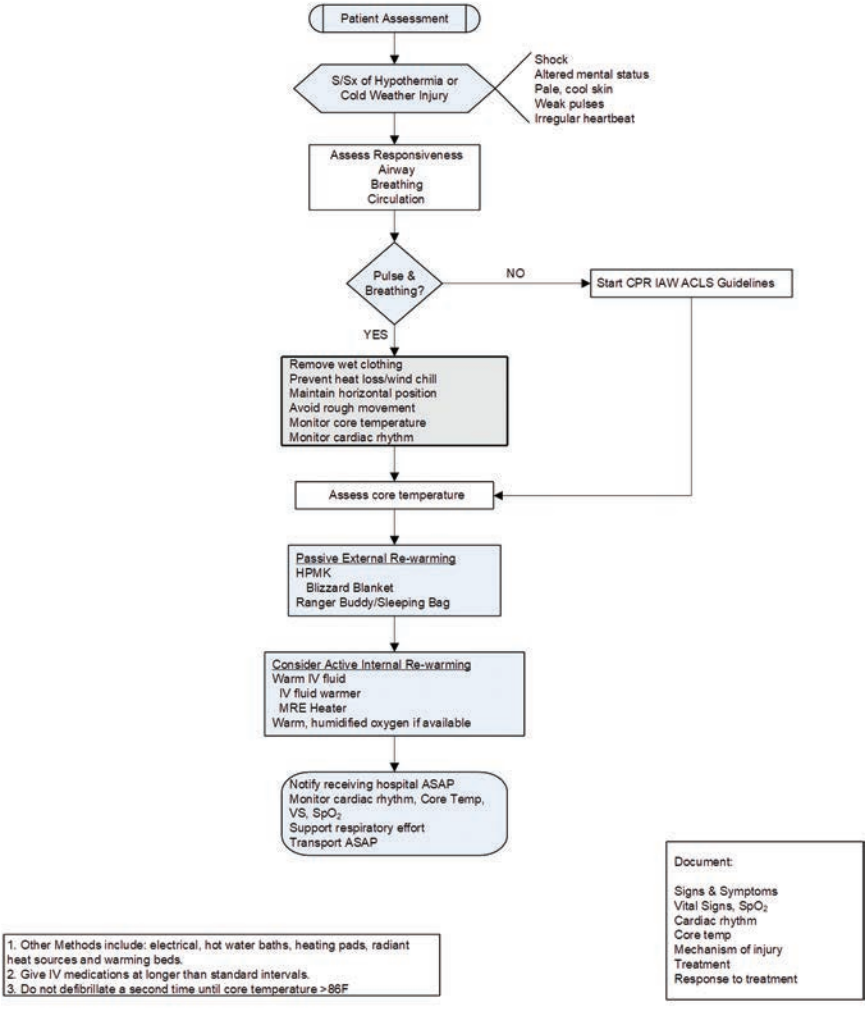
Tactical Field Care: All attention should be directed towards preventing heat loss. Stop bleeding and resuscitate appropriately. If available, warm fluids should be used. This will start generating internal heat that facilitates rewarming. Minimize the casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible. Remove and replace wet clothing with dry if possible. Get the casualty onto an insulated surface as soon as possible. Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS). If an HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready-Heat Blanket may also be used. If the items mentioned above are not available, use dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry. Warm fluids are preferred if IV fluids are required. Placement of a temperature dot on the forehead of the patient will assist in monitoring changes in the patients' response to treatment, and will serve as a visual "clue" to remind providers to monitor the patient's temperature throughout the evacuation process

Tactical Evacuation: Use a portable fluid warmer capable of warming all IV fluids including blood products. Protect the casualty from wind if doors must be kept open.

Extended Care

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

Hypothermia Prevention & Management Protocol



Ingrown Toenail

DEFINITION: Ingrown toenail with inflammatory response.

S/Sx: Pain, edema, erythema, and hyperkeratosis at lateral nail fold; pressure over the nail margins increases the pain; inflammatory or infectious responses are generally localized.

Initial management is prevention. Appropriate nail hygiene is important. Toenails should be cut straight across, and the corners should not be rounded off. For mild ingrown toenail initial management should be conservative. The use of topical antibiotics or drainage of paronychia is appropriate if present. Conservative management is initiated with once to twice daily warm water soaks with mild traction being applied to the ingrown nail area. Elevation of the nail with a cotton tip applicator, dental floss or other instrument to pry the nail out of the skin is appropriate. If forceps and appropriate monitoring is available a small piece of gauze or cotton can be placed under the ingrown nail and removed and replaced daily to allow the nail to grow.

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.

1. Partial toenail removal: Clean the site with soap, water, and Betadine; Perform a digital block at the base of the toe using lidocaine 1%; apply constricting band to base of toe; remove the lateral quarter of the nail toward the cuticle (or whole nail), using a sharp scissors with upward pressure; 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; clean the nail grooves to remove any debris; remove constricting band; control bleeding with direct pressure and dry the underlying nail bed.
2. Apply Mupirocin 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. Systemic antibiotics are typically not needed in these procedures; however, if an infection is suspected (increasing pain, redness, and swelling), then treat as per *Cellulitis Protocol*.

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

SPECIAL CONSIDERATIONS:

1. Consider toenail removal only if close follow-up is possible.
2. Local anesthetic with epinephrine for a digital block is still controversial although medically acceptable.

Insomnia

DEFINITION: Primary insomnia is sleeplessness not caused by another sleep, medical, psychiatric disorder, medications, or other substances. Secondary insomnia is a result of one of the above causes. Common in deployed setting with changes of > 4 time zones.

S/Sx: Perceived reduction of sleep time; difficulty initiating sleep on schedule; daytime sleepiness or tiredness; difficulty concentrating; anxiety; moodiness.

MANAGEMENT:

1. Practice consistent sleep hygiene of a sleep/wake schedule in a cool, dark, quiet environment (if possible). The CBT-I app should be used/offered as initial therapy. Cognitive behavioral therapy for insomnia is the first line and mainstay of treatment.
2. Reduce intake of stimulants, especially caffeine or energy drinks, and avoid heavy late-night meals or high-calorie snacks before bedtime. Also avoid working out 2–3 hours before bedtime.
3. Encourage a 30-minute "wind down" time before attempted sleep and decreased electronic screen stimulation for 2 hours prior to bed (TV, cell phones, tablets etc.).
4. The use of first generation antihistamines can be used if initiation of sleep is the biggest complaint. Dosing consists of 25–50mg. Consider melatonin 3mg PO approximately 30–120 minutes before bedtime **OR** in consultation with a medical provider, Zolpidem 5–10mg PO at bedtime or eszopiclone 2mg immediately at bedtime. Do not use these agents for longer than 2 weeks, abuse potential and side-effect profile are high. Any choice of pharmacotherapy should not be used for more than two weeks.

DISPOSITION: Evacuation not required unless individual's performance becomes a risk to mission, self or others.

SPECIAL CONSIDERATIONS:

1. Ensure differential diagnosis from sleep apnea, psychiatric or behavioral disorders and other medical reasons.
2. The body's circadian rhythm generally takes 1 day per time zone traveled to adjust to the new time zone or activity schedule.
3. Sleep management medications are intended to assist in adjustment of sleep schedule and not as a convenience during long travel.

Joint Infection

DEFINITION: Bacterial joint infection, infected bursitis, septic arthritis, septic joint; may result from penetrating trauma (e.g., animal bites or shrapnel).

S/Sx: History of adjacent penetrating trauma or infection; single red, swollen joint; fever; pain with axial load; inability to straighten/flex joint.

MANAGEMENT:

1. IMMOBILIZE THE JOINT.
2. Gain IV access.
3. For septic joint: ceftriaxone 2g IV/IM bid **OR** ertapenem 1g IV/IM qd. For septic bursitis: treat per *Cellulitis Protocol*.
4. Treat per *Pain Management Protocol.*

DISPOSITION: *Priority* evacuation

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).

Laceration

DEFINITION: Laceration

S/Sx: Simple uncomplicated laceration of skin without involvement of deeper structures.

MANAGEMENT:

1. Irrigate and clean wound thoroughly. Pressure with clean, potable water is as effective as hospital-based sterile water irrigation.
2. Prepare area in sterile fashion.
3. Provide local anesthesia with 1% lidocaine with or without epinephrine depending on site.
4. Close with nonabsorbable suture, Dermabond, or Steri-Strips as dependent on depth of wound. Absorbable sutures should only be used to close a laceration if: the laceration is on the face or hand or if subcutaneous sutures are being used for wound closure.
5. If dirty wound or environment, antibiotics should be considered.
6. Check tetanus status and treat as needed; do not suture if wound is > 12 hours hold (> 24 hours on face), or if puncture/bite wound.
7. Nonabsorbable sutures should be removed in 7–10 days. Most animal bites should not be closed with suture, consult a provider on when to close lacerations from animal bites. After sutures, place a dressing with antibiotic cream and do not soak in water while sutures are in place, keep dry for 24–48 hours.

DISPOSITION: Evacuation usually not required.

Loss of Consciousness (without Seizures) / Syncope

DEFINITION: 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).

S/Sx: Unconsciousness

MANAGEMENT:

1. If no respirations or pulse, follow BLS guidelines. If associated with trauma (blast, fall, MVA, etc.) in last 14 days, then manage per *mTBI Protocol*.
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. Place either 1 tube oral glucose gel or contents of one packet of sugar in buccal mucosal region (**DO NOT** use oral glucose if patient remains unconscious).
4. Gain IV access.
5. Naloxone 2mg IV/IM. Repeat q2–3min prn to max dose of 10mg.
6. If no response, treat per appropriate *protocol per Special Considerations.*
7. Pulse oximetry monitoring.
8. Oxygen if available.

DISPOSITION: *Urgent* evacuation, unless loss of consciousness clearly due to orthostatic hypotension or vasovagal hypotension. The evacuation package should include personnel certified in Advanced Cardiac Life Support (ACLS), with equipment, supplies and medications necessary for ACLS care.

SPECIAL CONSIDERATIONS: Also consider hypoglycemia, anaphylactic reaction, medication, recreational drug use, head trauma, hyperthermia, hypothermia, myocardial infarction, pulmonary embolism, lightning strikes, and intracranial bleeding. Obtain ECG if able in all undifferentiated syncope patients.

Malaria

DEFINITION: Protozoan infection transmitted by the female *Anopheles* mosquito; prevention through personal preventive measures is the key (antimalarial meds, DEET, permethrin, bed nets, and minimized skin exposure). **Malaria should be in the differential diagnosis of any patient with a fever in an endemic area. Malaria CDC Hotline: 770-488-7788, After Hrs: 770-488-7100.**

S/Sx: Hx of travel to malaria-endemic area; noncompliance with antimalarial medications and/or personal preventative measures. Prodrome of malaise, fatigue, and myalgia may precede febrile paroxysm by several days; paroxysm characterized by abrupt onset of fever, chills, rigors, profuse sweats, HA, backache, myalgia, abdominal pain, nausea, vomiting, diarrhea (may be watery and profuse) in *P. falciparum*; intermittent or continuous fever in *P. falciparum* malaria; classic "periodicity" is usually absent. Profuse sweating between febrile paroxysms; tachycardia, orthostatic hypotension, tender hepatomegaly, and delirium (cerebral malaria).

MANAGEMENT: If available, test with rapid assay test (BinaxNow NSN 6550-08-133-2341) or blood smear or if limited lab capability, CBC looking for anemia and low platelets. If unavailable and malaria is suspected, treat empirically. Can use acetaminophen 1,000mg q6hr prn for fever. Do not use same treatment as was used for prophylaxis. If any treatments are started medics must contact a medical officer.

1. Malarone (atovaquone 250mg/proguanil 100mg) 4 tabs PO qd × 3 consecutive days with food or milk **OR**
2. Coartem (artemether 20mg/lumefantrine 120mg) 1tab initial dose, repeat single dose 8 hours later, then one dose PO bid for following 2 days with food or milk **OR**
3. Quinine sulfate 542mg base PO tid for 3–7 days **PLUS** doxycycline 100mg PO bid for 7 days **AND if known chloroquine-resistant use:** option 1) or 3) and **ADD** primaquine phosphate 30mg (can cause hemolytic anemia in G6PD deficiency) base PO qd × 14 days as well.

DISPOSITION: *Urgent* treatment and evacuation for complicated malaria (cerebral/altered mental status, pulmonary changes with fever, or abnormal vital signs) these indicate a medical emergency. *Priority* evacuation for uncomplicated cases (normal vital signs, normal mental status, no nausea and vomiting, no cough/shortness of breath).

SPECIAL CONSIDERATIONS:

1. Malaria **MUST** be considered in all febrile patients currently in or recently returned in, a malarious area.
2. It is not uncommon for malaria to present like pneumonia or gastroenteritis (with vomiting and diarrhea).
3. It is appropriate to treat suspected malaria cases empirically if diagnostic test (blood smears or rapid test) are not available.
4. However, the BinaxNow rapid Diagnostic test is now FDA approved and should be used, if available, to guide treatment selection.
5. The use of chemoprophylaxis does not rule out malaria.
6. Consider bacterial meningitis in evaluating the patient – treat for both disorders if meningitis is suspected.
7. Patients who cannot tolerate PO meds **MUST** be evacuated.

PROPHYLAXIS AND POST EXPOSURE PROPHYLAXIS

1. Insecicides and preventing mosquito bites are primary prevention.
2. Chemoprophylaxis most commonly done with doxycycline 100mg daily, begin 1–2 days before travel and continue for 4 weeks after leaving. Cannot miss a dose to be effective.
3. For terminal prophylaxis primaquine 52.6mg daily for 14 days (contraindiciated in G6PD deficiency, ensure all are screened prior to prescribing).

Meningitis

DEFINITION: Inflammation of the meninges and spinal cord by bacterial, viral, or fungal agents.

S/Sx: Classic features include: severe headache, high fever, pain with any neck movement (particularly forward flexion), altered mental status; may also include: photophobia, nausea and vomiting, malaise, seizures; positive Brudzinski (pain on head and neck flexion, causing hips/knees to flex) and Kernig's (neck pain with hip flexion and knee extension) signs. May have petechiae in meningococcemia (mask and gown PPE if suspected)

MANAGEMENT:

1. If meningitis is suspected, treatment should be initiated immediately.
2. Gain IV access.
3. Dexamethasone 10mg IV/IM q6hr.
4. Ceftriaxone 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. For prophylaxis of close contacts: Rifampin 600mg PO bid for 2 days **OR** ceftriaxone 250mg IM once.

DISPOSITION: *Urgent* evacuation.

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.

Motion Sickness & Prevention

DEFINITION: Not a true sickness, but a normal response to a situation in which sensory conflict about body motion exists among visual receptors, vestibular receptors, and body proprioceptors. Referred to as air sickness, car sickness, sea sickness, and physiologic vertigo.

S/Sx: Nausea; vomiting; diaphoresis; pallor; hypersalivation; yawning; hyperventilation; anxiety; panic; malaise; fatigue; weakness; confusion; dizziness.

PREVENTION:

1. Meclizine 25mg PO taken 30–60 minutes before travel and bid **OR** 1× scopolamine transdermal patch 1.5mg behind ear up to 4 hours prior to travel.
2. If possible, sit in middle of plane/boat or fix vision on horizon while avoiding fixation on moving objects.
3. Minimize food intake before travel and increase airflow around face.

MANAGEMENT:

1. Manage as per *Nausea and Vomiting Protocol*.
2. For severe responses or vertigo, consider Midazolam 1–2mg IV q6–12hr.

DISPOSITION: Evacuation not required unless individual's performance becomes a risk to mission, self, or others. Consider routine evacuation or complete reevaluation if S/Sx do not alleviate < 24 hours after last motion travel.

SPECIAL CONSIDERATIONS:

1. Ensure differential diagnosis from altitude illness, gastroenteritis, central neurologic cause or stroke (evaluate and treat per ACLS guidelines), and toxin exposure.
2. All above medications may cause drowsiness and should be considered for mission impacts.

Nausea & Vomiting

DEFINITION: Nausea and vomiting usually as a result of underlying medical condition and managed in conjunction with other protocols.

S/Sx: Nausea and vomiting

MANAGEMENT:
1. Ondansetron 4–8mg IV/IM/SL or 8mg PO q4hr prn **OR** promethazine 25mg IV/IM/PO q6hr prn.
2. Treat per *Dehydration Protocol*.
3. Use in conjunction with appropriate protocols.

DISPOSITION: Evacuate per protocol for underlying condition.

SPECIAL CONSIDERATIONS:
1. Avoid rapid IV administration of promethazine.
2. **DO NOT** give subcutaneous promethazine.
3. Promethazine may cause drowsiness and therefore not recommended during combat operations or training.

Otitis Externa
(Outer Ear Infection or Swimmer's Ear)

DEFINITION: Bacterial or fungal infection of external ear canal, "swimmer's ear."

S/Sx: Ear pain and pain with passive ear movement, tragus swelling, erythema, pruritis in area; possible exudate and erythema in ear canal, decreased auditory acuity, sensation of fullness, and moisture in ear.

MANAGEMENT:
1. If external canal exudate is present, Ofloxacin Otic 0.3% 10 drops in affected ear daily × 7–10 days **OR** gatifloxacin ophthalmic 0.3% 5 drops tid–qid × 7–10 days (for both – administer while awake and laying on unaffected side for at least 5 minutes); ophthalmic used to minimize meds carried.
2. Place sterile dry dressing wick into ear canal to keep canal open and allows meds to reach inner canal with canal edema.
3. Acetaminophen 1,000mg PO q6hr prn pain.
4. No internal hearing protection until resolution.
5. If no response or worsens, treat with ciprofloxacin 750mg PO bid and urgent evacuation (concern for malignant otitis externa).

DISPOSITION: For uncomplicated cases, no evacuation is necessary. *Urgent* evacuation for complicated cases not responding to therapy or if condition worsens despite 12–24 hours of treatment with ciprofloxacin.

Otitis Media
(Middle Ear Infection)

DEFINITION: Eustachian tube dysfunction, viral infection, or bacterial infection of middle ear.

S/Sx: Ear pain, +/– fever, decreased hearing, sensation of ear fullness; erythema and bulging of TM are hallmark signs but loss of landmarks typically seen in adults, increased pressure may cause TM rupture and discharge; often noted with accompanying URI symptoms, recent air travel, or recent ascent to altitude.

MANAGEMENT:

1. Acetaminophen 1,000mg PO q6hr **AND/OR** ibuprofen 800mg PO tid prn pain **AND** pseudoephedrine 60mg qid.
2. Oxymetazoline nasal spray 2 squirts per nostril bid (max 3 days).
3. If grossly apparent, or no resolution in 1–2 days, or bacterial, then add antibiotics: amoxicillin/clavulanate acid 875/125mg PO bid × 10 days **OR** azithromycin 500mg PO initially followed by 250mg PO qd × 4 days **OR** ceftriaxone 250mg IM single dose.

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

SPECIAL CONSIDERATIONS:

1. 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).
2. If water immersion is anticipated, use ear plugs to prevent cold water entry, which will cause vertigo.

Pharyngitis
(Oral Pharyngeal Infections Including Viral, Strep, Epiglottitis, Peritonsillar Abscess, Mononucleosis)

DEFINITION: Inflammation of the fauces and pharynx leading to sore throat or discomfort swallowing and/or talking due to multiple etiologies. Most common causes in young healthy patients include viral URIs, group A beta-hemolytic strep (GABHS) pharyngitis, odontogenic (dental origin), cutaneous sources or postinjury (wound or fracture) infections.

S/Sx:
GABHS Pharyngitis: Pain, fever, malaise, absence of cough, odynophagia, tonsillar exudates, tender cervical adenopathy.

Peritonsillar Abscess: Pain, possibly unilateral sore throat, fever, malaise, trismus, odynophagia, muffled voice (hot potato voice), unilateral tonsillar enlargement, unilateral uvula deviation to unaffected side.

Epiglottitis: Sore throat, odynophagia, fever, muffled voice, drooling, stridor, hoarseness, dyspnea (less common in adults), tripoding/sniffing position, oral cavity/oropharynx normal in most patients, pooled secretions, laryngotracheal complex tender to palpation (particularly in the hyoid region).

Mononucleosis: triad of fever/tonsillar pharyngitis/lymphadenopathy; fatigue and possibly LUQ pain to splenomegaly (seen in 50–60% of patients).

Viral (Non-GABHS): S/Sx of URTI with no red flags of other etiologies.

MANAGEMENT:
GABHS Pharyngitis:
1. Evaluate and treat IAW CENTOR Criteria (Exudate on Tonsils, Fever, No Cough, Anterior Cervical Lymphadenopathy).
2. Treat empirically for 3 or greater S/Sx CENTOR criteria with benzathine penicillin G
3. 2 million units IM once (if available) **OR** penicillin 500mg PO qid × 10 days. If 2 or less S/Sx CENTOR criteria, then treat symptomatically per *non-GABHS management*.

Peritonsillar Abscess:
1. If potential for airway compromise, *Urgent* evacuation for surgical intervention.
2. Needle aspiration IF TRAINED with priority evacuation. If not trained, and no airway compromise, then *Priority* evacuation. Continue to treat symptomatically and with clindamycin 450mg PO tid **OR** amoxicillin/clavulanate 875mg bid × 10 days.

Epiglottitis:
1. Manage airway and breathing first IAW *Airway Management Protocol* (avoid airway manipulation if possible).
2. Place patient in position of comfort.
3. Monitor pulse oximetry.
4. Oxygen prn if possible.
5. Gain IV access.
6. Ceftriaxone 1g IV/IM qd × 7 days **AND** clindamycin 600mg IV q6hr **OR** clindamycin 300–450mg PO q6hr × 7 days.
7. Treat per *Pain Management Protocol.*
8. Consider dexamethasone 10mg IV for any airway involvement.

Mononucleosis:
1. Treat per *URI Protocol.*
2. Profile for no high-impact physical training, sports, jumping/FRIES × 6 weeks if able to confirm no splenomegaly on ultrasound to prevent splenic rupture; no corticosteroids.

Viral (Non-GABHS): *Treat per Upper Respiratory Tract Infection.*

DISPOSITION: *Urgent* evacuation if any airway compromise is present. *Routine* evacuation if no airway compromise and the infection is not widespread.

SPECIAL CONSIDERATIONS:
1. These infections may progress rapidly from minor to airway/life-threatening.

Pneumonia

DEFINITION: Acute lung (pulmonary parenchyma) infection due to virus, mycoplasma, or other bacteria

S/Sx: Fever > 100.4°F, chills, productive cough (dark yellow, green, red tinged), chest pain with breathing (pleuritic), malaise, wheezes, rhonchi and/or rales, decreased breath sounds (may be absent over affected lung), dyspnea, tachypnea, shortness of breath, tachycardia, possible decrease in pulse oximetry, egophony, bronchophony and tactile fremitus.

MANAGEMENT:

1. Acetaminophen 1,000mg PO q6hr prn pain/fever.
2. Antibiotic
   a. PCN NON-allergic: Amoxicillin 1g tid PLUS macrolide (preferred) or doxy 100mg bid for 5 days
   b. PCN Allergic: cephalosporin PLUS macrolide (preferred) or doxy
   c. Macrolide options: azithro 500mg daily for 3 days or clarithromycin 500mg bid or 1g extended release daily
   d. Cephalosporin options: cefpodoxime 200mg bid or cefditoren 400mg bid or cefdinir 300mg bid or 600mg daily. Duration: 5 days
3. Albuterol MDI 2 puffs qid prn wheezing.
4. Increase PO hydration.
5. Pulse oximetry.
6. Oxygen if indicated.
7. If at altitude > 8000 ft, descend 1,500–3,000 ft; differential diagnosis should include HAPE, PE, and pneumothorax Ensure smoking cessation and enforce hydration. Consider throat lozenges for accompanying pharyngitis.

DISPOSITION: *Urgent* evacuation for severe dyspnea or hypoxia. *Observation or Routine evacuation* as necessary.

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

Pulmonary Embolism (PE)

DEFINITION: Obstruction of a pulmonary artery or one of its branches by a thrombus (clot), tumor, air, or fat that originated else where in the body. Massive pulmonary emboli will result in obstructive shock.

S/Sx: Acute onset of dyspnea, tachypnea, tachycardia, localized chest pain, anxiety, diaphoresis (sweating), decreased oxygen saturation, full breath sounds with no wheezing, no prominent cough, and low-grade fever; usually proceeded by DVT with lower extremity pain, swelling, and tenderness with history of trauma, air travel, or long periods in sitting positions.

MANAGEMENT: Use a risk stratification tool such as PERC or Wells. PERC negative if age < 50, HR < 100, SpO_2 > 95%, no leg swelling, no hemoptysis, no recent surgery/trauma, no prior PE/DVT, and no hormone use (testosterone or birth control). History of malignancy with treatment within 6 months or palliative care is also a risk factor for PE.

1. Monitor with pulse oximetry and provide oxygen (if available).
2. Treat per *Pain Management Protocol*.
3. Consider myocardial Infarction and treat as per *Chest Pain Protocol*.
4. If at altitude > 8,000 ft, descend 1,500–3,000 ft as per *HAPE Protocol*.
5. If available, it is important to apply supplemental oxygen to maintain SpO_2 > 98%, establish IV access, prepare to support blood pressure with fluids and vasopressors if SBP persistently < 90.
6. PE can also be a cause of sudden unconsciousness or syncope.

DISPOSITION: *Urgent* evacuation

Rabies Post-Exposure Prophylaxis

DESCRIPTION: An RNA virus transmitted through the saliva of an infected animal by biting, licking of an abrasion/wound, or contact with mucosa.

Hx: Hx of being bitten/licked by potentially infected dogs, bats, raccoons, coyotes, foxes, skunks, cats, horses, cows, sheep, or around aerosolized excrements of bats.

S/Sx: Incubation period: Incubation in humans typically 4 days–3 months. Period can be shorter if bitten in the face or bitten by an animal with a high viral count in its saliva. PT will have intense pruritus, pain, paresthesia at the bite sight, malaise, fatigue, HA, fever, anorexia, apprehension, anxiety, insomnia, depression. Classic rabies patients will progress into coma ending with death.

MANAGEMENT:

1. If suspected bite from infected animal. Evacuate at earliest opportunity for vaccine but absolutely within 48 hours.
2. Initially debride, vigorously clean, and copiously irrigate the wound using iodine solution which will increase the efficacy (vaccine failures are associated with poor wound care).
3. Give tetanus booster
4. IF PREIMMUNIZED, purified chick embryo cell (PCEC) vaccination 2 doses 1.0mL IM day 0 and 3, administered in deltoid area (for children anterolateral aspect of the thigh is acceptable) and NEVER in the gluteal area.
5. IF NOT PREIMMUNIZED, inject Human Rabies Immunoglobulin around the site and remaining (< 50%, not able to be injected around wound) deep IM distant from vaccine site. **Also**, 4 doses of PCEC IM in deltoid days 0, 3, 7, 14. Immunoglobulin should never be administered in the same syringe or in the same anatomical site as the day 0 PCEC dose.

SPECIAL CONSIDERATIONS: Rabies is a universally fatal disease. Rabies virus can live dormant in bat feces, so exercise caution when going into caves. Bat bites often are unnoticed. They may only manifest by small abrasions with prolonged bleeding. If there is a suspected bat bite or PT awakens with bat in room; consider evacuation for vaccine and HRIG.

Rectal Bleeding

DEFINITION: Bleeding per rectum.

S/Sx: Bright red blood per rectum. Anal pain with defecation usually indicates hemorrhoids or anal fissures. Significant bleeding can result in hypotension. Red flags include dark/tarry stools (melena), abdominal pain, postural hypotension, fever, weight loss.

MANAGEMENT: Obtain vitals. If hemodynamically stable, perform rectal exam in an attempt to identify external source of bleeding. If hemorrhoid or anal fissure is identified as source of bleeding, treat conservatively with increased fiber intake and topical creams. If hemodynamically unstable, continue to monitor, volume resuscitate as needed, and evacuate to higher care.

DISPOSITION: *Urgent* evacuation if hemodynamically unstable or there is persistent significant bleeding. Priority evacuation if red flags are present.

SPECIAL CONSIDERATIONS: Certain medications (iron supplements, bismuth subsalicylate [Pepto-Bismol]) can cause dark stools that may be mistaken for melena.

Rhabdomyolysis

DEFINITION: Breakdown or necrosis of skeletal muscle cells that release cellular contents into the circulation. Typical causes: Limb ischemia, carbon monoxide poisoning, electrical or thermal burns, blunt trauma or crush injury, snake Bite, hyperthermia, hypothermia, and physical exertion.

S/Sx: Acute muscle pain (myalgias); muscle weakness; fever; malaise; nausea or vomiting; tea-colored urine; oliguria/anuria; dipstick positive for blood, but no intact RBC on a spun specimen (due to myoglobin in urine).

MANAGEMENT: Aggressive hydration is the cornerstone of treatment.

1. Crystalloid solution 1–2L bolus IV/IO followed by 500mL–1L/hr. In a patient making urine, any isotonic fluid is acceptable (you do not need to avoid potassium containing fluids if patient is making urine). *Titrate fluids to achieve target urine output of > 200mL/hr.*
2. Monitor intake/output hourly.
3. If unable to monitor due to clinical condition, insert Foley catheter to facilitate measuring urine output.
4. Reassess vital signs and mental status frequently. Utilize cardiac monitoring if available.

Potential Problems/Complications:

a. Cardiac dysrhythmia treatment: 1g calicum chloride or 3g calcium gluconate q5 minutes until arrhythmia has resolved, then adminster glucose+insulin.
b. If dysrhythmia occurred, loop diuretics may be needed to eliminate potassium.
c. Persistent oliguria despite adequate fluid resuscitation.
d. Avoid loop diuretics such as furosemide, which may increase myoglobin precipitation in kidneys and provoke acute renal failure.
e. Compartment syndrome: see *Compartment Syndrome Protocols.*

DISPOSITION: *Priority* evacuation

Sepsis / Septic Shock

DEFINITION: Severe life-threatening condition resulting from the presence of harmful microorganisms in the blood or other tissues and the body's response to their presence, potentially leading to the malfunctioning of various organs, shock, and death.

S/Sx: Hypotension; fever; tachycardia; altered mental status; dyspnea

MANAGEMENT: Do not attempt to treat without contacting a medical officer.

1. Obtain IV/IO access.
2. Ertapenem 1g IV/IO qd **OR** ceftriaxone 2g IV/IO qd.
3. If patient is hypotensive, give 1L crystalloid solution fluid bolus. Consider additional fluids if still hypotensive, then an additional liter titrated to maintain systolic blood pressure > 90mmHg or palpable radial pulse. Maintain aggressive fluid management.
4. Initiate vasopressor medications if persistent hypotension despite > 2L IVF boluses. (norepinephrine or epinephrine). Epinephrine (1:100,000) 0.5–2mL q5–15 minutes or drip prn. Epinephrine 10µg in large IV q5–15min if persistent hypotension despite > 2L IVF boluses. Initiate evacuation.
5. Upon consultation with medical officer, consider stress dose steroids (hydrocortisone 200mg IV daily) for septic shock refractory to vasopressors.
6. Monitor for decreased mental status and be prepared to manage airway.

DISPOSITION: *Urgent* evacuation

SPECIAL CONSIDERATIONS:

1. Ensure complete medical history and documentation of any preceding events are sent to medical provider.

Smoke Inhalation

DEFINITION: Common after closed space exposure to fire; consider airway burns, carbon monoxide poisoning, other toxin inhalation, and need for hyperbaric oxygen.

S/Sx: History of smoke exposure; burns (singed nares, facial burns); coughing; stridor; +/– carbonaceous sputum; respiratory distress (may be delayed in onset).

MANAGEMENT:
1. Remove from environmental exposure and allow patient to rest.
2. Administer oxygen if available.
3. Refer to *Airway Management Protocol* and consider the use of early cricothyroidotomy if airway burns/edema or singed nasal hair, facial burns are present/suspected.
4. Albuterol by metered dose inhaler 2–4 puffs q1hr or nebulizer if available.
5. Dexamethasone 10mg IV/IM qd.
6. Patient exertion will exacerbate symptoms and should be avoided.

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

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. Consider cyanide poisoning (treat with hydroxocobalamin) or coexisting trauma in hypotensive burn patient.

Spontaneous Pneumothorax

DEFINITION: Acute onset of pneumothorax usually without obvious or known chest trauma.

S/Sx: Spontaneous unilateral chest pain; dyspnea – typically mild; no wheezing; cough; decreased or absent breath sounds on affected side

Clinically significant pneumothorax can be diagnosed with ultrasound. Lung point, loss of lung sliding, or barcode sign support diagnosis of pneumothorax.

MANAGEMENT:
1. Pulse oximetry monitoring.
2. Oxygen if available (use oxygen for all suspected spontaneous pneumothoraces).
3. **Consider needle decompression for suspected tension pneumothorax.**
4. If needle decompression allows for patient improvement, followed by worsening of condition, consider repeat needle decompression.
5. Consider tube thoracostomy if recurrence of respiratory distress after 2 successful needle decompressions **OR** Evacuation time > 1 hour **OR** 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: *Urgent* evacuation for significant respiratory distress despite therapy. *Priority* evacuation for patients whose respiratory status is stable.

SPECIAL CONSIDERATIONS:
1. Consider also: anaphylaxis, pulmonary embolism, high altitude pulmonary edema (HAPE), asthma, myocardial infarction and pneumonia.
2. More common in tall, thin individuals and smokers.
3. Clinically significant pneumothorax can be diagnosed with ultrasound. Lung point, loss of lung sliding, or barcode sign support diagnosis of pneumothorax.

Subungal Hematoma

DEFINITION: Collection of blood under the nail; typically occurs after trauma to fingernail or toenail.

S/Sx: Pain and purplish-black discoloration under nail.

MANAGEMENT:

DO NOT DRAIN IF NO PAIN or if suspected underlying fracture.

1. Decompress the nail with a large gauge needle or electrocautery 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 and absorbing/wicking with alcohol swabs 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.

DISPOSITION: Evacuation should not be required for this injury if the subungual hematoma is successfully treated and healing does not hinder mission performance.

Testicular Pain

DEFINITION: Testicular pain due to torsion, epididymitis, orchitis, STDs, hernias, masses, and trauma.

S/Sx: Testicular torsion: Sudden onset testicular pain; usually associated with activity; associated testicular swelling; abnormal position of the affected testicle; symptoms may be increased by testicular elevation; usually associated with pain-induced nausea and vomiting; **Loss of cremasteric reflex is the best diagnostic indicator for testicular torsion.**

Epididymitis: Gradual onset of worsening pain; may have fever and/or dysuria; can also be traumatic; symptoms may be relieved with elevation; 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 single attempt to rotate the testicle outward (like opening the pages of a book 180 to 720 degrees) should be made. If pain increases, one attempt to rotate the opposite direction should be made again up to 720 degrees. Successful detorsion will result in relief of pain.
2. Gradual onset pain with a normal lying testicle should be treated per *Urinary Tract Infection Protocol*.
3. Treat pain per *Pain Management Protocol.*
4. Treat per *Nausea and Vomiting Protocol.*

Treat epididymitis with sexually transmitted infection treatment.

1. Ceftriaxone 500mg IV/IM × 1 AND Doxycycline 100mg bid × 10 days (can replace Doxycycline with Azithromycin 1g PO once if compliance is in question, although not recommended).

DISPOSITION: *Urgent* evacuation for testicular torsion. For other causes of testicular pain, treat cause and consider evacuation if symptoms persist more than 3 days.

SPECIAL CONSIDERATIONS:

1. The primary concern in testicular pain is differentiating testicular torsion from other causes of testicular pain.
2. Testicular torsion is a medical emergency requiring urgent correction to prevent loss of the affected testicle.
3. Other common causes of testicular pain include epididymitis and orchitis, infections commonly caused by STDs, as well as hernias and testicular masses.
4. Consider testicular cancer and further evaluation in cases with persistent mass.

Upper Respiratory Infection / Common Cold

DEFINITION: Inflammation of nasal passages due to a respiratory virus

S/Sx: Nasal congestion; sneezing; post-nasal drainage; sore throat; cough; hoarseness; malaise; headache; low-grade fever; body ache; fatigue

MANAGEMENT:

1. Increase PO hydration.
2. Acetaminophen 1,000mg PO q6hr **AND/OR** ibuprofen 800mg PO q8hr.
3. Treat symptomatically with pseudoephedrine 60mg PO q6hr **OR** fexofenadine 60mg/pseudoephedrine 120mg PO bid **OR** loratadine 10mg/pseudoephedrine 120mg PO qd.
4. Consider oxymetazoline 2–3 sprays each nostril bid (not to exceed 3 days). Lozenges for sore throat.

DISPOSITION: Evacuation usually not required. Monitor for worsening conditions.

Urinary Tract Infection

DEFINITION: Infection of urinary tract; more common in females, tactical setting, dehydration, kidney stones.

S/Sx: Dysuria; increased urinary urgency and frequency; cloudy, malodorous, or dark urine may be present; suprapubic discomfort; normally no CVAT/back/flank pain; normally no fever, hx of STD exposure.

MANAGEMENT:

1. For others, cephalexin 500mg PO qid × 7–10 days **OR** trimethoprim-sulfamethoxazole 1 PO bid for 7–10 days in males (bid for 5–7 days or 3–5 days respectively in females).
2. Treat per *Pain Management Protocol.*
3. If fever, back pain, flank pain, and/or costovertebral angle tenderness develop, suspect kidney infection and treat per *Flank Pain Protocol.*
4. Encourage PO hydration.

DISPOSITION: Usually responds to therapy and evacuation not required if it does. *Routine* evacuation for worsening signs and symptoms. *Priority* evacuation for pyelonephritis (see *Flank Pain 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).

Sexually Transmitted Infection

DEFINITION: Bacterial, viral, fungal, or parasitic infection that is passed from one person to another through sexual contact.

S/Sx: Bumps, sores, or warts: These can appear around the genitals, rectum, or mouth, and may be painful or itchy.

a. Discharge: discharge is a common symptom.
b. Pain: Pain or tenderness in the genital area, buttocks, or inner thighs, or pain during urination.

MANAGEMENT:

1. Send to a medical treatment facility for STI testing
2. Seek guidance from medical provider
3. Treat pain symptoms per pain protocol

GONORRHEA / CHLAMYDIA:

If < 35 years old, treat for sexually transmitted infection, ceftriaxone 500mg IV/IM × 1 AND doxycycline 100mg bid × 7 days (can replace doxycycline with azithromycin 1g PO once if compliance is in question).

SYPHILIS:

1. Penicillin G 2.4 million units IM single injection
2. Penicillin allergy: doxycycline 100mg PO BID × 7–10 days

HSV-2:

1. Acyclovir 400mg PO TID × 7–10 days or valacyclovir 1g PO BID × 7–10 days

NOTES

SECTION 4

RANGER MEDIC PHARMACOLOGY & FORMULARY

LEVEL 1 – PROFICIENT AND TRAINED

Level 1 pharmaceuticals designated as "Proficient and Always Carried" are those drugs that a Ranger Medic carries on virtually all assault missions. A Ranger Medic is expected to know the class, dose, indications, significant contraindications, significant side-effects, mission impacts, and K9 dosages of these medications at all times.

This category is within the expected knowledge base for a Ranger Medic to be considered Basic Mission Qualified (BMQ). A Medic must demonstrate proficiency in these medications through the Ranger Medic Assessment & Validation (RMAV) to be considered BMQ.

Level 1 – Proficient and Always Carried drugs are designated in GREEN

***Indicates always carried medication**

LEVEL 2 – PROFICIENT

Level 2 pharmaceuticals designated as "Proficient" are those drugs that a Ranger Medic administers as directed by standing Ranger Protocols. An FMQ Ranger Medic is expected to know the class, dose, indications, significant contraindications, significant side effects, mission impacts, and K9 dosages of these medications at all times.

This category is the within the expected knowledge base for a Ranger Medic to be considered Full Mission Qualified (FMQ). A Medic must demonstrate proficiency in these medications through the Ranger Medic Assessment & Validation (RMAV) to be considered FMQ.

Level 2 – Proficient drugs are designated in AMBER

LEVEL 3 – FAMILIAR

Pharmaceuticals designated as "Familiar" are those drugs that a Ranger Medic administers as directed by specific protocols or require familiarization for contingency health management. A Ranger Medic is expected to be familiar the class, dose, indications, contraindications, side-effects, mission impacts, and K9 dosages of these medications. The Ranger Medic Handbook is a reference for the rare use of these medications.
This category is the within the familiarization expectation for a Ranger Medic to be considered Full Mission Qualified Plus (FMQ+). A medic must demonstrate familiarization with these medications through the Ranger Medic Assessment & Validation (RMAV) to be considered FMQ+.

Level 3 – Familiar drugs are designated in RED

MISSION IMPACTS

Certain drugs in all categories have very specific mission impacts. Some are directly related to mission performance while others serve as a warning for potential mission impacts.

Specific drugs are categorized as "grounding" for any aviation personnel or for Rangers to conduct in-flight operations. Aviation grounding status also is grounding status for Rangers performing military free-fall operations. **REMINDER**: Any flight or MFF personnel grounded due to medication use or a medical condition MUST be cleared by a flight surgeon or an aeromedical physician assistant before returning to flight/MFF status.

Mission Impact drugs are designated by the helicopter/warning symbol. 

This list of pharmaceuticals is as of the current publication date of the Ranger Medic Handbook. Rangers Medics will adhere to current list as it is updated.

Rules of Drug Administration

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

ALWAYS DETERMINE IF THE PATIENT HAS ANY ALLERGIES TO MEDICATIONS BEFORE ADMINISTRATION

Reversals: For opioids, always have naloxone ready to administer. For benzodiazepines, always have flumazenil ready to administer.

Antibiotics: If allergic to one class of medications, use alternate class of medications (cephalosporins/penicillins, tetracyclines, quinolones, macrolides).

Right Patient	Check for Contraindications
Right Indication	Check for Potential Interactions
Right Drug	Be Prepared for Potential Side-Effects
Right Dose	Understand the Pharmacokinetics of Your Actions
Right Route	
Right Time	

Documentation: Document on casualty card or SF600 all drugs administered (type, dose, route) to include outcomes or reactions.

Safety in Pregnancy

FDA pregnancy categories A, B, C, D, and X have been replaced with the narrative sections and subsections below. Safest to greatest risk categories are "drug of choice," then "may use during pregnancy," "caution advised," "consider alternative," then "avoid use."

Pregnancy (includes Labor and Delivery):
- Pregnancy Exposure Registry
- Risk Summary
- Clinical Considerations
- Data

Lactation (includes Nursing Mothers)
- Risk Summary
- Clinical Considerations
- Data

Females and Males of Reproductive Potential
- Pregnancy Testing
- Contraception
- Infertility

IV Fluid Rates in Drops Per Minute

mL/hr	50	75	80	100	125	150	175	200	250
10gtt	8	13	13	17	21	25	29	33	42
15gtt	12	19	20	25	31	37	44	50	62
60gtt	50	75	80	100	125	150	175	200	250

ACETAMINOPHEN (TYLENOL)*

Class: CNS agent – nonnarcotic, analgesic, antipyretic

Action: Analgesia action possibly through peripheral nervous system; fever reduction through direct action on hypothalamus heat-regulating center resulting in peripheral vasodilation, sweating, and dissipation of heat; has minimal effect on platelet aggregation, bleeding time, and gastric bleeding

Dose: 325–975mg PO q6hr (max: 3g qd)

Onset/Peak/Duration: onset varies/peak 1–3 hours/duration 3–4 hours

Indications: For mild to moderate pain management, headache, fever reduction

Contraindications: Acetaminophen hypersensitivity; use with alcohol

Adverse/Side-effects: Negligible with recommended dose; rash, acute poisoning, anorexia, nausea, vomiting, dizziness, lethargy, diaphoresis, chills, epigastric or abdominal pain, diarrhea, hepatotoxicity: elevation of liver function tests, hypoglycemia, hepatic coma, acute renal failure; chronic ingestion: neutropenia, pancytopenia, leukopenia, thrombocytopenic purpura, renal damage

Interactions: Cholestyramine may decrease absorption; barbiturates, carbamazepine, phenytoin, rifampin, and excessive alcohol use may increase potential for hepatotoxicity

Mission Impact: None to minimal mission impact

K9 Dosage: DO NOT GIVE

ACETAZOLAMIDE (DIAMOX)

Class: CNS agent – carbonic anhydrase inhibitor; diuretic, anticonvulsant

Action: Diuretic effect due to inhibition of carbonic anhydrase activity in proximal renal tubule, preventing formation of carbonic acid; anticonvulsant action effect thought to involve inhibition of CNS carbonic anhydrase, retarding abnormal paroxysmal discharge from CNS neurons, decreases production of aqueous humor

Dose: Altitude Illness: PREVENTION: PO 125mg bid; begin the day before the ascent, may discontinue if staying at same altitude for 2–3 days or if descending. **Treatment:** PO 250mg bid; **Note:** With high altitude cerebral edema, dexamethasone is the primary treatment; however, acetazolamide may be used adjunctively with the same treatment dose

Indications: For acute high-altitude sickness, seizures, drug-induced edema, and for CHF edema

Contraindications: Sulfonamide and thiazide hypersensitivity; marked renal and hepatic dysfunction; adrenocortical insufficiency; hyponatremia, hypokalemia, hyperchloremic acidosis; pregnancy category may use during pregnancy and caution advised while breastfeeding.

Acetazolamide is CONTRAINDICATED in people who are G6PD deficient. All US Active Duty Soldiers are tested for G6PD deficiency upon accession into the military.

Adverse/Side-effects: Paresthesia, sedation, malaise, disorientation, depression, fatigue, muscle weakness, flaccid paralysis, anorexia, nausea, vomiting, weight loss, dry mouth, thirst, diarrhea, agranulocytosis, bone marrow depression, hemolytic anemia, aplastic anemia, leukopenia, pancytopenia, hyperglycemia, hyperuricemia, increased calcium, potassium, magnesium, sodium excretion, gout exacerbation, dysuria, glycosuria, urinary frequency, polyuria, hematuria, crystalluria, metabolic acidosis, hepatic dysfunction

Interactions: Renal excretion of amphetamines, ephedrine, flecainide, quinidine, procainamide, TCAs may be decreased, thereby enhancing or prolonging their effects; renal excretion of lithium and phenobarbital is increased; amphotericin B and corticosteroids may accelerate potassium loss; increased risk for salicylate and digitalis toxicity

Mission Impact: GROUNDING medication for personnel on flight status

K9 Dosage: Give only if indicated/directed for human use. 250mg q12hr beginning 24 hours prior to ascent **OR** 500mg q24hr

ACETYLSALICYLIC ACID (ASPIRIN)

Class: NSAID; salicylate; anti-inflammatory, analgesic, antipyretic

Action: Inhibits prostaglandin synthesis involved in the production of inflammation, pain, and fever; enhances antigen removal and reduces spread of inflammation; peripheral analgesic action with limited CNS action in the hypothalamus; antipyretic by indirect centrally mediated peripheral vasodilation and sweating; powerfully inhibits platelet aggregation and ability of blood to clot; high levels can impair hepatic synthesis of blood coagulation factors VII, IX, and X, possibly by inhibiting action of vitamin K

Dose: 325–650mg PO/PR q4–6hr (max: 4g qd); MI prophylaxis PO 80–325mg qd (chewable or nonenteric coated)

Indications: For mild to moderate pain management, fever reduction, and to decrease inflammation; also used for acute rheumatic fever, systemic lupus, rheumatoid arthritis, osteoarthritis, bursitis, calcific tendonitis, to reduce recurrence of TIA and risk of stroke, as prophylaxis and to prevent recurrence of MI

Contraindications: Salicylate and NSAID hypersensitivity; patients with "aspirin triad" (aspirin sensitivity, nasal polyps, asthma); chronic rhinitis or urticaria; GI ulcer, bleeding; hypoprothrombinemia, vitamin K deficiency, hemophilia, bleeding disorders; CHF; pregnancy category may use low-dose during pregnancy and consider alternative while breastfeeding; do NOT use in children or teenagers with viral illnesses due to link with Reyes syndrome

Adverse/Side-effects: Rash, urticaria, easy bruising, petechiae, bronchospasm, laryngeal edema, confusion, dizziness, drowsiness; tinnitus, hearing loss, nausea, vomiting, diarrhea, anorexia, heartburn, stomach pain, GI bleeding, ulceration; thrombocytopenia, hemolytic anemia, prolonged bleeding time

Interactions: Aminosalicylic acid and carbonic anhydrase inhibitors increase risk of toxicity; ammonium chloride, acidifying agents decrease renal elimination and increase toxicity; oral hypoglycemic agents increase hypoglycemic activity; corticosteroids increase ulcer potential; methotrexate toxicity is increased; anticoagulants and herbals (feverfew, garlic, ginger, ginkgo) increase bleeding potential

Mission Impact: Use of aspirin is to be minimized in the deployed and combat environment due to known coagulopathy issues

K9 Dosage: Only buffered aspirin 10–25mg/kg PO q8–12hr

ALBUTEROL (PROVENTIL)* 

Class: Autonomic nervous system agent – sympathomimetic, β-adrenergic agonist, bronchodilator

Action: Acts more prominently on β_2-receptors (particularly smooth muscles of bronchi, uterus, and vascular supply to skeletal muscles) than on β_1 (heart) receptors; minimal or no effect on α-adrenergic receptors; inhibits histamine release by mast cells; produces bronchodilation, by relaxing smooth muscles of bronchial tree which decreases airway resistance, facilitates mucus drainage, and increases vital capacity

Dose: MDI 2 puffs q4–6hr prn; NEB 0.5mL of 0.5% soln (2.5mg) in 5mL NS nebulized tid–qid

Indications: For prevention of exercise-induced bronchospasm, or relief of bronchospasm associated with acute or chronic asthma, bronchitis, or other reversible obstructive airway disease; also used 20–30 minutes before inhaled steroids to allow for deeper penetration of the steroids into the lungs

Contraindications: Pregnancy category caution advised during pregnancy and while breastfeeding

Adverse/Side-effects: Hypersensitivity reaction, tremor, anxiety, nervousness, restlessness, convulsions, weakness, headache, hallucinations, palpitation, hyper- or hypotension, bradycardia, reflex tachycardia, blurred vision, dilated pupils, nausea, vomiting, muscle cramps, hoarseness. Albuterol will also result in increase in a physiologic increase in serum lactate.

Albuterol will result in tachycardia because of adrenergic effect on the AV node. Albuterol will also result in increase in a physiologic increase in serum lactate.

Interactions: Additive effect with epinephrine and other sympathomimetic bronchodilators; MAOIs and TCAs potentiate action on vascular system; beta-adrenergic blockers antagonize effects

Mission Impact: **GROUNDING** medication for personnel on flight status

ALUMINUM HYDROXIDE, MAGNESIUM HYDROXIDE (MAALOX)

Class: Antacid

Action: Neutralizes gastric acid, increases gastric pH

Dose: Oral liquid 200mg/200mg/5mL; 10–20mL q6hr prn; max: 80mL/24hr

Indications: Relief of indigestion, heartburn, and GI upset.

Contraindications: Hypersensitivity, renal impairment pregnancy category may use during pregnancy and while breastfeeding.

Adverse/Side-effects: Abdominal cramps, constipation, fecal impaction, nausea, vomiting

Interactions: May decrease efficacy of most oral medications by inhibiting gastric absorption unless separated by 2 or more hours.

Mission Impact: None

AMOXICILLIN/CLAVULANATE (AUGMENTIN)

Class: Antimicrobial – antibiotic, aminopenicillin β-lactamase inhibitor

Action: Interferes with cell wall replication in certain organisms through osmotic instability and β-lactamase inhibitor

Dose: PO immediate release: 500mg q8–12hr or 875mg bid; PO extended release: 2,000mg bid

Indications: Lower respiratory tract infections, otitis media, sinusitis, skin and skin structure infections, urinary tract infections, animal bites (dog)

Contraindications: Serious and occasionally fatal hypersensitivity (anaphylactic) reactions can occur in individuals with history of penicillin hypersensitivity; do not use in patients with a history of liver failure; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Diarrhea/loose stools, nausea, skin rashes and urticaria, vomiting, vaginitis, hypersensitivity reactions, hepatic dysfunction, blood and lymphatic dysfunction (likely hypersensitivity-related)

Interactions: May increase effect anticoagulants, decrease effectiveness of oral contraceptives.

Mission Impact: **GROUNDING** for personnel on flight status

K9 Dosage: 10–20mg/kg PO bid × 5–7 days

ATOVAQUONE-PROGUANIL (MALARONE)

Class: Antimicrobial; antimalarial

Dose: Prophylaxis: 250mg/100mg qd; start 1 to 2 days prior to entering a malaria-endemic area, continue throughout the stay and for 7 days after returning; Treatment: 1,000mg/400mg qd × 3 days

Indications: Prophylaxis and treatment of *Plasmodium falciparum* malaria

Contraindications: Hypersensitivity to atovaquone or proguanil, renal impairment, pregnancy category avoid use during pregnancy and while breastfeeding

Adverse/Side-effects: Headache, abdominal pain, nausea, vomiting, diarrhea, dizziness, cough (pediatrics), liver transaminase elevations, possible association with seizures and psychotic events (e.g., hallucinations), cutaneous reactions, including photosensitivity, erythema multiforme and Stevens-Johnson syndrome

Mission Impact: None

ATROPINE SULFATE

Class: CNS agent – anticholinergic parasympatholytic, antidysrhythmic, antimuscarinic belladonna alkaloid

Action: Blocks acetylcholine at parasympathetic neuroeffector sites; increases cardiac output and heart rate by blocking vagal stimulation in heart; dries secretions by blocking vagus

Dose: Organophosphate poisoning (CBRN nerve agent):1–6mg IV/IM q3–5min PRN × 2–12hr. Bradycardia: 0.5mg IV/IM q3–5min (max 3mg)

Indications: Bradycardia, organophosphate poisoning, reversal of anticholinesterase agents, and decreasing secretions before surgery

Contraindications: Hypersensitivity to belladonna alkaloids, glaucoma, GI obstructions, ulcerative colitis, tachycardia/tachydysrhythmias, asthma, acute hemorrhage, myocardial ischemia, pregnancy category caution advised during pregnancy and while breastfeeding

Adverse/Side-effects: Headache, dizziness, involuntary movements, confusion, psychosis, anxiety, drowsiness, insomnia, hypotension, blurred vision, photophobia, pupil dilation, dry mouth, nausea, vomiting, constipation, abdominal distention, rash, urticaria, dry skin, urine retention.

Interactions: increase anticholinergic effects of tricyclics, decreased absorption with ketoconazole, decreased effect of atropine with antacids

AZITHROMYCIN (ZITHROMYCIN, Z-PAK) WARNING

Class: Antimicrobial – antibiotic; macrolide

Action: Reversibly binds to 50S ribosomal subunit of susceptible organisms inhibiting protein synthesis; effective against mild to moderate infections caused by pyogenic streptococci, *Streptococcus pneumoniae, Haemophilus influenzae, Mycobacterium avium intracellulare,* and *Staphylococcus aureus*

Dose: Pneumonia: 500mg PO on day 1, then 250mg qd × 4 days; 500mg PO qd × 3 days; or suspension 2g single dose. **STI (gonococcal):** 1g PO × 1 in adjunction with ceftriaxone.

Indications: For pneumonia, lower respiratory tract infections, pharyngitis, tonsillitis, gonorrhea, nongonococcal urethritis, skin infections, otitis media, and acute bacterial sinusitis

Contraindications: Macrolide hypersensitivity; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Headache, dizziness; nausea, vomiting, diarrhea, abdominal pain; hepatotoxicity

Interactions: Antacids may decrease peak level; may increase toxicity of ergotamine; food will decrease the amount of azithromycin absorbed by 50%

Mission Impact: **GROUNDING** medication for personnel on flight status

BACITRACIN

Class: Antimicrobial – antibiotic

Action: Polypeptide derived from *Bacillus subtilis* culture; bactericidal/bacteriostatic that appears to inhibit cell wall synthesis; activity similar to penicillin; active against many gram-positives including *Streptococcus, Staphylococcus, Pneumococcus, Corynebacteria, Clostridia, Neisseria, Gonococcus, Meningococcus, Haemophilus influenzae,* and *Treponema pallidum*; ineffective against most other gram-negatives

Dose: Topical ointment to AAA bid–tid, clean affected area prior to application

Indications: For topical treatment of superficial skin infections

Contraindications: Atopic individuals; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Bacitracin hypersensitivity (erythema, anaphylaxis)

Interactions: No clinically significant interactions established when given topically

BENZATHINE-PENICILLIN G (BICILLIN)

Class: Antimicrobial – anti-infective, β-lactam antibiotic, natural (first generation) penicillin; must be cold stored

Action: Acid-stable, penicillinase-sensitive, long-acting form of penicillin G; absorbed slowly due to extremely low water solubility; produces lower blood concentrations of penicillin G but has longer duration. Effective against many strains of *Staphylococcus aureus*, gram-positive cocci, and gram-negative cocci. Also effective against gram-positive and gram-negative bacilli

Dose: 1.2 million units IM single dose

Indications: Group A streptococcal pharyngitis; infections susceptible to penicillin G such as streptococcal, pneumococcal, and staphylococcal

Contraindications: Hypersensitivity to penicillins or cephalosporins; lactation; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Local pain, tenderness, and fever associated with IM injection; chills, fever, wheezing, anaphylaxis, neuropathy, nephrotoxicity, pruritis, and urticaria

Interactions: May decrease efficacy of oral contraceptives

BENZONATATE (TESSALON PERLES)

Class: Nonnarcotic antitussive

Action: Produces local anesthetic effect of stretch receptors on vagal afferent fibers in the respiratory passages, lungs, and pleura

Dose: 100–200mg PO tid as needed (max single dose: 200mg; max dose: 600mg qd)

Indications: Relief of cough

Contraindications: Hypersensitivity; pregnancy category caution advised during pregnancy and consider alternative during breastfeeding

Side-effects: chest numbness, chills, confusion, dizziness, headache, hallucination, sedation, pruritus, rash, constipation, nausea, congestion.

Interactions: None

Mission Impact: None

BISACODYL (DULCOLAX)

Class: Laxative, stimulant, diphenylmethane

Action: Direct action on the intestine by increasing motor activity

Dose: 5–15mg PO. Swallow the tablets whole with a full glass of water or juice. Do not crush or chew the tablets. The tablets should work within 6–10 hours

Indications: Used to treat constipation or to clean out the intestinal tract before bowel examinations or bowel surgery

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, pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Rarely, abdominal discomfort and diarrhea have been reported

Interactions: Dairy products, antacids, H_2-blockers, PPIs. Tablets have a special coating and therefore should not be taken together with milk or antacids

BLOOD

Class: Blood Product

Indications: IAW Tactical Damage Control Resuscitation Protocol

Interactions: Do not administer in same line as calcium or with calcium containing fluids

Considerations: Whole blood should be stored at 1–6°C and can be stored for 21 days using anticoagulant CPG or 35 days using anticoagulant CPDA-1. Fresh Whole Blood (FWB) can be stored at room temperature and is suitable for use up to 24 hrs. If FWB is refrigerated within 8 hrs of collection, it becomes Stored Whole Blood (SWB). Must maintain a temp tolerance device on SWB. Once SWB is out of temp tolerance it must be transfused within 4 hrs or must be destroyed.

BUPIVACAINE (MARCAINE) 

Class: Local anesthetic

Action: Decreases the neuronal membrane's permeability to sodium ions, this results in inhibition of depolarization, blocking conduction

Dose: 0.25% infiltrated locally (max: 400mg of bupivacaine/d); **note:** aspirate before every injection

Onset/Peak/Duration: Onset is fast/Peak 30–45 minutes/Duration 2–8 hours; **note:** epinephrine reduces the rate of absorption and peak plasma concentration of bupivacaine

Indications: Local or regional anesthesia; diagnostic and therapeutic procedures

Contraindications: Hypersensitivity to bupivacaine hydrochloride; amide-type local anesthetics; **note:** do not use as intravenous regional anesthesia, may cause cardiac arrest and death, pregnancy category consider alternative use during pregnancy and may use while breastfeeding

Adverse/Side-effects: Most effects are dose related, often due to accelerated absorption: Bradycardia, cardiac arrest, heart block, hypotension, palpitations, ventricular arrhythmias, anxiety, dizziness, restlessness, nausea, vomiting, hypersensitivity reaction, weakness, blurred vision, miosis, tinnitus, apnea

Interactions: Blood pressure–lowering medications may be enhanced; enhances other local anesthetic effects

Mission Impact: **GROUNDING** medication for personnel on flight status

CALCIUM CHLORIDE 10%

Class: Mineral - Calcium Salt

Action: Essential component and participant in the clotting cascade and ionotropic and vasopressor effects.

Dose: Calcium Chloride infusion in 100mg or 250mg NaCl or slow push IV/IO 1g over 1–2 minutes after 2nd unit of blood and after every 4 units.

Indications: Blood transfusion

Contraindications: Hypersensitivity to drug/class, hypercalcemia, caution with systemic illness or arrhythmias; pregnancy category category may use during pregnancy and while breastfeeding

Adverse/Side Effects: Arrhythmias, extravasation necrosis, flushing, dizziness

Interactions: Minimal prehospital interaction

CALCIUM GLUCONATE*

Class: Mineral - Calcium Salt

Action: Essential component and participant in the clotting cascade and ionotropic and vasopressor effects.

Dose: 1g infusion in 100mg or 250mg NaCl or slow push IV/IO over 1–2 minutes after 2nd unit of blood and after every 4 units. 30mg of 10% Calcium Gluconate equals a 1g dose of 10% Calcium Chloride.

Indications: Blood transfusion

Contraindications: Hypersensitivity to drug/class, hypercalcemia, caution with systemic illness or arrhythmias; pregnancy category category may use during pregnancy and while breastfeeding

Adverse/Side Effects: Arrhythmias, extravasation necrosis, flushing, dizziness

Interactions: Minimal prehospital interaction

Mission Impacts: 1–3g of Calcium Gluconate dose range is based on mission requirements and logistical constraints. Medics may only be carrying limited Calcium Gluconate.

CEFAZOLIN SODIUM (ANCEF)

Class: Antimicrobial – first-generation cephalosporin

Action: Inhibits susceptible bacterial cell wall synthesis rendering cell wall osmotically unstable. Activity against gram-negative organisms is limited

Dose: 1–2g IM/IV q8hr (max 12g/d)

Indications: Open bone fractures or joint disruptions as presurgical prophylaxis

Contraindications: Hypersensitivity to any cephalosporin and related antibiotics; lactation; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Anaphylaxis, fever, diarrhea, anorexia, abdominal cramps, maculopapular rash, urticaria

Interactions: Minimal prehospital interactions

Mission Impact: **GROUNDING** medication for personnel on flight status

K9 Dosage: 0.5–1g (25mg/kg) IV daily; give over 5 minutes

CEFTRIAXONE (ROCEPHIN)

Class: Antimicrobial – antibiotic; third-generation cephalosporin

Action: Preferentially binds to penicillin-binding proteins (PBPs) and inhibits bacterial cell wall synthesis; effective against most

Enterobacteriaceae, gram-positive aerobic cocci, *Neisseria meningitides,* and *gonorrhoeae;* some effect against *Treponema pallidum*

Dose: For moderate to severe infections, 1–2g IV/IM q12–24hr (max: 4g/d); for meningitis, 2g IV/IM q12hr; for uncomplicated gonorrhea 250mg IM × 1; dilute in 1% lidocaine for IM

Indications: For infections of the middle ear, lower respiratory tract, skin and skin structures, bones and joints, meningitis, intra-abdominal, urogenital tract, pelvis, septicemia; used for surgical prophylaxis

Contraindications: Cephalosporin hypersensitivity; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Pruritus, fever, chills, pain, induration at IM site, phlebitis at IV site, diarrhea, abdominal cramps, pseudomembranous colitis, biliary sludge

Interactions: Probenecid decreases renal elimination; alcohol produces disulfiram reaction

Mission Impact: **GROUNDING** medication for personnel on flight status

K9 Dosage: 1g IV/IM qd

CETIRIZINE (ZYRTEC)

Class: ENT agent – H_1-receptor antagonist; nonsedating antihistamine

Action: Potent H_1-receptor antagonist and antihistamine; low lipophilicity and H_1-receptor selectivity and thus no significant anticholinergic or CNS activity; reduces local and systemic effects of histamine release

Dose: 5–10mg PO qd

Indications: Seasonal and perennial allergic rhinitis and chronic idiopathic urticaria

Contraindications: H_1-receptor antihistamine hypersensitivity; pregnancy category may use during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Constipation, diarrhea, dry mouth; drowsiness, sedation, headache, depression

Interactions: Theophylline may decrease clearance leading to toxicity; do not use in combination with OTC antihistamines

Mission Impact: **GROUNDING** medication for personnel on flight status

CIMETIDINE (TAGAMET)

Class: GI agent – antisecretory H_2-receptor antagonist

Action: Antihistamine with high selectivity for reversible competitive inhibition of histamine H_2-receptors on parietal cells of the stomach (minimal effect on H_1-receptors) and thus decreases gastric acid secretion, raises the pH of the stomach, and indirectly reduces pepsin secretion

Dose: Oral: 300mg QID or 800mg at bedtime or 400mg bid for up to 8 weeks

Indications: For treatment of duodenal/gastric ulcer, prevention of ulcer recurrence, gastroesophageal reflux, chronic urticaria, acetaminophen toxicity

Contraindications: H_2-receptor antagonist hypersensitivity; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Fever, cardiac arrhythmias and cardiac arrest after rapid IV bolus; diarrhea, constipation, abdominal discomfort; increased prothrombin time, neutropenia, thrombocytopenia, aplastic anemia, hypospermia, exacerbation of preexisting arthritis; drowsiness, dizziness, light-headedness, depression, headache, reversible confusion states, paranoid psychosis; rash, Stevens-Johnson syndrome, reversible alopecia, gynecomastia, galactorrhea, reversible impotence

Interactions: Decreases hepatic metabolism of warfarin, phenobarbital, phenytoin, diazepam, propranolol, lidocaine, theophylline, thus increasing their activity and toxicity; antacids may decrease absorption

CIPROFOXACIN (CIPRO)

Class: Antimicrobial – antibiotic; quinolone. **All fluoroquinolones now have a US Black Box Warning due to serious adverse reactions including tendonitis and tendon rupture, peripheral neuropathy and CNS effects. However, in some rare cases, benefits may outweigh the risks of fluoroquinolone use. Fluoroquinolones require prior approval from unit physician or physician assistant**

Action: Synthetic broad-spectrum bactericidal agent; inhibits DNA-gyrase, an enzyme necessary for bacterial DNA replication, transcription, repair, recombination, and transposition; effective against many gram-positive and gram-negative organisms including *Citrobacter diversus, Enterobacter cloacae, Enterobacter aerogenes, Escherichia coli, Haemophilus influenzae, Klebsiella pneumoniae, Neisseria gonorrhoeae, Proteus miribilis, Proteus vulgaris, Pseudomonas aeruginosa, Serratia marcescens, Staphylococcus aureus, Streptococcus pyogenes, Shigella,* and *Salmonella*; less active against gram-positive than gram-negative bacteria, although active against many gram-positive aerobic bacteria, including penicillinase-producing, non–penicillinase-producing, and methicillin-resistant staphylococci; however, many strains of streptococci are relatively resistant; inactive against most anaerobic bacteria; resistant to some strains of methicillin-resistant *Staphylococcus aureus* (MRSA)

Dose: 250–750mg PO bid or 200–400mg IV q8–12hr

NOTE: Not first-line treatment

Indications: For infections of the lower respiratory tract, skin and skin structures, bone and joints, GI tract, urinary tract, prostate; also used for nosocomial pneumonia, acute sinusitis, and postexposure prophylaxis for anthrax

Contraindications: Quinolone hypersensitivity; syphilis, viral infection; tendon inflammation or tendon pain; pregnancy category consider alternative during pregnancy and avoid while breastfeeding

Adverse/Side-effects: Nausea, vomiting, diarrhea, cramps, gas, pseudomembranous colitis; tendon rupture; headache, vertigo, malaise, peripheral neuropathy, seizures

Interactions: May increase theophylline levels; antacids, sucralfate, iron decrease absorption; may increase PT for patients on warfarin; may cause false positive on opiate screening tests

Mission Impact: **GROUNDING** medication for personnel on flight status

K9 Dosage: DO NOT GIVE

CLINDAMYCIN (CLEOCIN)

Class: Antimicrobial – antibiotic

Action: Suppresses protein synthesis by binding to 50S subunits of bacterial ribosomes; effective against strains of anaerobic streptococci, *Bacteroides* (especially *B. fragilis*), *Fusobacterium, Actinomyces israelii, Peptococcus, Clostridium* sp., and aerobic gram-positive cocci, including *Staphylococcus aureus, Staphylococcus epidermidis,* streptococci (except *S. faecalis*), and pneumococci

Dose: 600–1,800mg/d in 2–4 divided doses; up to 2,400mg/d in 4 divided doses may be given for severe infections.
Cleocin T: topically AAA bid

Indications: For moderate to severe infections; topical applications used in treatment of acne vulgaris

Contraindications: Clindamycin or lincomycin hypersensitivity; history of regional enteritis, ulcerative colitis, or antibiotic–associated colitis; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Fever, serum sickness, sensitization, swelling of face, generalized myalgia, superinfections, proctitis, pain, induration, sterile abscess; thrombophlebitis; hypotension, cardiac arrest (rapid IV); diarrhea, abdominal pain, flatulence, bloating, nausea, vomiting, pseudomembranous colitis; esophageal irritation, loss of taste, medicinal taste (high IV doses), jaundice, abnormal liver function tests; leukopenia, eosinophilia, agranulocytosis, thrombocytopenia; skin rashes, urticaria, pruritus, dryness, contact dermatitis, gram-negative folliculitis, irritation, oily skin

Interactions: Chloramphenicol and erythromycin are possibly antagonistic; neuromuscular blocking action enhanced by neuromuscular blocking agents (atracurium, tubocurarine, pancuronium)

Mission Impact: **GROUNDING** medication for personnel on flight status.

K9 Dosage: DO NOT GIVE

CYCLOBENZAPRINE (FLEXERIL)

Class: Autonomic nervous system agent – central acting; skeletal muscle relaxant

Action: Structurally and pharmacologically related to TCAs; relieves skeletal muscle spasm of local origin without interfering with muscle function; believed to act primarily within CNS at brain stem with some action at spinal cord level; depresses tonic somatic motor activity, although both gamma and alpha motor neurons are affected; increases circulating norepinephrine by blocking synaptic reuptake, thus producing antidepressant effect; has sedative effect and potent central and peripheral anticholinergic activity

Dose: 5–10mg PO tid prn muscle spasm (max: 60mg/d); do not use longer than 2–3 weeks

Indications: As adjunct to rest and physical therapy for short-term relief of muscle spasm associated with acute musculoskeletal conditions

Contraindications: Recovery phase of MI; cardiac arrhythmias, heart block or conduction disturbances; CHF, hyperthyroidism; pregnancy category caution advised during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Tongue and face edema, sweating, myalgia, hepatitis, alopecia; toxic potential of TCAs; tachycardia, syncope, palpitation, vasodilation, chest pain, orthostatic hypotension, dyspnea; arrhythmias; dry mouth, indigestion, unpleasant taste, coated or discolored tongue, vomiting, anorexia, abdominal pain, flatulence, diarrhea, paralytic ileus; drowsiness, dizziness, weakness, fatigue, asthenia, paresthesia, tremors, muscle twitching, insomnia, euphoria, disorientation, mania, ataxia; pruritus, urticaria, rash; increased or decreased libido, impotence

Interactions: Alcohol, barbiturates, other CNS depressants enhance CNS depression; potentiates anticholinergic effect of phenothiazine and other anticholinergics; MAOIs may precipitate hypertensive crisis

Mission Impact: **GROUNDING**, Causes drowsiness in most people.

K9 Dosage: **DO NOT GIVE**

DEXAMETHASONE (DECADRON)

Class: Hormones and synthetic substitutes – steroid; adrenocorticoid; glucocorticoid

Action: Long-acting synthetic adrenocorticoid with intense glucocorticoid activity and minimal mineralocorticoid activity; Anti-inflammatory and immunosuppression properties; prevents accumulation of inflammatory cells at sites of infection; inhibits phagocytosis, lysosomal enzyme release, and synthesis of selected chemical mediators of inflammation; reduces capillary dilation and permeability

Dose: 0.25–4mg PO bid–qid; 8–12mg IM/IV q1–3wk. AMS: 8mg qid; HACE: Initial: 8mg as a single dose; Maintenance: 4mg PO qid until symptoms resolve

Onset/Peak/Duration: Onset hours/Peak in 8–12 hours/Duration 72 hours

Indications: For inflammatory conditions, allergic states, and cerebral edema

Contraindications: Systemic fungal infection, acute infections, tuberculosis, vaccinia, varicella, live virus vaccines (to patient, family members), amebiasis; pregnancy category caution advised during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Euphoria, insomnia, convulsions, increased ICP, vertigo, headache, psychic disturbances; CHF, hypertension, edema; hyperglycemia; cushingoid state; hirsutism; cataracts, increased IOP, glaucoma, exophthalmos; peptic ulcer or perforation, abdominal distension, nausea, increased appetite, heartburn, dyspepsia, pancreatitis, bowel perforation, oral candidiasis; muscle weakness, loss of muscle mass, vertebral compression fracture, pathologic fracture of long bones, tendon rupture; acne, impaired wound healing, petechiae, ecchymoses, diaphoresis, dermatitis, hypo- or hyperpigmentation, skin atrophy

Interactions: May inhibit antibody response to vaccines and toxoids

Mission Impact: **GROUNDING** medication for personnel on flight status.

K9 Dosage: 3–4mg (0.5mg/kg) IV/IM

DEXTROSE (D50)

Class: Endocrine agent – caloric, monosaccharide

Action: Needed for adequate utilization of amino acids, decreases protein and nitrogen loss, and prevents ketosis

Dose: 0.5–1g/kg (1–2mL/kg) up to 25g (50mL) of 50% solution IV; if tolerating PO, provide glucose tabs

Indications: For treatment of hypoglycemic episode

Contraindications: Hyperglycemia, delirium tremens, cranial or spinal hemorrhage, CHF

Adverse/Side-effects: Confusion, loss of consciousness, dizziness; hypertension, CHF, pulmonary edema; glycosuria, osmotic diuresis; hyperglycemia, rebound hypoglycemia; chills, flushing, rash, urticaria

Interactions: No clinically significant interactions established

DIAZEPAM (VALIUM) – CONTROLLED MEDICATION IV

Class: CNS agent – benzodiazepine; anticonvulsant; anxiolytic

Action: Anticonvulsant and antianxiety psychotherapeutic drug with action at both limbic and subcortical levels of CNS; increases total sleep time, but shortens REM and stage 4 sleep

Dose: 5–10mg slow IV push, repeat in 3–4hr; 2–10mg PO tid–qid

Onset/Peak/Duration: Onset/Peak/Duration 2–4 hours

Indications: For anxiety, seizures, skeletal muscle spasm relief; also used as an amnesic, for treatment of restless leg syndrome, acute alcohol withdrawal, and is the drug of choice for status epilepticus

Contraindications: Shock, coma, alcohol intoxication, depressed vital signs; acute narrow-angle glaucoma, untreated open-angle glaucoma; MAOIs; pregnancy category consider alternative during pregnancy and while breastfeeding

Adverse/Side-effects: Throat and chest pain; drowsiness, fatigue, ataxia, confusion, paradoxical rage, dizziness, vertigo, amnesia, vivid dreams, headache, slurred speech, tremor; EEG changes, tardive dyskinesia; hypotension, tachycardia, edema, cardiovascular collapse; blurred vision, diplopia, nystagmus; xerostomia, nausea, constipation, hepatic dysfunction; incontinence, urinary retention, gynecomastia (prolonged use); hiccups, coughing, laryngospasm; venous thrombosis, phlebitis

Interactions: Alcohol, CNS depressants, anticonvulsants, and herbals potentiate CNS depression; cimetidine increases levels and toxicity; may decrease effects of levodopa; may increase phenytoin levels; smoking decreases sedative and antianxiety effects

Mission Impact: Drowsiness. **GROUNDING** medication for personnel on flight status.

K9 Dosage: For seizures, 15–30mg (0.5–1mg/kg) IV or 30–60mg (1–2mg/kg) rectally q4hr. For sedation combined with opioid, 7.5mg (0.25mg/kg) IV/IM q4hr

DIPHENHYDRAMINE (BENADRYL)*

Class: ENT agent – H_1-blocker; antihistamine

Action: H1-receptor antagonist and antihistamine as it competes for H_1-receptor sites on effector cells; significant central anticholinergic activity as it prolongs action of dopamine by inhibiting its uptake and storage, thus decreasing Parkinsonism and drug-induced extrapyramidal symptoms

Dose: 25–50mg IV/IM/PO q4–6hr

Onset/Peak/Duration:

IV – Onset immediate/Peak in 1–3 hours/Duration 6–8 hours

IM – Onset 30 minutes/Peak 1–3 hours/Duration 6–8 hours

PO – Onset 15–60 minutes/Peak in 1–3 hours/Duration 6–8 hours

Indications: For allergic conditions; treatment or prevention of motion sickness or vertigo; blood or plasma reactions; treatment of Parkinsonism and drug-induced extrapyramidal reactions; also used with epinephrine for anaphylaxis; may be used as a cough suppressant, a sedative-hypnotic or for intractable insomnia

Contraindications: Antihistamine hypersensitivity, lower respiratory tract symptoms, asthma; narrow-angle glaucoma, prostatic hypertrophy, bladder neck obstruction, GI obstruction, pregnancy category may use during pregnancy and consider alternative while breastfeedings

Adverse/Side-effects: Drowsiness, dizziness, headache, fatigue, disturbed coordination, tingling, heaviness and weakness of hands, tremors, euphoria, nervousness, restlessness, insomnia, confusion, excitement, fever, palpitation, tachycardia, hypo- or hypertension, cardiovascular collapse, tinnitus, vertigo, dry nose/mouth, nasal stuffiness, blurred vision, diplopia, photosensitivity, dry eyes, nausea, epigastric distress, anorexia, vomiting, constipation, diarrhea, urinary frequency or retention, dysuria, thickened bronchial secretions, wheezing, chest tightness

Interactions: Alcohol, other CNS depressants, and MAOIs compound CNS depression

Mission Impact: **GROUNDING**, Sedative effects on patient should be considered in tactical situation

K9 Dosage: 50mg IM/SQ/PO. Impacts sense of smell

DOCUSATE (COLACE)

Class: GI agent – stool softener

Action: Anionic surface-active agent with emulsifying and wetting properties; detergent action lowers surface tension, permitting water and fats to penetrate and soften stools for easier passage

Dose: 50–500mg/d PO divided qd–qid

Indications: For treatment of constipation associated with hard and dry stools, also used prophylactically in patients taking narcotics or patients who should avoid straining during defecation

Contraindications: Atonic constipation, nausea, vomiting, abdominal pain, fecal impaction, structural anomalies of colon and rectum, intestinal obstruction or perforation; patients on sodium restriction or with renal dysfunction; concomitant use of mineral oil; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Mild abdominal cramps, diarrhea, nausea, bitter taste; rash

Interactions: Increases systemic absorption of mineral oil

DOXYCYCLINE

Class: Antimicrobial – antibiotic; tetracycline

Action: Semisynthetic broad-spectrum antibiotic derived from oxytetracycline, but more completely absorbed with effective blood levels maintained for longer periods and excreted more slowly than most other tetracyclines, thus it requires smaller and less frequent dosing; primarily bacteriostatic in effect

Dose: As antimalarial, 100mg PO qd starting 1–2 days prior to 4 weeks after exposure; as antimicrobial, 100mg PO q12hr on day 1, then 100mg qd; for travelers' diarrhea, 100mg PO QD during risk period; for gonorrhea, 200mg PO immediately, followed by 100mg bid × 3 days; for syphilis 100mg PO tid × 10 days; for acne, 100mg PO qd–bid

Indications: For suppression and chemoprophylaxis of chloroquine-resistant malaria, short-term prophylaxis and treatment of travelers' diarrhea caused by enterotoxigenic strains of *Escherichia coli*, chlamydial and mycoplasmal infections, gonorrhea, syphilis in penicillin-allergic patients, rickettsial diseases, acute exacerbations of chronic bronchitis, and treatment of acne

Contraindications: Tetracycline hypersensitivity; use during period of tooth development including last half of pregnancy causes permanent yellow discoloration of teeth, enamel hypoplasia, and retardation of bone growth, pregnancy category may use for anthrax infection and otherwise consider alternative during pregnancy and avoid use while breastfeeding

Adverse/Side-effects: Interference with color vision; anorexia, nausea, vomiting, diarrhea, enterocolitis; esophageal irritation; rashes, photosensitivity reaction; superinfections

Interactions: Antacids, iron preparation, calcium, magnesium, zinc, kaolin-pectin, sodium bicarbonate can significantly decrease absorption; effects of both doxycycline and desmopressin antagonized; increases digoxin absorption and risk of toxicity; methoxyflurane increases risk of renal failure. **Antacids (Pepto-Bismol, Kaopectate, Mylanta) can significantly decrease the absorption effects of doxycycline.**

EPINEPHRINE (INCLUDING EPI-PEN)* 

Class: Autonomic nervous system agent – natural and synthetic catecholamine; α- and β-adrenergic agonist; bronchodilator

Action: Sympathomimetic that acts directly on both alpha and beta receptors; the most potent activator of alpha receptors; strengthens myocardial contraction; increases systolic but may decrease diastolic blood pressure; increases cardiac rate and output; constricts bronchial arterioles and inhibits histamine release, thus reducing congestion and edema and increasing tidal volume and vital capacity

Dose: Anaphylaxis: 0.3–0.5mg IM q10–15min (1:1,000 soln = 1mg/1mL) ACLS: 1mg IV/IO q3–5min for cardiac arrest

Onset/Peak/Duration: IV/IM – Onset Rapid/Duration 1–2 minutes

Indications: For hypersensitivity and anaphylactic reactions, acute asthma attack, bronchospasm, mucosal congestion, syncope due to heart block or carotid sinus hypersensitivity, and to restore cardiac rhythm in cardiac arrest; prolong action and delay absorption of anesthetics; control superficial bleeding

Contraindications: Sympathomimetic amine hypersensitivity; narrow-angle glaucoma; hemorrhagic, traumatic, or cardiogenic shock; cardiac dilatation, cerebral arteriosclerosis, coronary insufficiency, arrhythmias, organic heart or brain disease; (use with local anesthesia of fingers, toes, ears, nose, genitalia has been demonstrated safe); pregnancy category caution advised during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Nervousness, restlessness, sleeplessness, fear, anxiety, tremors, headache, CVA, weakness, dizziness, syncope, pallor, sweating, dyspnea; nausea, vomiting; precordial pain, palpitations, hypertension, MI, tachyarrhythmias; bronchial and pulmonary edema; urinary retention; tissue necrosis; metabolic acidosis; altered state of perception and thought, psychosis

Interactions: May increase hypotension in circulatory collapse; additive toxicities with other medications

Mission Impact: **GROUNDING** medication for personnel on flight status

ERTAPENEM (INVANZ)* WARNING

Class: Antimicrobial – antibiotic, carbapenem, β-lactam

Action: Broad-spectrum antibiotic that inhibits cell wall synthesis of gram-positive and gram-negative bacteria by its strong affinity for bacterial cell wall penicillin-binding proteins (PBPs); highly resistant to most bacterial β-lactamases; effective against most *Enterobacteriaceae, Pseudomonas aeruginosa*, and *Acinetobacter* spp.; poorly effective against enterococci, particularly vancomycin-resistant strains

Dose: 1g IV/IM q24hr (for IV reconstitute with 10mL NS; for IM 3.2mL 1.0% lidocaine without epinephrine)

Indications: For complicated infections of abdomen, pelvis, urinary tract, and skin; also used for community-acquired pneumonia

Contraindications: Carbapenem, β-lactam, or amide-type local anesthetic (i.e., lidocaine) hypersensitivity; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Injection site phlebitis or thrombosis; asthenia, fatigue, death, fever, leg pain, anxiety, altered mental status, dizziness, headache, insomnia; chest pain, hypo- or hypertension, tachycardia, edema; abdominal pain, diarrhea, acid reflux, constipation, dyspepsia, nausea, vomiting, increased LFTs; cough, dyspnea, pharyngitis, rales, rhonchi, respiratory distress; erythema, pruritus, rash

Interactions: Probenecid decreases renal excretion

Mission Impact: **GROUNDING** medication for personnel on flight status

ERYTHROMYCIN OPHTHALMIC OINTMENT

Class: Macrolide antibiotic

Dose: One-half inch ribbon of ointment q3–4hr or 2–6 × daily.

Indications: For superficial ocular infections of the cornea and conjunctiva

Contraindications: Hypersensitivity, astemizole, cisapride, pimozide, terfenadine therapy, pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Minor ocular irritations and redness

Interactions: Terfenadine, atorvastatin, lovastatin, pravastatin, simvastatin, carbamazepine, digoxin, diltiazem, midazolam, oral contraceptives, ototoxic drugs, penicillins, warfarin

Mission Impact: Blurred vision

ESZOPICLONE (LUNESTA) – CONTROLLED SUBSTANCE IV WARNING

Class: Sedative-hypnotic

Action: May potentiate effects of inhibitory neurotransmitter γ-aminobutyric acid (GABA) by binding close to or with benzodiazepine receptors

Dose: 2mg up to 3mg immediately at bedtime. Maintenance dose 3mg

Indications: Insomnia

Contraindications: Hypersensitivity, pregnancy category consider alternative during pregnancy and avoid use while breastfeeding

Adverse/Side-effects: Agitation, anxiety, confusion, depression, dizziness, hallucinations, HA, nervousness, neuralgia, unusual dreams, chest pain, peripheral edema, dry mouth, gynecomastia, diarrhea, indigestion, hepatitis, nausea, vomiting, decreased libido, dysmenorrhea, UTI, asthma, respiratory tract infection, pruritus, rash, or heat stroke

Interactions: Clarithromycin, ketoconazole, itraconazole, rifampin, and alcohol

Mission Impact: Grogginess. Puts patient at higher risk for heat injury. **GROUNDING** medication for personnel on flight status

FENTANYL – CONTROLLED SUBSTANCE II 

Class: CNS agent – potent narcotic (opiate) agonist

Action: Action similar to that of morphine with more rapid and less prolonged analgesia and sedation, but less emetic effect

Dose: 800mcg/dose (max 1600mcg/day); lozenge on a stick to be placed in mouth between cheek and lower gum and sucked, not chewed (have opioid antagonist [naloxone] immediately available!) **IV:** For severe pain 50–100mcg IV/IO/IM (consider doubling IV/IO dose for IM) q1–2hr prn

Onset/Peak/Duration: TD: Onset 15 minutes; peak 20–40 minutes; duration 2–3 hours. IV/IO: Onset immediate; peak 30–60 minutes; duration 2–4 hours

Indications: For moderate to severe pain management

Contraindications: MAOIs; myasthenia gravis; pregnancy category consider alternative during pregnancy and may use while breastfeeding (caution advised in patients trying to conceive)

Adverse/Side-effects: Sedation, euphoria, dizziness, diaphoresis, delirium, convulsions, bradycardia, hypotension, circulatory depression, cardiac arrest; miosis, blurred vision; nausea, vomiting, constipation, ileus; muscle and thoracic muscle rigidity; urinary retention, rash; laryngospasm, bronchoconstriction, respiratory depression or arrest

Interactions: Alcohol and other CNS depressants potentiate effects; MAOIs may precipitate hypertensive crisis

Mission Impact: **GROUNDING** medication for personnel on flight status

FEXOFENADINE (ALLEGRA)

Class: ENT agent – H_1-receptor antagonist; nonsedating antihistamine

Action: Competitively antagonizes histamine at the H_1-receptor site; does not bind with histamine to inactivate it; not associated with anticholinergic or sedative properties; inhibits antigen-induced bronchospasm and histamine release from mast cells

Dose: 60mg PO bid or 180mg PO qd

Indications: For symptom relief from seasonal allergic rhinitis (nasal congestion and sneezing, watery or red eyes, itching nose, palate, or eyes) and chronic urticaria

Contraindications: Fexofenadine hypersensitivity; pregnancy category may use during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Headache, drowsiness, fatigue, nausea, dyspepsia, throat irritation

Interactions: No clinically significant interactions established

FLUCONAZOLE (DIFLUCAN)

Class: Antifungal

Action: Damages fungal cells by interfering with a cytochrome P450 enzyme needed in cell membrane synthesis

Dose: Skin infection: 150mg, 1 pill per week × 4 weeks. **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. **Vaginal candidiasis:** The recommended dosage of fluconazole for vaginal candidiasis is 150mg as a single oral dose

Indications: Vaginal candidiasis (vaginal yeast infections due to *Candida*), oropharyngeal and esophageal candidiasis, fungal skin infections

Contraindications: Hypersensitivity to fluconazole, pregnancy category avoid use during pregnancy and may use while breastfeeding

Adverse/Side-effects: Exfoliative skin disorders including Stevens-Johnson syndrome and toxic epidermal necrosis

Interactions: Erythromycin; heart medications

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

FLUTICASONE (FLONASE)

Class: Anti-inflammatory corticosteroid; skin and mucous membrane agent

Action: Inhibits cells involved in the inflammatory response of asthma (mast cells, eosinophils, basophils, and lymphocytes). Also inhibits secretion of chemical mediators such as histamines

Dose: 1 spray in each nostril bid **OR** 2 sprays in each nostril daily

Indications: For management of nasal symptoms of seasonal and perennial allergic and nonallergic rhinitis in adults and children > 4 years old

Contraindications: Hypersensitivity, pregnancy category consider alternative during pregnancy and may use while breastfeeding

Adverse/Side-effects: Irritation of nasal mucous membranes, blood in nasal mucous, runny nose, abdominal pain, diarrhea, dizziness, flulike symptoms

Interactions: Drugs with immunosuppressive properties, other steroid drugs, suspected chickenpox or measles, antiviral drugs

GATAFLOXACIN OPHTHALMIC (ZYMAR) 

Class: Antimicrobial – antibiotic, ocular fluoroquinolone

Dose: Days 1 and 2: instill 1 drop in affected eye(s) q2hr while awake, up to 8 × daily. Days 3–7: Instill 1 drop in affected eye(s) up to 4 times/day while awake. 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

Indications: Eye infections

Contraindications: Hypersensitivity to any component of product, pregnancy category may use during pregnancy and while breastfeeding

Adverse/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, discontinue at first sign of skin rash or other allergic reaction, corneal staining, tearing and photophobia

Interactions: When gatifloxacin is absorbed into the bloodstream, there may be an interaction between gatifloxacin and any of the following:

- antacids (containing aluminum, calcium, and magnesium)
- digoxin
- probenecid
- vitamins (containing zinc, calcium, magnesium, or iron)

Mission Impact: 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

GUAIFENESIN

Class: ENT agent – antitussive, expectorant

Action: Enhances reflex outflow of respiratory tract fluids by irritation of gastric mucosa; aids in expectoration by reducing adhesiveness and surface tension of secretions

Dose: 100–400mg PO q4hr or 600–1,200mg XR PO q12hr (max: 2.4g/d)

Indications: Relief of dry, nonproductive coughs associated with colds and bronchitis

Contraindications: Guaifenesin hypersensitivity; pregnancy category may use during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Low incidence of nausea; drowsiness

Interactions: By inhibiting platelet function, may increase risk of bleeding in patients receiving heparin

HYDROCORTISONE CREAM

Class: Skin and mucous membrane agent – synthetic hormone; adrenal corticosteroid, glucocorticoid, mineralocorticoid, anti-inflammatory

Action: Stabilizes leukocyte lysosomal membranes, inhibits phagocytosis and release of allergic substances, suppresses fibroblast formation and collagen deposition

Dose: Topically AAA qd–qid

Indications: To reduce inflammation in various skin conditions

Contraindications: Steroid hypersensitivity, viral or bacterial diseases of skin; varicella or vaccinia on surfaces with compromised circulation; pregnancy category caution advised during pregnancy and while breastfeeding

Adverse/Side-effects: Anaphylactoid reaction, aggravation or masking of infections, skin thinning and atrophy, acne, impaired wound healing, petechiae, ecchymosis, easy bruising, hypopigmentation or hyperpigmentation, hirsutism, acneiform eruptions, subcutaneous fat atrophy, allergic dermatitis, urticaria, angioneurotic edema, increased sweating

Interactions: Estrogens potentiate effects; immune response to vaccines may be decreased

HYDROMORPHONE (DILAUDID) – CONTROLLED SUBSTANCE II

Class: CNS agent – narcotic (opiate) agonist; analgesic

Action: Semisynthetic derivative structurally similar to morphine with 8–10 × more potent analgesic effect, more rapid onset, shorter duration of action, less hypnotic effect, and less tendency to produce nausea and vomiting; also has antitussive properties

Dose: 1mg IV; 1–2mg IM q4–6hr prn

Onset/Peak/Duration:
IV – Onset in 10–15 minutes/Peak in 15–30 minutes/Duration 2–3 hours
IM – Onset in 15 minutes/Peak in 30–60 minutes/Duration 4–5 hours

Indications: For moderate to severe pain management, and control of persistent nonproductive cough

Contraindications: Opiate hypersensitivity, acute bronchial asthma, COPD, decreased respiratory reserve, severe respiratory depression, opiate-naïve patients; pregnancy category consider alternative during pregnancy and caution advised while breastfeeding (caution advised in patients trying to conceive)

Adverse/Side-effects: Nausea, vomiting, constipation; euphoria, dizziness, sedation, drowsiness; hypotension, bradycardia, tachycardia; respiratory depression; blurred vision

Interactions: Alcohol and other CNS depressants compound sedation and CNS depression; herbal (St. John's wort) may increase sedation

Mission Impact: **GROUNDING** medication for personnel on flight status

K9 Dosage: 3–6mg (0.1–0.2mg/kg) IV/IM q2–4hr using lower dose if IV

IBUPROFEN (MOTRIN, ADVIL)

Class: NSAID (nonselective COX-1); anti-inflammatory, analgesic, antipyretic

Action: Propionic acid inhibitor prototype that blocks prostaglandin synthesis, modulates T-cell function, inhibits inflammatory cell chemotaxis, decreases release of superoxide radicals or increases scavenging of these compounds at inflammatory sites, inhibits platelet aggregation and prolongs bleeding time

Dose: 400–800mg PO tid–qid (max: 3,200mg/d)

Indications: For mild to moderate pain management, symptomatic relief of arthritis, and to reduce fever

Contraindications: NSAID- or aspirin-induced urticaria, severe rhinitis, bronchospasm, angioedema, nasal polyps; active peptic ulcer, bleeding abnormalities; pregnancy category caution advised during 1st trimester and avoid use > 19 week gestation. Drug of choice while breastfeeding (caution advised in patients trying to conceive)

Adverse/Side-effects: Headache, dizziness, light-headedness, anxiety, emotional lability, fatigue, malaise, drowsiness, anxiety, confusion, depression, aseptic meningitis, hypertension, palpitation, CHF, peripheral edema; amblyopia (blurred vision, decreased visual acuity, scotomas, changes in color vision), nystagmus, visual-field defects; tinnitus, impaired hearing; dry mouth, gingival ulcerations, dyspepsia, heartburn, nausea, vomiting, anorexia, diarrhea, constipation, bloating, flatulence, epigastric or abdominal discomfort or pain, GI ulceration, occult blood loss; thrombocytopenia, neutropenia, hemolytic or aplastic anemia, leukopenia; decreased Hgb/Hct; acute renal failure, polyuria, azotemia, cystitis, hematuria, nephrotoxicity, decreased creatinine clearance; maculopapular and vesiculobullous skin eruptions, erythema multiforme, pruritus, acne; fluid retention with edema, Stevens-Johnson syndrome, toxic hepatitis, hypersensitivity reactions, anaphylaxis, bronchospasm, serum sickness, SLE, angioedema

Interactions: Oral anticoagulants and heparin may prolong bleeding time; may increase lithium and methotrexate toxicity; herbals (feverfew, garlic, ginger, ginkgo) may increase risk of bleeding; do not take aspirin concurrently; concurrent alcohol use may increase risk of GI ulceration and bleeding tendencies

KETACONAZOLE

Class: Antimicrobial – antifungal agent, imidazole derivative

Action: Alters the permeability of the cell wall by blocking fungal cytochrome P450; inhibits biosynthesis of triglycerides and phospholipids by fungi; inhibits several fungal enzymes that results in a build-up of toxic concentrations of hydrogen peroxide

Dose: Oral: 200mg once daily; may increase to 400mg once daily if response is insufficient. Continue until active fungal infection is resolved; some infections may require a treatment duration of up to 6 months; **tinea cruris, tinea pedis:** topical cream: apply to the affected and immediate surrounding area once daily for tinea corporis, cruris: 2 weeks; tinea pedis: 6 weeks; **seborrheic dermatitis:** topical cream: apply to the affected area twice daily for 4 weeks or until clinical response is noted. Foam: apply to affected area twice daily for 4 weeks. Gel: apply to the affected area once daily for 2 weeks. Shampoo 2%: Apply 5–10mL to wet scalp, lather, leave on 3–5 minutes, and rinse; apply twice weekly for 2–4 weeks

Indications: Topical – Treatment of tinea corporis (ringworm), tinea cruris (jock itch), and tinea pedis (athlete's foot) caused by *Trichophyton rubrum*, treatment of seborrheic dermatitis. **Systemic –** Treatment of susceptible fungal infections in patients who have failed or who are intolerant to other antifungal therapies

Contraindications: Not indicated for the treatment of onychomycosis, cutaneous dermatophyte infections, or Candida infections; ketoconazole hypersensitivity; alcoholism, fungal meningitis; ocular administration; administration of the following drugs with ketoconazole is contraindicated: dofetilide, quinidine, pimozide, cisapride, methadone, disopyramide, dronedarone, and ranolazine. Ketoconazole can cause elevated plasma concentrations of these drugs and may prolong QT intervals, sometimes resulting in life-threatening ventricular dysrhythmias, such as torsades de pointes; administration with benzodiazepines; pregnancy category caution advised during pregnancy and may use while breastfeeding

Adverse/Side-effects: Orthostatic hypotension, peripheral edema, fatigue, insomnia, malaise, nervousness, paresthesia, erythema, urticarial, anaphylactoid reaction.

Interactions: Topical treatment has no known drug interactions. Systemic treatment coadministration with midazolam, triazolam, and alprazolam may result in elevated plasma concentrations of the benzodiazepines, leading to prolonged hypnotic and sedative effects. There are many other drug interactions that require you to consult with a provider and pharmacology resources prior to administration

Notes: Systemic – Hepatic function tests (baseline), including weekly ALT for the duration of treatment; calcium and phosphorous (periodically with long-term use); adrenal function as clinically necessary. Use ketoconazole only when other effective antifungal therapy is not available or tolerated and the potential benefits are considered to outweigh the potential risks

KETAMINE* – CONTROLLED SUBSTANCE III

Class: Dissociative

Action: Produces a cataleptic-like state causing dissociation from the surrounding environment by direct action on the cortex and limbic system. Ketamine is a noncompetitive NMDA receptor antagonist that blocks glutamate. Smaller doses produce analgesia, and modulate central sensitization, hyperalgesia and opioid tolerance. Reduces polysynaptic spinal reflexes.

Dose: Sedation: 1–1.5mg/kg slow IV push titrate to effect, followed by half induction dose PRN q10–20min. 4–5mg/kgIM, repeat doses q30min prn for maintenance. Do not administer faster as this may result in respiratory depression/apnea

Pain: 0.1–0.3mg/kg slow IV push over 30 seconds–1 minute. IM/IN = 0.2–0.6mg/kg

Avoid: 0.3–0.8mg/kg IV due to adverse effects

Onset/Peak/Duration:

IV – Onset in 30 seconds/Duration 5–10 minutes

IM – Onset in 3–4 minutes/Duration 12–25 minutes

IN – Onset in 5–10 minutes/Duration 12–25 minutes

Indications: General sedative and analgesic; anesthetic agent for procedures

Contraindications: Hypersensitivity to ketamine, cardiovascular disease category consider alternative during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Hypertension, respiratory depression, emergence reactions (delirium, hallucinations, confusion)

Interactions: Effects of ketamine are increased when combined with other analgesics or muscle relaxants

Mission Impact: GROUNDING medication for personnel on flight status

K9 Dosage: 100–150mg (5mg/kg) IV/IM (best given in conjunction with midazolam 2–10mg for profound sedation)

KETOROLAC (TORADOL)*

Class: NSAID; anti-inflammatory, analgesic, antipyretic

Action: Inhibits COX-1 and -2 enzymes, resulting in decreased formation of prostaglandin precursors

Dose:
IM – 30mg as a single dose or 15–30mg q6hr
IV – 15mg slow IV push as a single dose or 15mg q6hr (maximum: 120mg/d)

Onset/Peak/Duration:
IV/IM – Onset in 30–60 minutes/Peak in 1–2 hours/Duration 4–6 hours

Indications: For short-term moderate pain management

Contraindications: Ketorolac hypersensitivity; nasal polyps; angioedema or bronchospastic reaction to aspirin or other NSAIDs; severe renal impairment or renal failure due to volume depletion; patients with risk of bleeding; active peptic ulcer disease; pre- or intraoperatively; pregnancy category avoid use during pregnancy and may use while breastfeeding (caution advised in patients trying to conceive)

Adverse/Side-effects: Drowsiness, dizziness, headache; nausea, dyspepsia, GI pain, hemorrhage; edema, sweating

Interactions: May increase methotrexate and lithium levels and toxicity; herbals (feverfew, garlic, ginger, ginkgo) increase bleeding potential

LACTATED RINGER'S (LR)

Class: Plasma volume expander – crystalloid; isotonic salt solution

Action: Each 1L contains 6.0g sodium chloride (Na^+ 130mEq/L, Cl^- 109mEq/L) and other electrolytes (K^+ 4mEq/L, Ca^{2+} 3mEq/L, lactate 28mEq/L, and 9kcal/L); pH 6.4; remains in the intravascular space for only a very limited time as it diffuses rapidly throughout the extracellular space

Dose: 500–1,000mL IV

Indications: For fluid replacement and plasma volume expansion and for adjunctive treatment of shock and hypovolemic states caused by hemorrhage, burns, surgery, sepsis, trauma, dehydration, or illness; also used for irrigation

Contraindications: CHF; do not use with blood or blood products

Adverse/Side-effects: Fluid overload, CHF, edema, electrolyte imbalance, hypertension

Interactions: Calcium in LR can bind to other drugs and reduce efficacy, also has potential for creating emboli if given with blood or blood products

K9 Dosage: Bolus of 1L over 30 minutes, then reassess VS; repeat if no response. Do not exceed 2L in 1 hour

LEVETIRACETAM (KEPPRA)

Class: Antiepileptic

Action: Unknown

Dose: 1,000–4,000mg IV; 1,000mg IV for seizure prevention; 4,000mg for seizure treatment

Indications: For seizure prevention in moderate to severe TBI and treatment of active seizures

Contraindications: Hypersensitivity to drug, pregnancy category caution advised during pregnancy and while breastfeeding

Adverse/Side-effects: The most common adverse effects of levetiracetam treatment include CNS effects such as somnolence, decreased energy, headache, dizziness, mood swings and coordination difficulties

Interactions: No significant pharmacokinetic interactions

LEVOFLOXACIN (LEVOQUIN)

Class: Antimicrobial – antibiotic; fluoroquinolone. **All fluoroquinolones now have a US Black Box Warning due to serious adverse reactions including tendonitis and tendon rupture, peripheral neuropathy and CNS effects. However, in some rare cases, benefits may outweigh the risks of fluoroquinolone use. Fluoroquinolones require prior approval from unit physician or physician assistant.**

Action: Broad-spectrum antibiotic that inhibits DNA bacterial topoisomerase II, an enzyme required for DNA replication, transcription, repair, and recombination; prevents replication of certain bacteria resistant to β-lactam antibiotic

Dose: Community-acquired pneumonia – 750mg/d PO/IV × 7 days; skin infection – 750mg/d × 5–14 days; rhinosinusitis (bacterial) – 500mg/d × 5–7 days; for chronic bacterial prostatitis: 500mg PO qd × 28 days; for UTIs: 500–750mg PO qd × 7 days

Indications: For treatment of maxillary sinusitis, acute exacerbations of bacterial bronchitis, community-acquired pneumonia, uncomplicated skin/skin structure infections, UTI, acute pyelonephritis; chronic bacterial prostatitis; bacterial conjunctivitis

Contraindications: Quinolone hypersensitivity; hypokalemia; tendon pain; syphilis; viral infections; phototoxicity; pregnancy category consider alternative during pregnancy and avoid while breastfeeding

Adverse/Side-effects: Prolonged QT syndrome, tendon rupture, headache, insomnia, dizziness; nausea, diarrhea, constipation, vomiting, abdominal pain, dyspepsia; rash, pruritus; decreased vision, foreign body sensation, transient ocular burning, ocular pain, photophobia; chest or back pain, fever, pharyngitis

Interactions: Magnesium- or aluminum-containing antacids, sucralfate, iron, and zinc may decrease absorption; NSAIDs may increase risk of CNS reactions including seizures; may cause hyper- or hypoglycemia in patients on oral hypoglycemic agents; may cause false positives on opiate screening tests; avoid exposure to excess sunlight or artificial UV light; avoid NSAIDs while taking levofloxacin

Mission Impact: **GROUNDING** medication for personnel on flight status

LIDOCAINE (XYLOCAINE)

Class: Amide-type local anesthetic; cardiovascular agent; class IB antiarrhythmic

Action: Anesthetic effect similar to that of procaine; class IB antiarrhythmic action by suppressing automaticity in the His-Purkinje system and by elevating the electrical stimulation threshold of ventricles during diastole

Dose: For local anesthesia, infiltrate 0.5–2% injection with and without epinephrine; max dose – 4.5mg/kg/dose (without epinephrine); 7mg/kg (with epinephrine)

Onset/Peak/Duration: Procedural local injection – Onset 1–3 minutes/Duration 10 minutes; dosing with epinephrine – Onset 1–3 minutes/Duration infiltration ~2 hours, nerve block ~3–3.5 hours

Indications: For surface, infiltration, and nerve block anesthesia; also used for rapid control of ventricular arrhythmias

Contraindications: Amide-type local anesthetic hypersensitivity; systemic injection in presence of severe trauma or sepsis, blood dyscrasias, supraventricular arrhythmias, untreated sinus bradycardia, severe degrees of sinoatrial, atrioventricular, and intraventricular heart block; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Drowsiness, dizziness, light–headedness, restlessness, confusion, disorientation, irritability, apprehension, euphoria, wild excitement, numbness of lips or tongue, hot and cold paresthesia, chest heaviness, difficulty speaking, difficulty breathing or swallowing, muscular twitching, tremors, psychosis; convulsions, respiratory depression and arrest, hypotension, bradycardia, conduction disorders, heart block, cardiovascular collapse, and cardiac arrest in high doses; tinnitus, decreased hearing; blurred or double vision, impaired color perception; local erythema and edema; anorexia, nausea, vomiting; excessive perspiration, thrombophlebitis; urticaria, rash, edema, anaphylactoid reaction

Interactions: Barbiturates decrease activity; cimetidine, β-blockers, quinidine increases effects; phenytoin increases cardiac depressant effects; procainamide compounds neurologic and cardiac effects

Mission Impact: **GROUNDING** medication for personnel on flight status

LOPERAMIDE (IMODUM)*  DO NOT ALLOW OPEN ACCESS

Class: GI agent – antidiarrheal

Action: Synthetic piperidine derivative that inhibits GI peristaltic activity by direct action on circular and longitudinal intestinal muscles; prolongs intestinal content transit time, increases consistency of stools, and reduces fluid and electrolyte loss

Dose: 4mg PO, followed by 2mg after each unformed stool (max: 16mg/d)

Indications: For acute nonspecific diarrhea, chronic diarrhea associated with inflammatory bowel disease

Contraindications: Conditions in which constipation should be avoided, severe colitis, acute diarrhea caused by broad-spectrum antibiotics (pseudomembranous colitis) or from organisms that penetrate the intestinal mucosa (toxigenic *Escherichia coli, Salmonella,* or *Shigella*); pregnancy category caution advised during pregnancy and may use while breastfeeding

Adverse/Side-effects: Rash; fever; drowsiness, fatigue, dizziness, CNS depression with overdose; abdominal distension, discomfort or pain, bloating, constipation, nausea, vomiting, anorexia, dry mouth; toxic megacolon in patients with ulcerative colitis

Interactions: Caution when dosing in conjunction with prolonging QTc medications.

Mission Impact: **GROUNDING** medication for personnel on flight status

LORATADINE (CLARITIN)

Class: ENT agent – H_1-receptor antagonist – nonsedating antihistamine

Action: Long–acting histamine antagonist with selective peripheral H_1-receptor sites that blocks histamine release; disrupts capillary permeability, edema formation, and constriction of respiratory, GI, and vascular smooth muscle

Dose: 10mg/d PO, take on an empty stomach

Indications: Symptom relief from seasonal allergic rhinitis; idiopathic chronic urticaria

Contraindications: Loratadine hypersensitivity; pregnancy category may use during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Dizziness, dry mouth, fatigue, headache, somnolence, altered salivation and lacrimation, thirst, flushing, anxiety, depression, impaired concentration; hypo- or hypertension, palpitations, syncope, tachycardia; nausea, vomiting, flatulence, abdominal distress, constipation, diarrhea, weight gain, dyspepsia; arthralgia, myalgia; blurred vision, earache, eye pain, tinnitus; rash, pruritus, photosensitivity

Interactions: No clinically significant interactions established

MECLIZINE (ANTIVERT)

Class: H_1-receptor antagonist; antihistamine, antivertigo agent

Action: Long-acting piperazine antihistamine with marked effect in blocking histamine-induced vasopressive response, but only slight anticholinergic action; marked depressant action on labyrinthine excitability and on conduction in vestibular – cerebellar pathways; exhibits CNS depression, antispasmodic, antiemetic, and local anesthetic activity

Dose: For motion sickness, 25–50mg PO 1 hour before travel, may repeat q24hr prn for duration of journey; for vertigo, 25–100mg/d PO in divided doses

Indications: For management of nausea, vomiting, and dizziness associated with motion sickness and vertigo associated with diseases affecting the vestibular system

Contraindications: Hypersensitivity to meclizine; pregnancy category may use during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Drowsiness; dry mouth; blurred vision; fatigue

Interactions: Alcohol and CNS depressants may potentiate sedative effects; do not drive or engage in potentially hazardous activities until response to drug is known

Mission Impact: **GROUNDING** medication for personnel on flight status

MELATONIN

Class: Hormone produced by the pineal glands involved in mammalian circadian rhythms.

Dose: 0.3–3mg for short periods of time (no longer than 2 weeks). Do not exceed 3mg due to paroxysmal hyperstimulation from elevated melatonin levels.

Indications: Insomnia and sleep disturbances

Contraindications: Hypersensitivity

Adverse/Side-effects: Stomach discomfort, morning grogginess, daytime "hangover", feeling of a heavy head, depression, HA, lethargy, amnesia, increased seizure activity, suppression of male libido, hypothermia, retinal damage, and gynecomastia

Interactions: ASA, NSAIDs, benzodiazepines, β-blockers, corticosteroids, alcohol

Mission Impact: **GROUNDING** medication for personnel on flight status

MELOXICAM (MOBIC)*

Class: NSAID; COX-2 Inhibitor, anti-inflammatory, analgesic, antipyretic

Action: Inhibits cyclooxygenase

Dose: 7.5–15mg PO qd

Indications: For mild to moderate pain management, osteoarthritis, rheumatoid arthritis

Contraindications: NSAID or salicylate hypersensitivity; rhinitis, urticaria, angioedema, asthma; severe renal or hepatic disease; pregnancy category caution advised in 1st trimester and avoid use remainder of pregnancy. Consider alternative while breastfeeding (caution advised in patients trying to conceive)

Adverse/Side-effects: Edema, flulike syndrome, pain; abdominal pain, diarrhea, dyspepsia, flatulence, nausea, constipation, ulceration, GI bleed, anemia; arthralgia; dizziness, headache, insomnia; pharyngitis, upper respiratory tract infection, cough; rash, pruritus; urinary frequency, UTI

Interactions: May decrease effect of ACE inhibitors and diuretics; may increase lithium levels and toxicity; aspirin may increase GI bleed risk; warfarin and herbals (feverfew, garlic, ginger, ginkgo) may increase bleeding

METHOCARBOMOL (ROBAXIN)

Class: Somatic nervous system agent – central-acting, skeletal muscle relaxant

Action: Causes skeletal muscle relaxation by general CNS depression

Dose: 500mg up to 1.5g PO qid × 2–3 days; 500mg recommended starting dose

Indications: For management of discomfort associated with acute musculoskeletal disorders as adjunct to physical therapy and other measures

Contraindications: Comatose; CNS depression; acidosis, kidney dysfunction; pregnancy category caution advised during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Fever, anaphylactic reaction, flushing, syncope, convulsions; urticaria, pruritus, rash, thrombophlebitis, pain, sloughing; conjunctivitis, blurred vision, nasal congestion; drowsiness, dizziness, light-headedness, headache; hypotension, bradycardia; nausea, metallic taste

Interactions: Alcohol and other CNS depressants enhance CNS depression

Mission Impact: **GROUNDING** medication for personnel on flight status

METHYLPREDNISOLONE (SOLU-MEDROL)

Class: Hormones and synthetic substitutes – adrenal corticosteroid, glucocorticosteroid, anti-inflammatory

Action: Intermediate-acting synthetic steroid with less sodium and water retention effects than hydrocortisone; inhibits phagocytosis and release of allergic substances; modifies immune response to various stimuli; anti-inflammatory and immunosuppressive

Dose: 125mg IV q6hr or 150mg IM q6hr

Indications: For management of acute and chronic inflammatory diseases, control of severe acute and chronic allergic processes, acute bronchial asthma.

Contraindications: Systemic fungal infections; pregnancy category caution advised during pregnancy and may use while breastfeeding

Adverse/Side-effects: Euphoria, headache, insomnia, confusion, psychosis; CHF, edema; nausea, vomiting, peptic ulcer; muscle weakness, delayed wound healing, muscle wasting, osteoporosis, aseptic necrosis of bone, spontaneous fractures; cushingoid features, growth suppression in children, carbohydrate intolerance, hyperglycemia; cataracts; leukocytosis; hypokalemia

Interactions: Amphotericin B, furosemide, thiazide diuretics increase potassium loss; may enhance virus replication or increase attenuated virus vaccine adverse effects; isoniazid, phenytoin, phenobarbital, rifampin increase metabolism and decrease effectiveness

METRONIDAZOLE (FLAGYL, METROGEL)

Class: Antimicrobial – antibiotic, antitrichomonal, amebicide

Action: Synthetic compound with direct trichomonacidal, amebicidal, and antibacterial activity (anaerobic bacteria and some gram-negative bacteria); effective against *Trichomonas vaginalis, Entamoeba histolytica, Giardia lamblia*, obligate anaerobic bacteria, gram-negative anaerobic bacilli, and *Clostridia*; microaerophilic streptococci and most aerobic bacteria are resistant

Dose: For giardia 250mg PO tid × 5–7 days; for amebiasis (dysentery) 500–750mg PO tid × 7–10 days; for pseudomembranous colitis, 250–500mg PO tid–qid; for trichomoniasis, 2g PO once or 500mg PO bid × 7 days; for bite wound (animal/human) 500mg q8hr × 3–5 days; for bacterial vaginosis 500mg PO bid for 7 days

Indications: For giardiasis, trichomoniasis, amebiasis, and amebic liver abscess; topical for rosacea

Contraindications: Blood dyscrasias; active CNS disease; pregnancy category may use during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Hypersensitivity (rash, urticaria, pruritus, flushing), fever, fleeting joint pains, *Candida* overgrowth; vertigo, headache, ataxia, confusion, irritability, depression, restlessness, weakness, fatigue, drowsiness, insomnia, paresthesia, sensory neuropathy; nausea, vomiting, anorexia, epigastric distress, abdominal cramps, diarrhea, constipation, dry mouth, metallic or bitter taste, proctitis; polyuria, dysuria, pyuria, incontinence, cystitis, decreased libido, nasal congestion; ECG changes (flattening of T wave)

Interactions: Oral anticoagulants potentiate hypoprothrombinemia; alcohol and solutions of citalopram, ritonavir, lopinavir, and IV formulations of sulfamethoxazole, trimethoprim, nitroglycerin may elicit disulfiram reaction due to the alcohol content; disulfiram causes acute psychosis; phenobarbital increases metabolism; may increase lithium levels; fluorouracil, azathioprine may cause transient neutropenia

Mission Impact: **GROUNDING** medication for personnel on flight status.

MIDAZOLAM (VERSED)* – CONTROLLED SUBSTANCE II

Class: CNS agent – Benzodiazepine

Action: Binds to specific sites on GABA type A receptors within the brain.

Dose: 0.07–0.08mg/kg IM (average or typical adult dose is 5mg IM).10mg IM for seizure control. 2–5mg IV/IO slowly q2–3min to maximum adult dose of 10mg. Titrate to achieve necessary level. (The patient is somewhat somnolent, but still easily arousable.)

Onset/Peak/Duration:

IV – Onset in 1–5 minutes/Peak rapid/Duration 2–6 hours

IM – Onset in 5–15 minutes/Peak in 15–60 minutes/Duration 2–6 hours

Indications: Sedation in combination with analgesia to perform brief, but painful procedures, treatment of active seizures, sedation of agitated patients

Contraindications: Known sensitivity to benzodiazepines, acute narrow angle glaucoma, injectable midazolam should not be administered to adult or pediatric patients in shock or coma, or in acute alcohol intoxication with depression of vital signs, pregnancy category consider alternative during pregnancy and may use short-term while breastfeeding

Adverse/Side-effects: Laryngospasm, bronchospasm, wheezing, shallow respirations, bradycardia, tachycardia, vomiting, retrograde amnesia, hallucination, confusion, blurred vision, diplopia, nystagmus, pinpoint pupils, anaphylactoid reactions, hives, rash, pruritus, yawning, lethargy, chills, weakness

Interactions: Use with caution when other medications capable of producing central nervous system depression are used

Mission Impact: **GROUNDING** medication for personnel on flight status

K9 Dosage: For sedation combined with opioid, 7.5mg (0.25mg/kg) IV/IM q4hr

Notes: Monitor patients continuously for early signs of hypoventilation, airway obstruction, or apnea. Use with caution in patients with severe fluid or electrolyte disturbances.

MODAFINIL (PROVIGIL) – CONTROLLED SUBSTANCE IV

Class: CNS stimulant

Dose: 200mg daily. Shift work sleep disorder 200mg 1 hour prior to start. Max dose 400mg

Indications: Improve wakefulness in patients with narcolepsy, obstructive sleep apnea-hypopnea syndrome, and shift work sleep disorder

Contraindications: Hypersensitivity, pregnancy category avoid use during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Aggressiveness, agitation, anxiety, confusion, delusions, depression, hallucinations, HA, insomnia, mania, nervousness, psychosis, suicidal ideations, nausea, rash, Stevens-Johnson syndrome, anaphylaxis, or angioedema.

Interactions: Amitriptyline, diazepam, propanolol, carbamazepine, cimetidine, clarithromycin, erythromycin, fluconazole, oral contraceptives, dexamethasone, rifampin, warfarin

Mission Impact: Must be approved by medical officer and command leadership prior to administration. Individual must be screen tested in noncombat environment prior to administration during operational timeframes.

MORPHINE SULFATE (MSO_4) – CONTROLLED SUBSTANCE II

Class: CNS agent – narcotic (opiate) agonist; analgesic

Action: Natural opium alkaloid with agonist activity as it binds with three types of the same receptors as endogenous opioid peptides; analgesia at supraspinal level, euphoria, respiratory depression and physical dependence; sedation and miosis; dysphoric, hallucinogenic, and cardiac stimulant effects

Dose: 5–10mg slow IV push, titrate to pain

Onset/Peak/Duration:
IV – Onset in 5–20 minutes/Peak in 20 minutes/Duration 4–5 hours
IM – Onset in 10–30 minutes/Peak in 30–60 minutes/Duration 4–5 hours

Indications: For severe acute and chronic pain management, preanesthesia and as adjunct to anesthesia, and for relief of dyspnea from acute left ventricular failure and pulmonary edema

Contraindications: Opiate hypersensitivity; seizures; acute bronchial asthma, chronic pulmonary disease, severe respiratory depression; chemical-irritant induced pulmonary edema; BPH; diarrhea due to poisoning until toxic material has been eliminated; following biliary tract surgery and surgical anastomosis; pancreatitis; acute ulcerative colitis; severe liver or renal insufficiency; hypothyroidism; pregnancy category consider alternative during pregnancy and may use while breastfeeding (caution advised in patients trying to conceive)

Adverse/Side-effects: Pruritus, rash, urticaria, edema, anaphylactoid reaction; sweating, skeletal muscle flaccidity; cold, clammy skin, hypothermia; euphoria, insomnia, disorientation, visual disturbances, dysphoria, paradoxical CNS stimulation (restlessness, tremor, delirium, insomnia), convulsions; decreased cough reflex, drowsiness, dizziness, deep sleep, coma; miosis; bradycardia, palpitations, syncope; flushing of face, neck, and upper thorax; orthostatic hypotension, cardiac arrest; constipation, anorexia, dry mouth, biliary colic, nausea, vomiting, elevated LFTs; urinary retention or urgency, dysuria, oliguria, reduced libido or potency; severe respiratory depression or arrest; pulmonary edema

Interactions: CNS depressants, sedatives, barbiturates, alcohol, benzodiazepines, and TCAs potentiate CNS-depressant effects; MAOIs may precipitate hypertensive crisis; phenothiazines may antagonize analgesia

Mission Impact: **GROUNDING** medication for personnel on flight status

K9 Dosage: 2–3mg IV **OR** 10–20mg IM/SQ. Nausea/emesis and defecation common. Reverse with 1mg naloxone IV/IM/SQ

MOXIFLOXACIN (AVELOX)*

Class: Antimicrobial – antibiotic; fluoroquinolone. **All fluoroquinolones now have a US Black Box Warning due to serious adverse reactions including tendonitis and tendon rupture, peripheral neuropathy and CNS effects. However, in some rare cases, benefits may outweigh the risks of fluoroquinolone use. Fluoroquinolones require prior approval from unit physician or physician assistant.**

Action: Broad spectrum bactericidal agent that inhibits DNA-gyrase topoisomerase II, an enzyme necessary for bacterial replication, transcription, repair and recombination; effective against gram-positive and gram-negative organisms, *Staphylococcus aureus, Streptococcus pneumonia, Haemophilus influenzae, Klebsiella pneumoniae, Moraxella catarrhalis, Chlamydia pneumoniae, Mycoplasma pneumoniae,* and other microbes

Dose: 400mg PO/IV qd × 5–10 days

Indications: For acute bacterial exacerbation of chronic bronchitis, acute sinusitis, community-acquired pneumonia, skin infections

Contraindications: Quinolone hypersensitivity; hepatic insufficiency; syphilis; arrhythmias; myocardial ischemia or infarction; hypokalemia, or those receiving class IA or class III antiarrhythmic drugs; pregnancy category avoid use during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Tendon rupture; QT_c prolongation; dizziness, headache, peripheral neuropathy, nausea, diarrhea, abdominal pain, vomiting, taste perversion, abnormal LFTs, dyspepsia, tendon rupture

Interactions: Iron, zinc, antacids, aluminum, magnesium, calcium, sucralfate decrease absorption; atenolol, erythromycin, antipsychotics, TCAs, quinidine, procainamide, amiodarone, may cause false positive on opiate screening tests

Mission Impact: **GROUNDING** medication for personnel on flight status.

MUPIROCIN (BACTROBAN)

Class: Antimicrobial – antibiotic; pseudomonic acid

Action: Inhibits protein synthesis by binding with bacterial transfer RNA; effective against *Staphylococcus aureus* (including methicillin-resistant [MRSA] and β-lactamase–producing strains], *Staphylococcus epidermidis, Staphylococcus saprophyticus,* and *Staphylococcus pyogenes*

Dose: Topically apply tid–qid × 1–2 weeks; reevaluate for response after 3–5 days

Indications: For impetigo or nasal carriage due to *Staphylococcus aureus*, β-hemolytic streptococci, and *Streptococcus pyogenes*; superficial skin infections

Contraindications: Hypersensitivity to any of its components; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Headache, burning, stinging; pruritis, erythema, dry skin, tenderness, swelling, rash; nausea; local pain; rhinitis, congestion, pharyngitis

Interactions: None

Mission Impact: None

NALOXONE (NARCAN)* 

Class: CNS agent – narcotic (opiate) antagonist

Action: Pure opiate antagonist without agonistic (morphine-like) properties that displaces opioids at receptor sites. Acts by completing the μ, μ, and × opiate receptor sites and forcing

Dose: 0.4–2.0mg IV, repeat q2–3min prn

Onset/Peak/Duration:
IV – Onset in 1–2 minutes/Peak in 5–15 minutes/Duration 45 minutes or longer
IM – Onset in 2–5 minutes/Peak in 5–15 minutes/Duration 45 minutes or longer

Indications: Narcotic overdose and reversal of effects of natural and synthetic narcotics (opiates), including respiratory depression, sedation, and hypotension; drug of choice for suspected acute opioid overdose or unknown ingestion with respiratory depression.

Contraindications: Hypersensitivity; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Analgesia reversal, tremors, hyperventilation, drowsiness, sweating; increased BP, tachycardia; nausea, vomiting; elevated PTT

Interactions: Reverses analgesic effects of narcotic (opiate) agonists and agonist-antagonists.

Mission Impact: **GROUNDING** medication for personnel on flight status.

K9 Dosage: 1mg (0.02–0.04mg/kg) IV/IM

NAPHAZOLINE (NAPHCON-A, VASCON, CLEAR EYES) 

Class: Autonomic nervous system agent – sympathomimetic, α-adrenergic agonist, vasoconstrictor, decongestant

Action: Stimulates α-adrenergic receptors in arterioles of conjunctiva and nasal mucosa to produce rapid and prolonged vasoconstriction, reducing fluid exudation and mucosal engorgement; systemic absorption may cause CNS depression rather than stimulation.

Dose: 1–2gtt in each eye q6hr prn (remove contact lenses before use if worn). **Limit use to 72 hours.**

Indications: Ocular vasoconstriction and decongestion

Contraindications: Hypersensitivity, narrow angle glaucoma, MAOIs, hyperthyroidism, diabetes mellitus, ocular trauma; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Keratitis, coma, hypertension, bradycardia, blurred vision, hyperglycemia, respiratory depression, tachycardia, shock like hypotension, increased intraocular pressure, irritation, drowsiness, weakness, headache, nausea, hypothermia, rebound congestion and chemical rhinitis with continued use

Interactions: Vasoconstrictive nasal decongestants ay reduce analgesic effect, TCAs and maprotiline may potentiate pressor effects

Mission Impact: **GROUNDING** medication for personnel on flight status

NAPROXEN (NAPROSYN)

Class: NSAID; anti-inflammatory, analgesic, antipyretic

Action: Propionic acid derivative with properties similar to ibuprofen; inhibits COX-1 and -2 enzymes inhibiting prostaglandin synthesis and platelet aggregation; prolongs bleeding time

Dose: 250–500mg PO bid (max: 1,000mg qd)

Onset/Peak/Duration: Onset: 30–60 minutes, **Peak:** 2–4 hours, **Duration:** < 12 hours

Indications: For mild to moderate pain management and symptomatic treatment of acute and chronic arthritis

Contraindications: Hypersensitivity; peptic ulcer; history of asthma, rhinitis, urticaria, bronchospasm or shock caused by aspirin or other NSAIDs; hyperkalemia; liver or renal impairment or disease, recent MI or CABG; pregnancy category caution advised during 1st trimester and avoid use > 19 weeks in pregnancy. Consider shorter acting alterative while breastfeeding (caution advised in patients trying to conceive)

Adverse/Side-effects: Headache, drowsiness, dizziness, lightheadedness, depression; palpation, dyspnea, peripheral edema, CHF, tachycardia; blurred vision, tinnitus, hearing loss; anorexia, heartburn, indigestion, nausea, vomiting, thirst, GI bleeding, elevated LFTs; thrombocytopenia, leukopenia, eosinophilia, pruritus, rash, ecchymosis, nephrotoxicity, increased risk of stroke or MI; pulmonary edema

Interactions: Herbals (feverfew, garlic, ginger, ginkgo) may increase bleeding

NITROFURANTOIN (MACROBID)

Class: Antimicrobial – miscellaneous

Action: Nitrofurantoin is reduced by bacterial flavoproteins to reactive intermediates that inactivate or alter bacterial ribosomal proteins leading to inhibition of protein synthesis, aerobic energy metabolism, DNA, RNA, and cell wall synthesis. Nitrofurantoin is bactericidal in urine at therapeutic doses

Dose: PO 100mg bid × 5 days for females, × 7 days for males

Indications: Acute, recurrent, and prophylactic treatment for cystitis; chronic suppression of recurrent UTIs

Contraindications: Hypersensitivity to drug or any component of the formulation; anuria, oliguria, or significant impairment of renal function, pregnancy category consider alternative during 1st trimester and avoid use 38–42 weeks, but otherwise may use in pregnancy. Avoid use while breastfeeding

Adverse/Side-effects: ECG changes, chills, confusion, depression, drowsiness, headache, malaise, numbness, paresthesia, psychotic reaction, alopecia, dermatitis, skin rash; Stevens-Johnsons syndrome; decreased hemoglobin, hepatitis; candida; weakness; amblyopia; cough; cyanosis; dyspnea; fever, hepatotoxicity

Interactions: Minimal interactions

Mission Impact: **GROUNDING** medication for personnel on flight status

OFLOXACIN OTIC (FLOXIN)

Class: Antimicrobial – antibiotic, fluoroquinolone

Action: broad-spectrum fluoroquinolone against gram-positive and gram-negative aerobic and anaerobic bacteria. Inhibits bacterial DNA replication and some aspects of its transcription, repair, recombination, and transposition

Dose: 10gtt in affected ear(s) qd × 7 days

Indications: Otitis externa in adults and pediatric patients (> 6 months) due to *Escherichia coli, Pseudomonas aeruginosa,* and *Staphylococcus aureus*

Contraindications: Hypersensitivity to ofloxacin or other quinolone antibacterial agents; tendon pain; lactation; pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Hypersensitivity; fungal or bacterial superinfection with prolonged use, tendon inflammation/rupture; pruritis; earache; dizziness; headache; vertigo

Interactions: Minimal prehospital interactions

Mission Impact: **GROUNDING** medication for personnel on flight status

OMEPRAZOLE (PRILOSEC)

Class: GI agent – proton pump inhibitor (PPI)

Action: Antisecretory compound that is a gastric acid pump inhibitor; suppresses gastric acid secretion by inhibiting the H^+, K^+–ATPase enzyme system (the acid [proton H^+] pump) in the parietal cells, which relieves gastrointestinal distress and promotes ulcer healing

Dose: 20mg PO qd × 4–8 weeks

Indications: Duodenal ulcer, gastroesophageal reflux disease (GERD), heartburn, and erosive esophagitis; used in conjunction with clarithromycin and metronidazole to treat duodenal ulcers associated with *Helicobacter pylori*

Contraindications: PPI hypersensitivity, pregnancy category caution advised during pregnancy and may use while breastfeeding

Adverse/Side-effects: Headache, dizziness; rash; abdominal pain, diarrhea, nausea, vomiting, constipation; hematuria, proteinuria

Interactions: May increase diazepam, phenytoin, and warfarin levels

ONDASETRON (ZOFRAN)* WARNING

Class: GI agent – 5-HT_3 antagonist, antiemetic

Action: Selective serotonin (5-HT_3) receptor antagonist, acting centrally in the chemoreceptor trigger zone and peripherally on the vagal nerve terminals; serotonin is released from the wall of the small intestine, stimulates the vagal efferents through the serotonin receptors, and initiates the vomiting reflex

Dose: 4–8mg PO q4hr prn; 4–8mg slow IVP or IM q4hr prn

Onset/Peak/Duration:
IV – Onset in 10–30 minutes/Duration 8 hours

Indications: Prevention of nausea and vomiting

Contraindications: Hypersensitivity to ondansetron; pregnancy category caution advised during pregnancy and while breastfeeding

Adverse/Side-effects: Dizziness, light-headedness, headache, sedation; diarrhea, constipation, dry mouth, fatigue, fever, hypoxia

Interactions: Rifampin may decrease ondansetron levels; use with antimalarial drugs may cause decreased efficacy or increased blood toxicity; caution when dosing in conjunction with prolonging QTc medications

Mission Impact: **GROUNDING** medication for personnel on flight status

OXYMETAZOLINE (AFRIN)

Class: ENT agent – vasoconstrictor (decongestant), sympathomimetic

Action: Sympathomimetic agent that acts directly on alpha receptors of sympathetic nervous system. No effect on β-receptors.

Dose: Spray into each nostril 2 times, twice daily. Not to exceed 3 consecutive days due to rebound congestion. Do not tilt head backward while spraying.

Indications: Epistaxis, Use as an adjunct to Valsalva maneuver to clear ears and sinuses during compression and decompression, nasal congestion.

Contraindications: Severe damage to tympanic membrane/sinuses from barotrauma, lactation, pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Sneezing, burning and stinging of nasal mucosa, rhinitis, rebound congestion

PLASMA-LYTE A

Class: Plasma volume expander – crystalloid; isotonic salt solution

Action: Sterile, nonpyrogenic isotonic solution. Each 100mL contains 526mg of sodium chloride, USP (NaCl); 502mg of sodium gluconate ($C_6H_{11}NaO_7$); 368mg of sodium acetate trihydrate, USP ($C_2H_3NaO_{23}H_2O$); 37mg of potassium chloride, USP (KCl); and 30mg of magnesium chloride, USP ($MgCl_{26}H_2O$).

Dose: 500–1,000mL IV

Indications: A source of water and electrolytes or as an alkalinizing agent. Plasma-Lyte A is compatible with blood or blood components

Contraindications: Known hypersensitivity of the product.

Adverse/Side-effects: Peripheral/pulmonary edema, anaphylactic reaction, and the following manifestations: tachycardia, palpitations, chest pain, chest discomfort, dyspnea, respiratory rate increased, flushing, hyperemia, asthenia, feeling abnormal, piloerection, edema peripheral, pyrexia; infusion site reactions

Interactions: Caution is advised when administering to patients treated with drugs that may increase the risk of sodium and fluid retention, such as corticosteroids or patients with congestive heart failure

POLYETHYLENE GLYCOL (MIRALAX)

Class: Osmotic laxative

Action: Increases water in the stool resulting in softer stool and increased frequency of bowel movements

Dose: 17g (1 heaping tablespoon) dissolved in 8oz of beverage once daily as needed

Indications: Occasional constipation

Contraindications: Hypersensitivity, bowel obstruction, renal disease, pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Diarrhea, abdominal bloating, abdominal pain, nausea, cramping

Mission Impact: None

PREDNISONE

Class: Systemic corticosteroid

Action: Synthetic glucocorticoid; controls/prevents inflammation by governing the rate of protein synthesis, suppressing migration of leukocytes, reversing capillary permeability and stabilizing lysosomes

Dose: Asthma attack or post anaphylaxis: 60mg PO per day × 4–5 days. Tapered dosing (systemic poison ivy, other anaphylactoid reactions) – 60mg PO per day (days 1–5), 40mg PO per day (days 6–10), 20mg PO per day (days 11–15)

Indications: Asthma, anaphylaxis or other systemic swelling/edema

Contraindications: Hypersensitivity, systemic fungal infections, peptic ulcers, hypertension, osteoporosis, pregnancy category consider alternative during pregnancy and may use while breastfeeding

Side-effects: Bradycardia, CHF, edema, euphoria, headache, nausea, vomiting, peptic ulcer, muscle weakness, delayed wound healing, hypertension

Interactions: Barbiturates, diuretics; may inhibit antibody response to live vaccines or toxoids; may inhibit efficacy of hormonal birth control

Mission Impact: None

PRIMAQUINE

Class: Antimicrobial – antimalarial

Action: Antiprotozoal agent that disrupts mitochondria and binds to DNA. Acts on primary exoerythrocytic forms of *Plasmodium vivax* and *Plasmodium falciparum*. Destroys late forms of *P. vivax* preventing relapse

Dose: 30mg PO once daily × 14 days immediately following departure form malaria-endemic areas. Screen for G6PD deficiency prior to providing as it can cause fatal hemolysis in severally G6PD deficient patients

Indications: Interruption of transmission of malaria, prevents relapse of *P. vivax* and *P. ovale* following travel to endemic areas

Contraindications: G6PD deficiency, rheumatoid arthritis, lupus, hemolytic drugs, bone marrow depression, NADH methemoglobin reductase deficiency, pregnancy category avoid use during pregnancy and while breastfeeding infant with G6PD deficiency but otherwise may use while breastfeeding (obtain negative pregnancy test before starting medication)

Side-effects: Hematologic reactions to include acute hemolytic anemia if G6PD deficient; early hemolytic reaction symptoms include darkening of the urine, decrease in urine volume, chills, fever, precordial pain, cyanosis; leukocytosis, leukopenia, anemia, granulocytopenia, confusion, mental depression, visual accommodation disturbances, hypertension, arrhythmias.

Interactions: Increased toxicity of both quinacrine and primaquine

Mission Impact: None

PROMETHAZINE (PHENERGAN) 

Class: GI agent – phenothiazine; antiemetic, antivertigo

Action: Long-acting phenothiazine derivative with prominent sedative, amnesic, antiemetic, and anti–motion-sickness actions and marked antihistamine activity; antiemetic action due to depression of CTZ in medulla; as with other antihistamines, it exerts antiserotonin, anticholinergic, and local anesthetic action

Dose: 12.5–25mg PO/IM/IV (IM must be deep injection into glut muscle, see adverse effects below) q4–6hr prn

Onset/Peak/Duration:
IV – Onset in 3–5 minutes/Duration 4–6 hours
IM – Onset in 20 minutes/Duration 4–6 hours
PO – Onset in 15–60 minutes/Duration 4–6 hours

Indications: For symptomatic relief from nausea, vomiting, motion sickness, or headache.

Contraindications: Phenothiazine hypersensitivity; narrow-angle glaucoma; stenosing peptic ulcer, BPH; bladder neck obstruction; epilepsy; bone marrow depression; comatose or severe depressed states; Reye's syndrome, encephalopathy, hepatic diseases; pregnancy category caution advised during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Deep sleep, coma, convulsions, cardiorespiratory symptoms, extrapyramidal reactions, nightmares, CNS stimulation, abnormal movements; irregular respirations, respiratory depression; sedation drowsiness, confusion, dizziness, disturbed coordination, restlessness, tremors; transient mild hypo- or hypertension; anorexia, nausea, vomiting, constipation; leukopenia, agranulocytosis; blurred vision, dry mouth, nose, or throat; photosensitivity; urinary retention. If administering IV dilute and administer slowly, discontinue if severe burning occurs, can cause tissue and digit necrosis.

Interactions: Alcohol and other CNS depressants add to CNS depression and anticholinergic effects

Mission Impact: **GROUNDING** medication for personnel on flight status

PSEUDOEPHEDRINE (SUDAFED)

Class: Autonomic nervous system agent–sympathomimetic; alpha/beta-adrenergic agonist, decongestant

Action: Sympathomimetic amine that produces decongestion of respiratory tract mucosa by stimulating the sympathetic nerve endings including alpha-, beta-1 and beta-2 receptors causing vasoconstriction; Stimulates beta-androgenic receptors causing bronchial relaxation and increasing heart rate and contractility

Dose: 30–60mg PO q4–6hr **OR** 120mg XR PO q12hr

Onset/Peak/Duration: Onset in 30 minutes/Peak in 1–2 hours/Duration of 3–8 hours

Indications: Symptomatic relief of nasal and eustachian tube congestion, rhinitis, and sinusitis; promotes nasal sinus drainage and relief on sinus congestion

Contraindications: Sympathomimetic amine hypersensitivity; severe hypertension; coronary artery disease; MAOIs; glaucoma; hyperthyroidism; BPH; pregnancy category avoid use during 1st trimester and caution advised during 2nd and 3rd trimesters in pregnancy. May occasionally use and while breastfeeding.

Adverse/Side-effects: Stimulation, tremulousness, difficulty voiding; arrhythmias, palpitation, tachycardia; nervousness, chest tightness, dizziness, headache, sleeplessness, numbness; anorexia, dry mouth, nausea, vomiting, diaphoresis, restlessness; heart palpitations when given with pre-workout

Interactions: Sympathomimetics and β-blockers increase pressor effects and toxicity; MAOIs may precipitate hypertensive crisis; decreases antihypertensive effects of guanethidine, methyldopa, reserpine; avoid use with pre-workout

Note: Do not allow open access to this medication

RABEPRAZOLE (ACIPHEX)

Class: GI agent – proton pump inhibitor (PPI)

Action: Gastric PPI that specifically suppresses gastric acid secretion by inhibiting the H^+, K^+-ATPase enzyme system (the acid [proton H^+] pump) in the parietal cells of the stomach; does not exhibit H_2-histamine receptor antagonist properties

Dose: 20mg PO qd

Indications: For healing and maintenance of erosive or ulcerative gastroesophageal reflux disease (GERD), duodenal ulcers, and hypersecretory conditions

Contraindications: PPI hypersensitivity; pregnancy category caution advised during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Headache; Stevens-Johnson syndrome, toxic epidermal necrolysis, erythema multiforme

Interactions: May decrease absorption of ketoconazole; may increase digoxin levels

RIZATRIPTAN (MAXALT)

Class: CNS agent – sumatriptan; autonomic nervous system agent; adrenergic antagonist; serotonin 5-HT($_{1B/1D}$) receptor agonist

Action: Selective (5-HT$_{1B/1D}$) receptor agonist reverses the vasodilation of cranial blood vessels associated with migraine headache

Dose: 5–10mg PO (may repeat 1 dose in 2 hours prn); max dose of 30mg/24hr

Indications: Acute migraine headache with or without aura

Contraindications: Hypersensitivity; coronary artery disease or CAD risk factors of hypertension, hypercholesterolemia, obesity, diabetes, smoking or strong family history; concurrent administration of ergotamine drugs, sumatriptan, or MAOIs; basilar or hemiplegic migraine, pregnancy category consider alternative during pregnancy and while breastfeeding

Adverse/Side-effects: Asthenia; fatigue; pain; pressure sensation; paresthesia; throat pressure; warm/cold sensations; dizziness; headache; decreased mental acuity; euphoria; tremor; coronary artery vasospasm; transient myocardial ischemia; myocardial infarction; ventricular tachycardia; ventricular fibrillation; chest pain/tightness; palpitations; dry mouth; nausea; vomiting; diarrhea; dyspnea; flushing; hot flashes

Interactions: Propranolol; dihydroergotamine; methysergide; other 5-HT$_1$ agonists; Gingko; Ginseng; echinacea; St. John's wort

Mission Impact: **GROUNDING** medication for personnel on flight status

SCOPOLAMINE (TRANSDERM SCOP)

Class: Autonomic nervous system agent – parasympatholytic; anticholinergic, antimuscarinic, antispasmodic

Action: Alkaloid of belladonna with peripheral action resembling those of atropine, but in contrast, produces CNS depression with marked sedative and tranquilizing effects for use in anesthesia; potent mydriatic and cycloplegic action inhibiting secretions of salivary, bronchial, and sweat glands with less prominent effect on heart, intestines, and bronchial muscles

Dose: For motion sickness, 0.25–0.6mg PO 1 hour before travel **OR** topical transdermal disc patch applied to dry surface behind ear q72hr starting 12 hours before travel

Indications: Prophylactic agent for motion sickness; used as mydriatic and cycloplegic in ophthalmology; preanesthetic agent to control bronchial, nasal, pharyngeal and salivary secretions; control of spasticity and drooling in paralytic and spastic states

Contraindications: Anticholinergic, belladonna, or barbiturate hypersensitivity; asthma; hepatitis; narrow angle glaucoma; GI or GU obstructive diseases; myasthenia gravis; pregnancy category caution advised during pregnancy and while breastfeeding

Adverse/Side-effects: Fatigue, dizziness, drowsiness, disorientation, restlessness, hallucinations, toxic psychosis; dry mouth and throat, constipation; urinary retention; decreased heart rate; dilated pupils, photophobia, blurred vision, follicular conjunctivitis; depressed respiration; local irritation, rash

Interactions: Amantadine, antihistamines, TCAs, quinidine, disopyramide, procainamide add to anticholinergic effects; decreases levodopa effects; methotrimeprazine may precipitate extrapyramidal effects; decreases absorption and antipsychotic effects of phenothiazines

SODIUM CHLORIDE, 0.9% (NORMAL SALINE)

Class: Plasma volume expander – crystalloid; isotonic salt solution

Action: Each 1mL contains 9g sodium chloride (Na^+ 154mEq/L; Cl^- 154mEq/L); pH 5.7; expands circulating volume by approximating sodium content of the blood; but it remains in the intravascular space for only a very limited time as it diffuses rapidly throughout the extracellular space

Dose: 500–1,000mL IV; 5–50mL IV for medication dilution or as flush

Indications: For fluid replacement and plasma volume expansion when blood or plasma is not available, and for adjunctive treatment of shock and hypovolemic states caused by hemorrhage, burns, surgery, sepsis, trauma, dehydration, or heat injury; also used for dilution of medications, as IV flush agent, for saline locks, and irrigation of eyes and wounds

Contraindications: Congestive heart failure (CHF)

Adverse/Side-effects: Fluid overload, CHF, edema, electrolyte imbalance, hyperchloremic metabolic acidosis, hypertension

Interactions: No clinically significant interactions established

SODIUM CHLORIDE, 3% OR 23.4% (HYPERTONIC SALINE)*

Class: Plasma volume expander – crystalloid; ***hypertonic*** salt solution.

Action: Each 100mL of **3% sodium chloride injection USP** contains: sodium chloride USP 3g; each 10mL of **23.4% sodium chloride injection USP** contains: sodium chloride USP 2.34g

Dose: 250mL IV bolus of 3% or 30mL bullet of 23.4%

Indications: For AMS IAW Hyperthermia Management Protocol and concern for emergent hyponatemia; for TBI IAW Head Injury Management Protocol

Contraindications: CHF; do not use with blood or blood products, presence of normal or elevated plasma electrolyte concentrations

Adverse/Side-effects: Fluid overload, CHF, edema, electrolyte imbalance, hypertension

Interactions: None

SUFENTANIL (DSUVIA) 

Class: CNS agent – potent narcotic (opiate) agonist

Action: Action similar to morphine with more rapid and less prolonged analgesia and sedation, but less emetic effect

Dose: 30mcg sublingual ODT q1hr prn pain

Onset/Peak/Duration: Onset 15 minutes; Peak 30–40 minutes; Duration 3 hours

Indications: For moderate to severe pain management

Contraindications: Significant respiratory depression; known hypersensitivity to sufentanil; pregnancy category may use during pregnancy and consider alternative while breastfeeding

Adverse/Side-effects: Nausea, headache, vomiting, dizziness, hypotension, severe respiratory depression

Interactions: Macrolides, azole-antifungals, rifampin, phenytoin, alcohol, benzodiazepines, opioids, MAOIs, SSRIs, TCAs

Mission Impact: **GROUNDING** medication for personnel on flight status

SUMATRIPTAN (IMATREX)

Class: Antimigraine

Action: Insert action

Dose: Tabs 25–100mg PO single dose q2hr. Max 300mg/d. SC injection initial 6mg repeated in 1–2 hours if needed. Max 6mg q24hr. If migraine symptoms return, 50mg PO q2hr, up to 200mg

Indications: Relief of acute migraine headaches

Contraindications: Basilar migraine, cardiovascular disease, concurrent use of ergotamine-containing drugs, hypersensitivity, ischemic heart disease, use within 14 days of MAOIs, within 24 hours of serotonin receptor agonist, pregnancy category caution advised during pregnancy and may use while breastfeeding

Adverse/Side-effects: Anxiety, dizziness, drowsiness, fatigue, fever, malaise, sedation, seizures, vertigo, arrhythmias, coronary artery vasospasm, chest tightness, hypertension, palpitations, abnormal vision, nasal irritation, photophobia, tongue numbness, abdominal discomfort, dysphagia, muscle cramps, myalgia, dermatitis, diaphoresis, flushing, pallor, or pruritus

Interactions: Antidepressants, sertraline, and MAOIs

Mission Impact: **GROUNDING** medication for personnel on flight status

TERBINAFINE (LAMISIL)

Class: Antimicrobial – antibiotic; antifungals

Action: Inhibits sterol biosynthesis in fungi; ergosterol, the principal sterol in the fungal cell membrane, becomes depleted and interferes with cell membrane function, thus producing antifungicidal effect

Dose: For tinea pedis, tinea cruris, and tinea corporis, topically AAA qd–bid × 1–7 weeks; for onychomycosis, 250mg PO qd × 6 weeks for fingernails and 12 weeks for toenails (monitor baseline LFTs, repeat at least monthly)

Indications: For topical treatment of superficial mycoses such as interdigital tinea pedis, tinea cruris, and tinea corporis due to *Epidermophyton floccosum, Trichophyton mentagrophytes,* or *T. rubrum;* for oral treatment of onychomycosis due to tinea unguium

Contraindications: Terbinafine hypersensitivity; pregnancy category B; elevated LFT or known liver disease, hepatitis or mononucleosis, pregnancy category may use during pregnancy and caution advised while breastfeeding.

Adverse/Side-effects: Pruritus, local burning, dryness, rash, vesiculation, redness, contact dermatitis at application site; headache; diarrhea, dyspepsia, abdominal pain, neutropenia; taste disturbances

Interactions: May increase theophylline levels; may decrease cyclosporine and rifampin levels

TETRACAINE OPHTH

Class: Local anesthetic

Dose: 1–2gtt 2–3 minutes before procedure. **DO NOT DISPENSE TO PATIENT**

Indications: As a topical optic anesthetic (may aid in ocular exam to relieve blepharospasm); removal of foreign bodies

Contraindications: Not for prolonged use, pregnancy category may use during pregnancy and while breastfeeding

Adverse/Side-effects: Stinging, conjunctival redness, tearing swelling, sensitivity to light, transient eye pain, hypersensitivity reactions

Mission Impact: **GROUNDING** medication for personnel on flight status

TRANEXAMIC ACID (TXA)*

Class: Antifibrinolytic agent; synthetic lysine amino acid derivative

Action: Displaces plasminogen from surface of fibrin by binding to high-affinity lysine site of plasminogen, which diminishes dissolution of hemostatic fibrin, which decreases bleeding

Dose: Administer 2g of TXA IV/IO as soon as possible but not later than 3 hours after injury

Indications: For patients anticipated to need significant blood transfusion presenting with hemorrhagic shock, one or more major amputations, penetrating torso trauma or evidence of severe bleeding

Contraindications: Active intravascular clotting, pregnancy category consider alternative during pregnancy and while breastfeeding

Adverse/Side-effects: Blurred vision or impaired color vision; gastrointestinal disturbances (nausea, vomiting, diarrhea) may occur but disappear when the dosage is reduced; transient hypotension has been observed when intravenous injection is too rapid

Interactions: Should not be administered concomitantly with factor IX complex concentrates or anti-inhibitor coagulant concentrates, as the risk of thrombosis may be increased

Mission Impact: Store at 25°C (77°F); excursions permitted to 15°–30°C (59°–86°F)

TRIMETHOPRIM-SULFAMETHOXAZOLE (TMP-SMZ, BACTRIM, SEPTRA)

Class: Antimicrobial – antibacterial, sulfonamide

Action: Fixed combination of TMP=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*

Dose: 1 tablet (DS) PO bid × 10 days for cellulitis, 3–5 days for UTI

Indications: For cellulitis, pneumonitis, enteritis, severe complicated UTIs, acute otitis media, acute episodes of chronic bronchitis, prevention of traveler's diarrhea, cholera

Contraindications: TMP, SMZ, sulfonamide, or bisulfite hypersensitivity; group A β-hemolytic streptococcal pharyngitis; megaloblastic anemia due to folate deficiency; use caution with severe allergy or bronchial asthma, G6PD deficiency, and sulfonamide derivative drug (acetazolamide, thiazides, tolbutamide) hypersensitivity; pregnancy category consider alternative during pregnancy and avoid use while breastfeeding

Adverse/Side-effects: Rash, toxic epidermal necrolysis; nausea, vomiting, diarrhea, anorexia, hepatitis, pseudomembranous enterocolitis, stomatitis, glossitis, abdominal pain; kidney failure, oliguria, anuria, crystalluria; agranulocytosis, aplastic anemia, megaloblastic anemia, hypoprothrombinemia, thrombocytopenia; weakness, arthralgia, myalgia, photosensitivity, allergic myocarditis.

Interactions: CNS depressants, alcohol, and phenothiazines augment CNS depression; food significantly decreases extent and rate of absorption, do NOT give with or immediately after a meal

Mission Impact: None

ZOLPIDEM (AMBIEN) – CONTROLLED SUBSTANCE IV

Class: CNS agent – nonbenzodiazepine; anxiolytic, sedative-hypnotic

Action: Nonbenzodiazepine hypnotic that does not have muscle relaxant or anticonvulsant effects; preserves deep sleep (stages 3 and 4) at hypnotic doses

Dose: 5–10mg PO qhs, limited to 7–10 days

Indications: For short-term treatment of insomnia

Contraindications: Pregnancy category consider alternative during pregnancy and caution advised while breastfeeding

Adverse/Side-effects: Headache on awakening, drowsiness or fatigue, lethargy, drugged feeling, depression, anxiety, irritability, dizziness, double vision; doses > 10mg may be associated with anterograde amnesia or memory impairment; dyspepsia, nausea, vomiting; myalgia

Interactions: CNS depressants, alcohol, and phenothiazines augment CNS depression; food significantly decreases extent and rate of absorption, **DO NOT** give with or immediately after a meal

Mission Impact: Drowsiness

NEW DRUGS

Class:

Action:

Dose:

Indications:

Contraindications:

Adverse/Side-effects:

Interactions:

Mission Impact:

K9 Dosage:

Class:

Action:

Dose:

Indications:

Contraindications:

Adverse/Side-effects:

Interactions:

Mission Impact:

K9 Dosage:

NEW DRUGS

Class:

Action:

Dose:

Indications:

Contraindications:

Adverse/Side-effects:

Interactions:

Mission Impact:

K9 Dosage:

Class:

Action:

Dose:

Indications:

Contraindications:

Adverse/Side-effects:

Interactions:

Mission Impact:

K9 Dosage:

Class:

Action:

Dose:

Indications:

Contraindications:

Adverse/Side-effects:

Interactions:

Mission Impact:

K9 Dosage:

DRUG QUICK REFERENCE

ACETAMINOPHEN (Tylenol): 325–1,000mg PO q4–6hr prn (max: 3g/d)
ALBUTEROL MDI: 2 puffs q4–6hr prn
CALCIUM CHLORIDE: 1g IV/IO q4 units of blood transfused
CALCIUM GLUCONATE: 1–3g IV/IO q4 units of blood transfused
DEXAMETHASONE (Decadron): 4mg PO q6–12hr; 10mg IV/IM single dose
DIPHENHYDRAMINE (Benadryl): 25–50mg IV/IM/PO q4–6hr
EPINEPHRINE (1:1,000): 0.3–0.5mg IM q10–15min
ERTAPENEM (Invanz): 1g IV/IM q24hr
FENTANYL ORAL LOZ: 800–1,600mcg (max: 1,600mcg/d)
FENTANYL: 50–100mcg IV/IM q1–2hr prn
HYDROMORPHONE (Dilaudid): 1mg PO/SC/IM/IV q2–4hr prn
IBUPROFEN: 600mg PO tid
KETAMINE: pain: 0.1–0.3mg/kg IV; sedation: 1–1.5mg/kg slow IV push until nystagmus, bump 20–25mg q10–20min
KETOROLAC (Toradol): 15mg IV or 30mg IM q6hr
LIDOCAINE: Infiltration 0.5%–2% injection
LOPERAMIDE: 4mg PO then 2mg after each unformed stool (max 16mg/day)
MELOXICAM (Mobic): 7.5–15mg PO qd
MIDAZOLAM (Versed): 2mg slow IV push q2–3min to max dose of 10mg **OR** 5–10mg IM for seizure control
MOXIFLOXACIN: 400mg PO/IV QD 5–10d
NALOXONE (Narcan): 0.4–2.0mg IV; repeat q2–3min to max of 10mg prn
NAPROXEN: 250–500mg PO bid
NORMAL SALINE (HYPERTONIC): 30mL 23.4% bullet for impending herniation or 250mL bolus of 3% for emergent hyponatremia
ONDANSETRON (Zofran): 4–8mg slow IV push or IM q4hr prn **OR** 4–8mg PO q4hr prn
PROMETHAZINE (Phenergan): 12.5–25mg PO/IM/IV q4–6hr prn
TRANEXAMIC ACID (TXA): 2g IV/IO ASAP

Ketamine Drip

Ketamine drip (for sedation): Sedation loading dose first (1.5mg/kg IV/IO over 60 seconds).
MIX: 250mg (1/2 vial of 500mg/5mL) in 250mL of normal saline (1mg/mL solution).
Initial drip dose:
Best: Using an IV pump, set to µg/kg/min dose desired. Increase or decrease dose by 5–1µg/kg/min increments.
Better: Using a dial flow adaptor, initial drip rate in mL/h equals the casualty's weight in kg divided by 2 (sedations) or 4 (pain).
Minimum: Count drip rate. Increase or decrease rate by 1–2 drips/min (very slowly) to achieve goal.

250mg Ketamine / 250mL Saline Bag

Ketamine Drip Dosing Tables

Ketamine Drip Rate for Dial Flow (starting dose highlighted)

Dose mg/kg/hr	Patient's Weight, kg		
	60	80	100
	Infusion Rate, Dial Flow Setting		
0.5	30	40	50
0.75	45	60	75
1	60	80	100
1.25	75	100	125
1.5	90	120	150
1.75	105	140	175
2	120	160	200
Ketamine Drip Rate for × drip set			
1.5	60	80	100
Drip Set Size	**Infusion Rate, 1 drip/X seconds**		
10	1 drop per 4 seconds	1 drop per 3 seconds	1 drop per 2.4 seconds
15	1 drop per 2.67 seconds	1 drop per 2 seconds	1 drop per 1.6 seconds
20	1 drop per 2 seconds	1 drop per 1.5 seconds	1 drop per 1.2 seconds

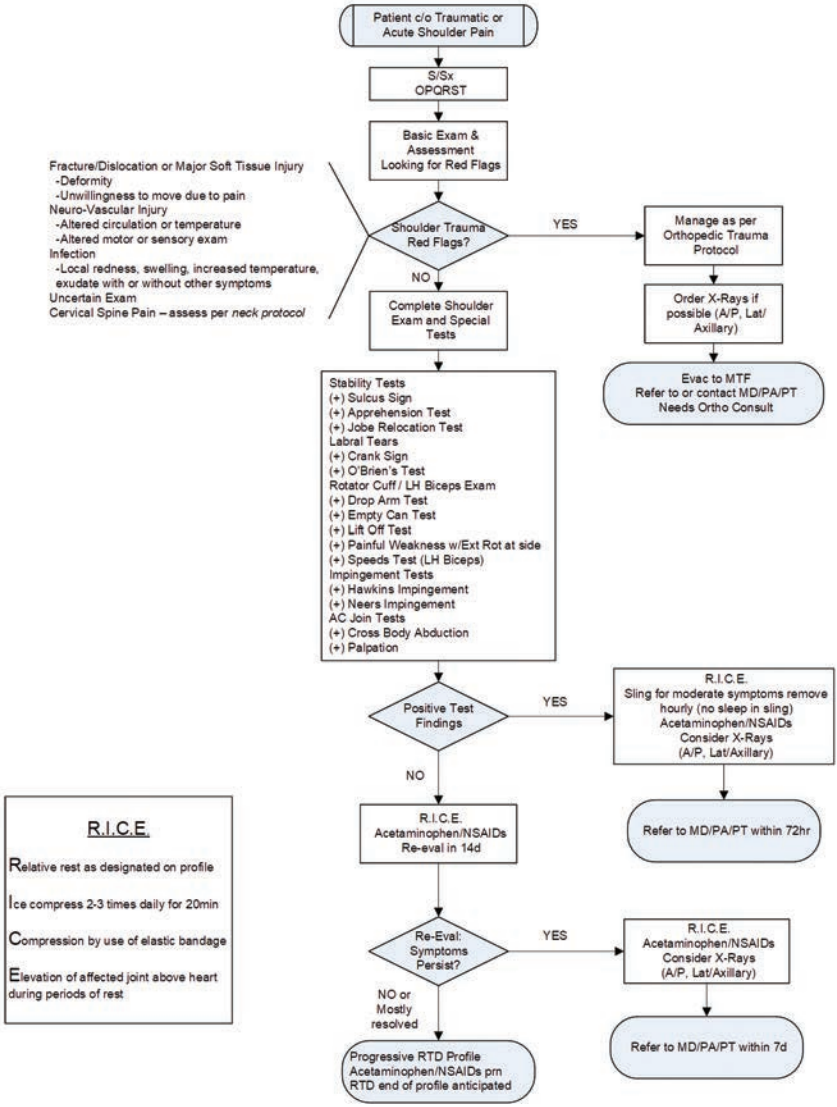
Note: Ranger medics will use their best judgement in determining drip estimation in varying drop set sizes.

PHARMACOLOGY NOTES

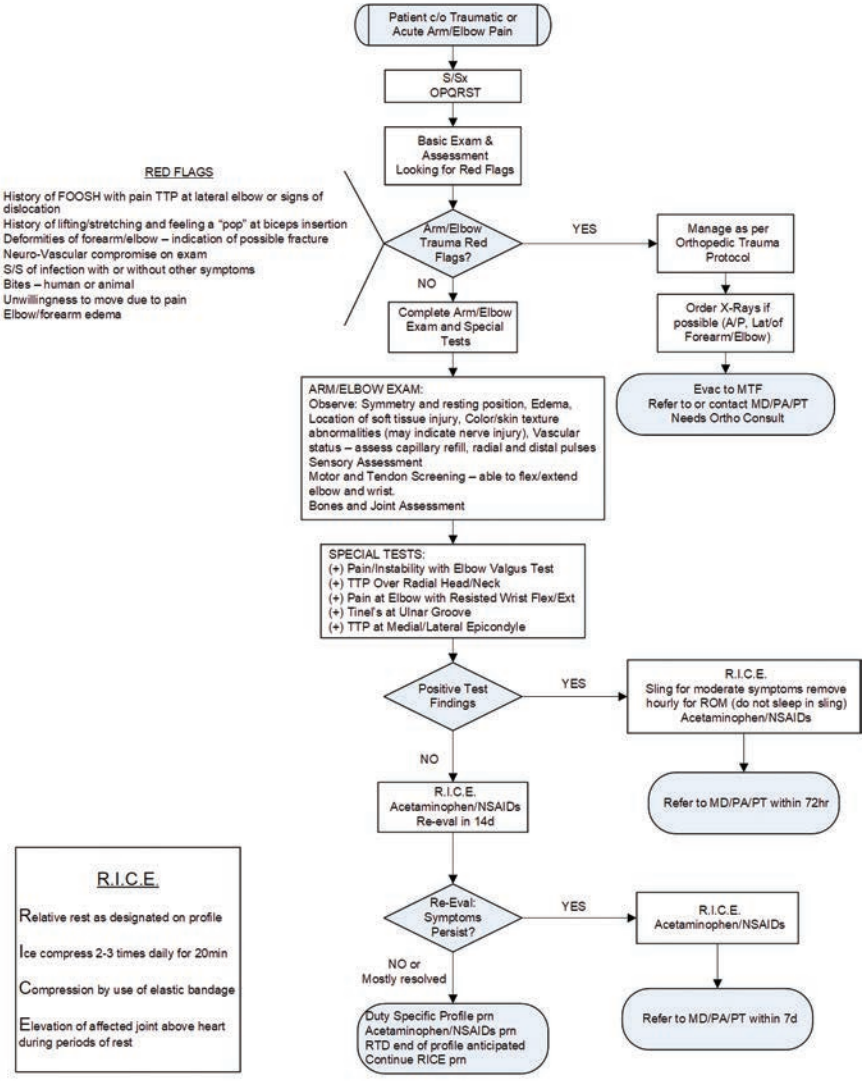
SECTION 5

SPORTS MEDIC SCOPE OF PRACTICE

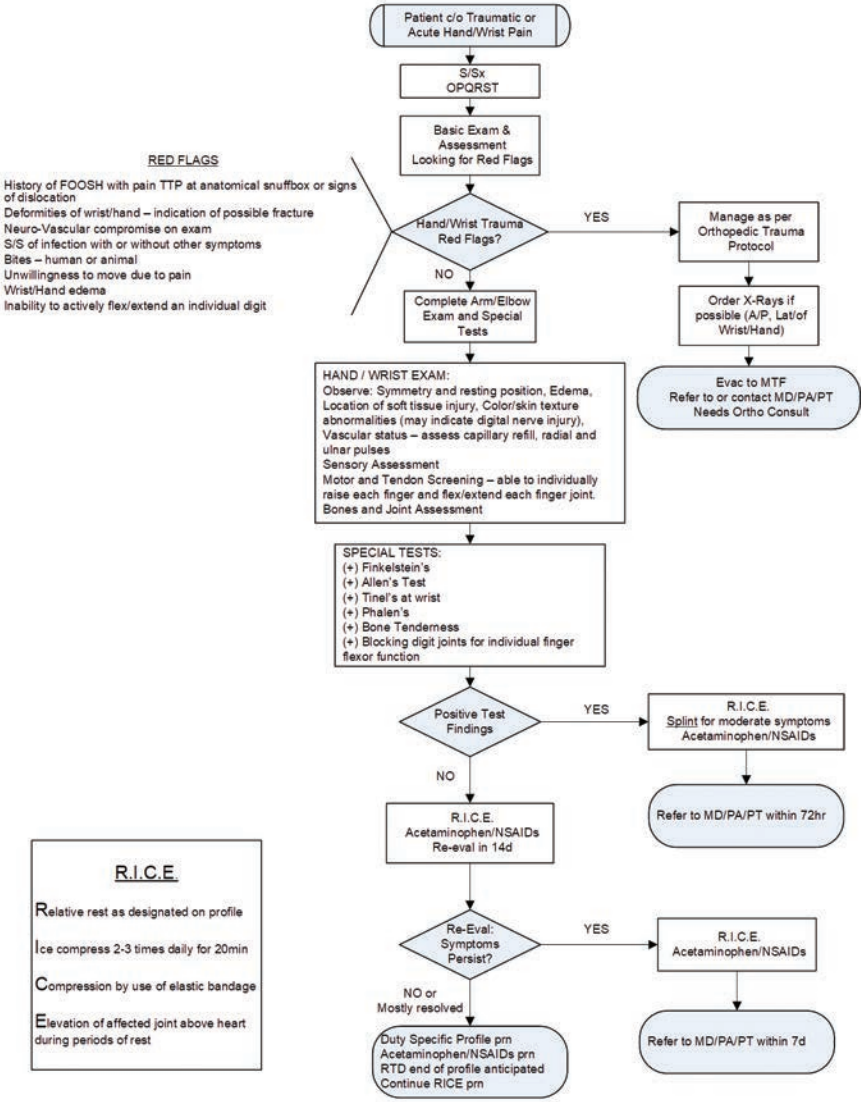
Shoulder – Traumatic & Acute Pain



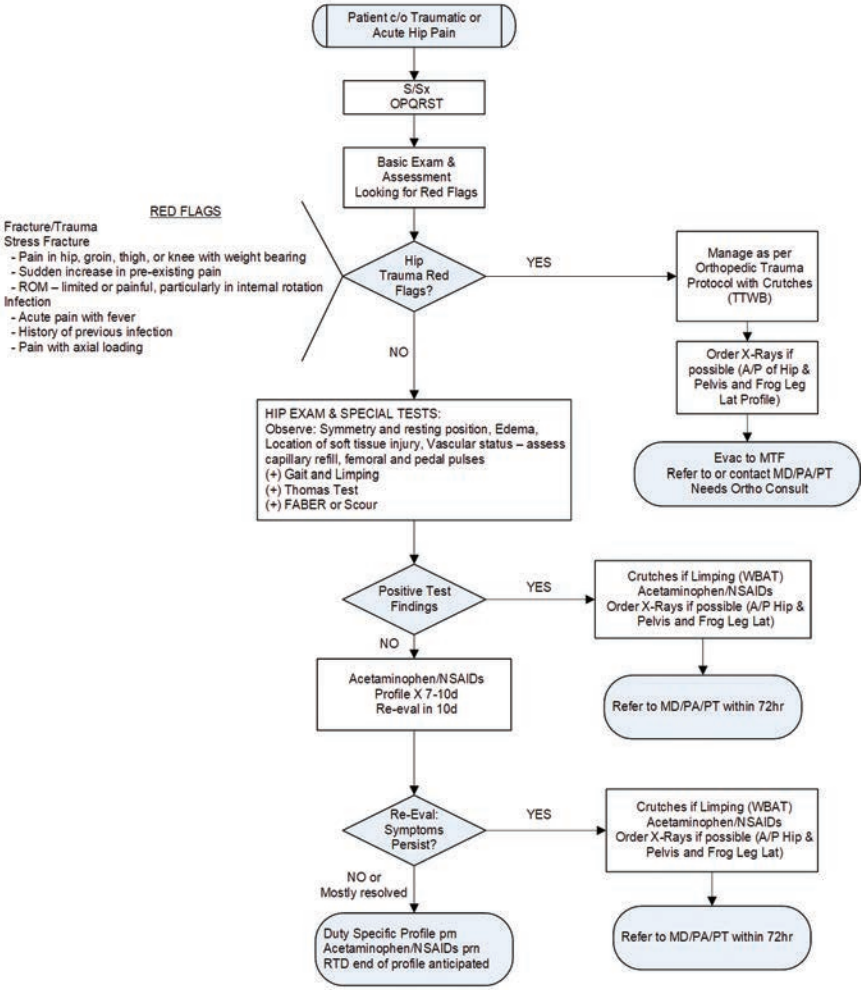
Arm/Elbow – Traumatic & Acute Pain



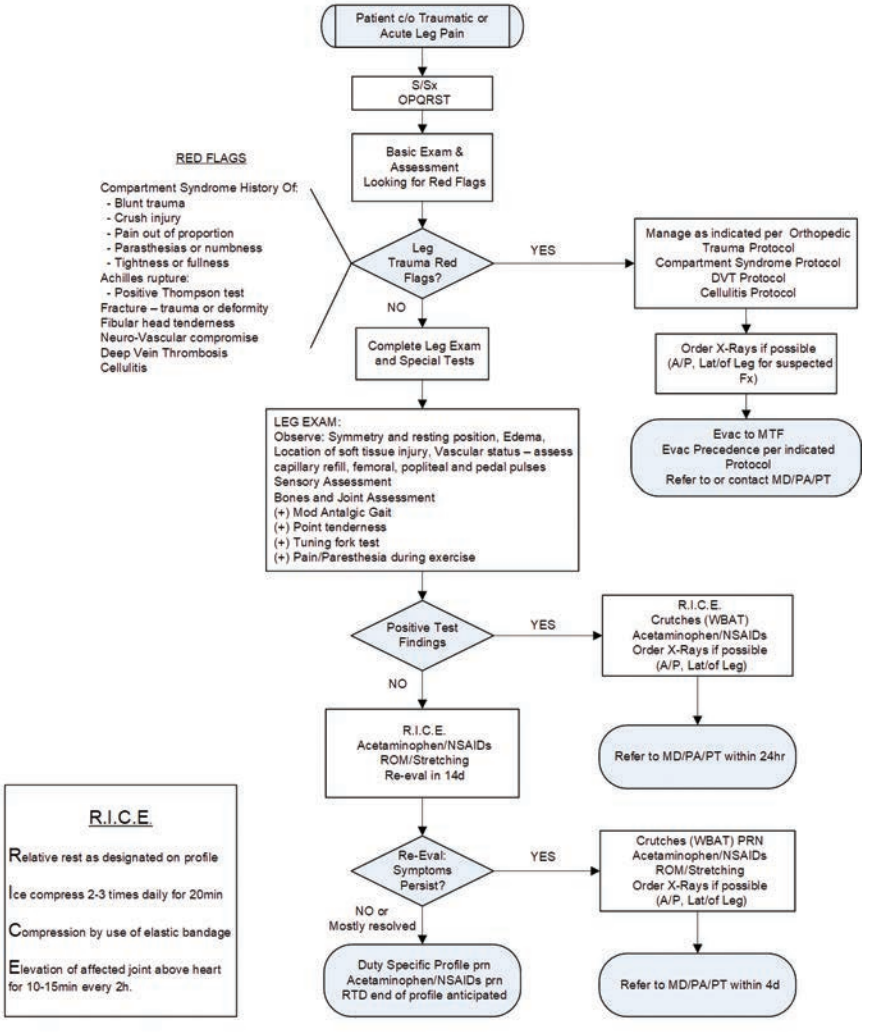
Hand/Wrist – Traumatic & Acute Pain



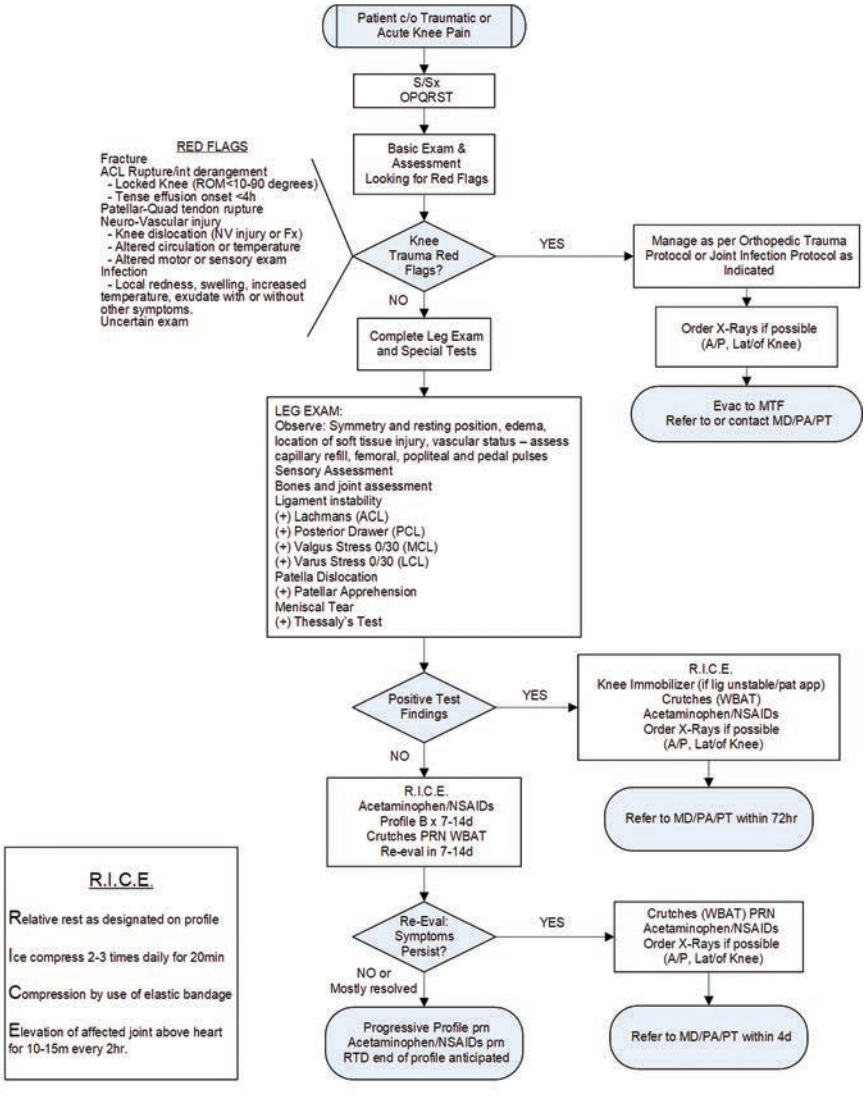
Hip – Traumatic & Acute Pain



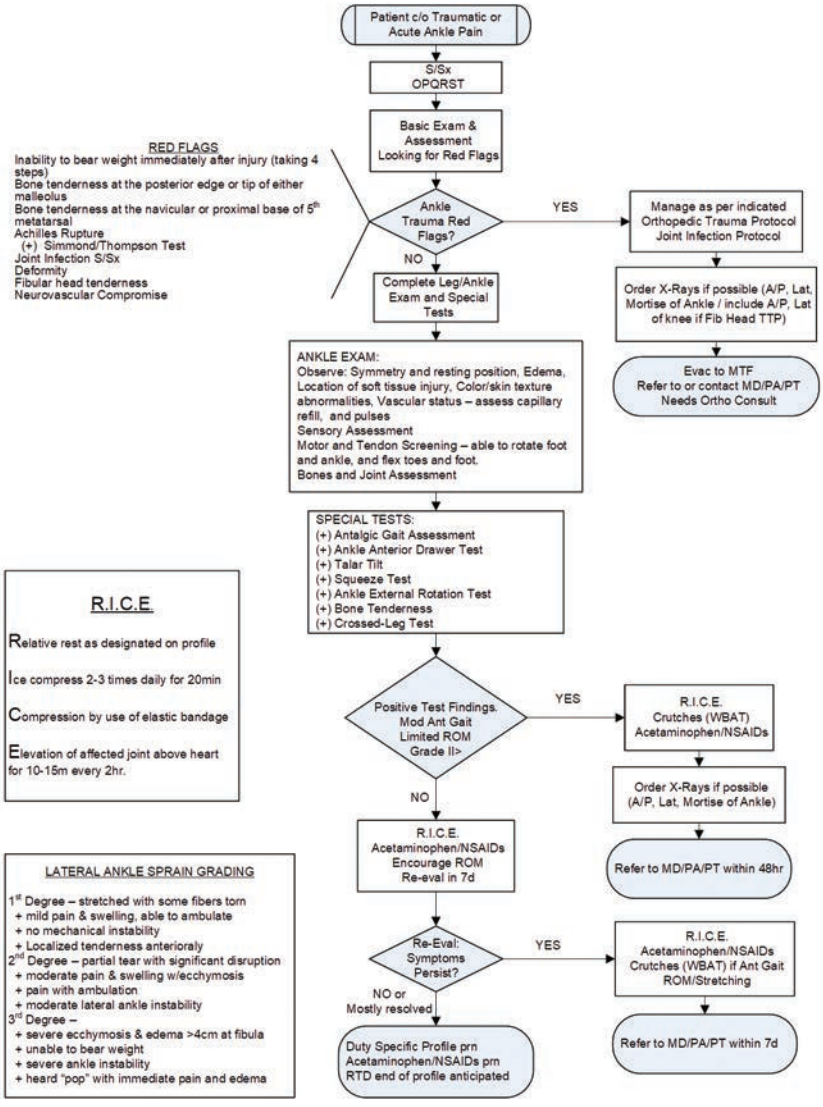
Leg – Traumatic & Acute Pain



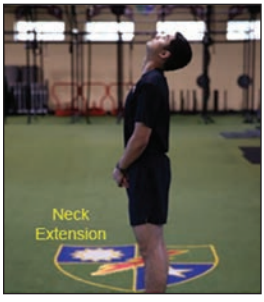
Knee – Traumatic & Acute Pain



Ankle – Traumatic & Acute Pain



Clearing the Spine and Joint for Mechanical Issues at the Joint Pain

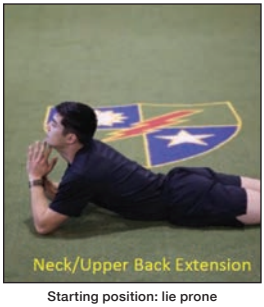


Starting position: ears over shoulders

1st perform joint movement that hurts as a "test"

Movement: Looking upward as far as you can go

- After reaching end range, bring your neck back to the starting position.
- Repeat 10 times.
- If pain is produced in your neck or joint, and does not decrease with more reps, stop.
- After completing 10 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, continue this neck extension and recheck the joint movement until it abolishes or stops improving.
- If this movement does not change your joint pain, move to the specific exercise for your joint pain.

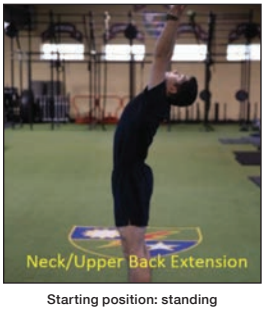


Starting position: lie prone

1st perform joint movement that hurts as a "test"

Movement: Prone on elbows and placing your chin on the tips of your fingers

- This is not a repeated movement, but a static hold for 30sec–1min.
- After holding, lie prone and rest for 30 seconds.
- If pain is produced your neck or upper back and it does not decrease in this position with time, stop.
- After lying prone in this position for 30 seconds, recheck the movement that causes your joint to hurt.
- If the movement is less painful, repeat this static position for 60 seconds and recheck the joint movement until it abolished or stops changing.



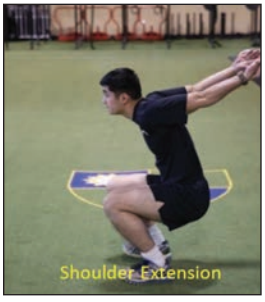
Starting position: standing

1st perform joint movement that hurts as a "test"

Movement: Holding your thumbs up, raise your arms over your head while looking upward

- After reaching end range, return to starting position.
- Repeat 10 times.
- If pain is produced in your neck or joint, and does not decrease with more reps, stop.
- After completing 10 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, continue this neck extension and recheck the joint movement until it abolishes or stops improving.
- If this movement does not change your joint pain, move to the specific exercise for your joint pain.

Clearing the Spine and Joint for Mechanical Issues at the Joint Pain (cont.)

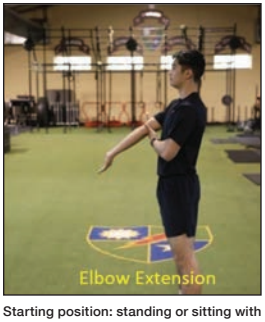


Starting position: Standing with arms at side and palms facing backwards

1st perform joint movement that hurts as a "test"

Movement: Squat as far as you can until you reach your end range

- After reaching end range, return to the standing position.
- Repeat 5–7 times.
- After completing 5–7 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, repeat 5–7 more times and recheck joint movement until pain is abolished or stops changing.

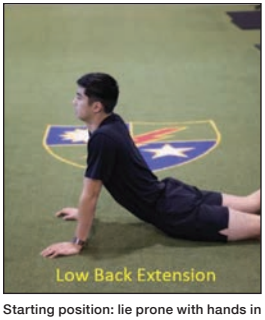


Starting position: standing or sitting with opposite hand supporting your elbow

1st perform joint movement that hurts as a "test"

Movement: Extend the elbow as straight as you can

- Grasping a shelf and using your supporting hand to push up on your elbow can assist in achieving end range motion.
- After reaching end range, return to the starting position.
- Repeat 5–7 times.
- After completing 5–7 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, repeat 5–7 more times and recheck joint movement until pain is abolished or stops changing.



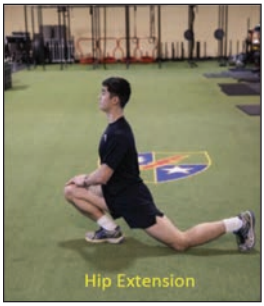
Starting position: lie prone with hands in the Push Up position

1st perform joint movement that hurts as a "test"

Movement: Perform a Push Up motion leaving your hips close to the ground

- After achieving full elbow extension, return to the starting position.
- Repeat 10 times.
- If pain is produced in your lower back or joint, and does not decrease with more reps, stop.
- After completing 10 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, continue this low back extension and recheck the joint movement until it abolishes or stops improving.
- If this movement does not change your joint pain, move to the specific exercise for your joint pain.

Clearing the Spine and Joint for Mechanical Issues at the Joint Pain (cont.)



Starting position: Kneeling lunge

1st perform joint movement that hurts as a "test"

Movement: Kneeling hip is pushed forward until you reach end range. Using your fist to push on the back of your hip can assist in achieving end range of motion

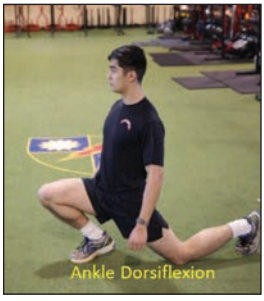
- After reaching end range, return to the starting position.
- Repeat 5–7 times.
- After completing 5–7 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, repeat 5–7 more times and recheck joint movement until pain is abolished or stops changing.

Starting position: standing with foot of knee to be extended in front and placing your hands above your knee

1st perform joint movement that hurts as a "test"

Movement: Press your thigh back, extending your knee to end range

- After reaching end range, return to the starting position.
- Repeat 5–7 times.
- After completing 5–7 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, repeat 5-7 more times and recheck joint movement until pain is abolished or stops changing.



Starting position: Kneeling lunge

1st perform joint movement that hurts as a "test"

Movement: Move knee over the front ankle to end range

- After reaching end range, return to the starting position.
- Repeat 5–7 times.
- After completing 5–7 times, recheck the movement that causes your joint to hurt.
- If the movement is less painful, repeat 5–7 more times and recheck joint movement until pain is abolished or stops changing.

NOTES

SECTION 6

MPC/CANINE TRAUMA & TACTICAL MEDICAL EMERGENCY PROTOCOLS (TMEPs)

Canine Patient Assessment

General Guidelines

Medics should perform only procedures necessary to treat life-threatening emergencies and prepare multipurpose canines (MPC) for MEDEVAC. Canine patients differ slightly in anatomy, physiology, and pharmacology from injured adult humans, but the same trauma principles apply. Knowledge of these key differences will increase success of resuscitative efforts to our MPCs. Routine care of MPCs requires guidance from veterinary personnel. Veterinary care is not always available within your AO; it is often limited to major transport hubs.

Canine Vital Signs and Normal Values

1. Temperature: Normal Rectal Temp is 99.5°F to 102.5°F
   a. May increase up to 106°F after exercise/work without deleterious effects.
   b. An acclimated and conditioned dog should recover to a normal temperature within 10–15 minutes after exercise.
2. Pulse: Normal pulse rate varies from 60 to 120 bpm in conditioned dogs and increases with exercise/excitement.
   a. The femoral artery, or grasping the chest at the heart, are the easiest locations to feel a pulse. The femoral artery is located on the inside of a dog's rear limb at the division between the sartorius muscle and gracilis/adductor muscles. In simpler terms, it is generally just behind the femur on the inside of the hind leg. Apply light pressure and you should feel the pulse with two fingertips.
   b. Alternate distal sites include:
      1. Medially above the large foot pad on the backside of the front limb.
      2. Medially two finger widths below the hock on the front/inside of the hind limb.
   c. Variations will exist between individual dogs.
   d. Count the number of beats for 15 seconds and then multiply by 4 to get beats per minute. Alternatively, you can count for 10 seconds and multiply by 6 or count for 6 seconds and multiply by 10.
   e. Pulses should be strong, succinct, and synchronous with heart beats.
3. Respiration rate: 10–30 respirations per minute. Controlled panting is normal, meaning panting should stop with any significant stimulus (Ball, Kong, treat, tug, smell of isopropyl alcohol).
4. Capillary refill time (CRT): less than 2 seconds.
5. Mucous membranes (MM): generally pink and moist. Many dogs will have pigmented membranes.
6. Skin turgor: pinch the skin between the shoulder blades and lift up, pulling out any slack. Release and the skin should immediately fall back into place if properly hydrated.
7. $EtCO_2$: normal 35–45mmHg
8. Pulse Ox: > 95% SpO_2. Place the probe on the tongue or any highly vascularized, nonpigmented area (lip, vulva, prepuce, between toes, etc.). Nonin finger probes only work on the tongue. Sedation with dexmedetomidine lowers SpO_2 reading on the tongue.
9. Indirect blood pressure (BP): > 90mmHg systolic, > 60mmHg MAP, > 40mmHg diastolic. Use pediatric-sized non-invasive blood pressure cuffs (neonate 5, pediatric 6–8). The cuff should be tight without overlapping. Use pediatric settings on BP machine. Placement options below in order of ease.
   a. Tail: place at the tail base (closest to body) with the artery indicator zone on the bottom side.
   b. Front limb: place above the carpus with indicator zone on the back side.
   c. Hind limb: place below the hock over the metatarsals with indicator zone on top of the foot and slightly off-center medially.
10. Labs: human analyzers may be used for canines.
    a. Chemistry, HCT, and ABG parameters similar to humans.
    b. Canine albumin values are falsely low using human analyzers, and not accurate for diagnostic purposes.
    c. Urine output 1–2mL/kg/hr. Urinalysis results comparable to humans.

Canine CPR

1. If MPC is unresponsive, not breathing **AND** the tactical situation permits, then begin CPR. Lay the animal on either side.
2. Hand placement can be directly over the heart (where the elbow crosses the chest above the sternum when the forearm is pulled caudally) or over the widest part of the chest.
3. 100 to 120 compressions per minute. Sustain compressions for at least 2 minutes per cycle before checking status. Compress one-third to one-half the chest width. Check status – palpate femoral pulse (Radial pulse is not easily palpable in a dog.)
4. Establish airway as rapidly as possible (Intubate or tracheostomy without interrupting compressions).
5. Ventilate at 8–10 breaths per minute; use oxygen if it is available.
6. With more help or higher level of care you can begin advanced life support procedures.

Canine Trauma & Shock Management

S/Sx OF CANINE TRAUMA & SHOCK	
S/Sx of Shock:	**Advanced:**
1. Pale, gray, blue MM 2. Prolonged CRT, > 3 seconds 3. Weak, "thready" pulses 4. Tachycardia, > 160 bpm 5. Tachypnea, > 30 bpm (differentiate from panting) 6. Decreased consciousness 7. Hypotension 8. Collapse	1. Loss of consciousness. 2. Dilated pupils. 3. Dyspnea. 4. Hypothermia, < 98°F. 5. Mechanism: Often seen with penetrating wounds of the neck, chest, abdomen, and hip

Canine TCCC Management

Canine trauma management follows the same TCCC/MARCH principles as for humans. This section covers specific deviations and/or requirements from human protocols, which may improve survivability of MPC trauma patients. Handlers are trained in these principles and will usually be the first to initiate aid.

Safety. Injured MPCs may bite from fear and/or pain, even with decreased consciousness. Wounded MPCs must be muzzled when performing assessment and procedures unless presenting with respiratory distress. Sedation/pain meds are authorized for MPCs not amenable to physical exam or treatment.

Care Under Fire:
Handler is okay: Handler will move himself and injured MPC to cover. Handler and/or Medic perform quick head-to-toe check **assessing level of consciousness** and correcting life-threatening hemorrhage if the situation permits.

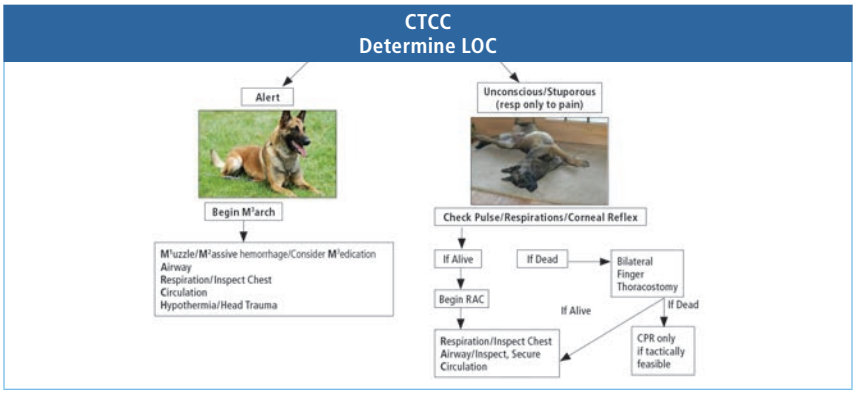
Handler Wounded: Wounded Rangers are first priority. Remove the injured MPC to cover if tactically feasible. Every handler should have members of their platoon identified and comfortable working with the MPC. This person will help maintain control of the injured MPC while another Medic or ARFR provides care.

Tactical Field Care: MPC moves to CCP with other casualties. Medic triages other casualties before attending to MPC's wounds. Handlers and/or other EMT/RFR will provide initial care until Medics can divert their attention. Remove equipment and tactical vests to fully assess the chest area. Provide sedation/pain meds (dosages on MPC Card) as needed in conscious patients to complete exams and treatments. Communicate MPC casualty status and evacuation requirements through normal C2 channels.

Tactical Evacuation: MEDEVAC per usual manner according to precedence (Urgent, Priority, Routine). However, MPCs will not precede other casualties of the same category. Handlers or trained representatives must remain with the MPC throughout transport. Always reassess the patient and all interventions after movement. Always complete a K9 Casualty Card and maintain with the patient throughout transport. Complete a casualty AAR in the normal manner and include the RVET on all communications. MPC casualty information is maintained in the Prehospital Trauma Registry the same as Rangers.

Point of Injury:
M³ARCH Always try to consider what is killing the animal and treat that first. Use the algorithm when you are not sure.

1. **Muzzle:** Although our dogs are generally sociable with other Rangers, any dog in pain will likely bite. These dogs bite really hard . . . Muzzle them first. Generally our handlers carry a medical muzzle in their lower leg pocket.
2. **Massive hemorrhage:** Control extremity bleeding with combat gauze and pressure bandages. CAT tourniquets are large and effectiveness can be tricky. If used, place above the stifle or elbow for injuries distal. SOF-T tourniquets are 100% useless on dogs. Pack GSWs to the neck, hip and shoulder with combat gauze using hemostats or Rochester-Carmalt 8" (curved) or Rochester-Pean (curved) 8" forceps. X-stat has been ineffective at staying in the GSW track of a hip and did not create tamponade or effective hemostasis in one Ranger MPC.
3. **Medication:** (Consider) an alert injured dog may need its pain managed and sedated just to pack a wound/treat an injury, catheterize, bandage, etc. Unconscious dogs do not need sedation. In an alert dog, start on M³ARCH and if necessary sedate. The following are protocols that may be used based on the medications available to Ranger Medics and handlers in combat:



a. Alert dog with strong pulse (e.g., bleeding a little but not bleeding out, can't restrain for fractured leg splint/bandage or pad laceration or need to pack a GSW through the neck, leg or hip that only has minor bleeding, sedate a healthy dog for blood donation)

0.5mL (0.25mg) of dexmedetomidine
+1.5mL (150mg) of ketamine
+ 1–2mL (2–10mg) midazolam

Approximately 4mL total volume in 5mL syringe, give IM.
Takes 10 minutes and lasts up to 40 minutes

b. Responds to voice commands, beginning of shock, losing consciousness has a weak pulse, is bleeding profusely in pain but will not hold still

1.5mL (150mg) of ketamine
+ 1–2mL (2–10mg) midazolam
Approx. 3.5mL total volume in 5mL syringe, give IM

c. Unconscious dog, no response, barely detectable pulse

DOES NOT GET SEDATED

4. **Airway:** First check the airway to ensure it is clear using a finger sweep. Then determine the dog's breathing pattern, rate, and if it is having difficulty to determine if interventions are necessary.
   a. NPAs are not functional in MPCs.
   b. Orotracheal intubation is easier than for humans. Intubation is only possible if there is loss of consciousness or significant sedation. If under cover, use a size 9 or 10 ET tube (ETT) found in the Handler's IFAK. Place the MPC in sternal recumbency with the head held out, extending the neck. Assistant grasps over the top of the muzzle. He then pinches the top lips behind the top canines with one hand and uses the other to open the lower jaw. The assistant then pulls the tongue out and downward between the lower canine teeth, opening the mandible (use gauze if you can, it is slippery). Medic/handler can then insert the ETT between the arytenoids similar as for a person. Use an 8" curved Rochester-Pean (or Carmalt) forceps or tongue depressor with light source to reach back to the soft palate and gently flip down the epiglottis to visualize the arytenoids.

NOTE: After the ET tube is inserted, pass a 2" roll of Elastikon or Coflex over the end of the ET tube and secure in the dog's mouth as a gag. Use 1" white athletic tape (handler's aid kit) to keep the dog's mouth shut around this temporary gag (see pictures on page 198). This will give you time to remove or resedate the dog and prevent him from chewing through the tube if he wakes up.

   c. Perform a surgical tracheostomy if upper airway is obstructed and the animal is unconscious (or properly sedated). The cricothyroid membrane is difficult to access in dogs. Make at least a 3" midline incision from a point that is three finger widths from the thoracic inlet (base of the neck) rostral (toward the head). Now make a midline incision through the facial layer of muscle and blunt dissect (fingers) to the trachea. Make a stab incision between tracheal rings to access the tracheal lumen. Insert the handler's 9–10mm ETT (preferred) up to the thoracic inlet or use the standard 6mm Cric kit tube when an ETT is unavailable. Secure in place as usual.

d. Emma/$EtCO_2$ monitor (reference range is 35–45mmHg). Opioids (e.g., fentanyl CRIs) can depress the CNS, leading to a higher CO_2 reading. Pain will cause an animal to hyperventilate and decrease the CO_2 reading.

5. **Respirations**
   a. Remove the vest. Check both sides of the chest and neck. Thirty percent of our penetrating GSWs to the thorax communicated with a GSW to the neck.
   b. In the conscious patient with an actively sucking wound – use a large, vented occlusive dressings. It is difficult to get them to adhere; bigger is better. Try to cover as much surface area as possible with the occlusive dressing. Wrap the chest circumferentially with an Elastikon bandage if adherence is a problem. Be careful not to restrict breathing. Be prepared to treat a pneumothorax or hemothorax.
   c. Dogs with pneumothorax and/or hemothorax often have increased resistance when bagging and may present $EtCO_2$ two ways when intubated: they may have (1) a low $EtCO_2$ reading because the volume of air crossing the sampling device (emma) is decreased from the restriction of tidal volume movement caused by the tension pneumothorax or (2) a high $EtCO_2$ reading when sufficient tidal volume is available to move but venous return to the heart is decreasing from pressure. This causes less blood to move to the lungs, which increases the concentration of CO_2 that is released when it finally arrives. The wave form is normally square with the right side of the square/plateau slightly higher. Pneumothoraxes often show a short plateau wave form where the left side of the plateau is higher. Open chest lacerations/finger thoracostomies need positive pressure ventilation. Increased compliance while bagging may indicate hemopneumothorax/pneumothorax/hemothorax and the need to be decompressed.
   d. Needle decompression: Place between 6th to 8th intercostal spaces cranial to the rib using a standard 14-gauge catheter. Place in highest portion of chest when laterally recumbent to remove air and lower third (near sternum) to remove fluid. Repeat needle decompression often indicates need for tube or finger thoracostomy. NOTE: 92% of dogs have a fenestrated mediastinum but bilateral decompression may be indicated clinically in a smaller percentage.
   e. Chest tube: Indicated if needle decompression does not resolve pneumothorax or hemothorax is present. Place the dog in lateral recumbency with the affected side up. Pull skin cranially. If conscious, block the rib in front and the rib behind with 1–2mL of lidocaine (about an inch proximal to your entry point). Use a 28–36 French chest tube (same as a human). Place mid-thorax between the 7th and 8th intercostal spaces (dogs have 13 ribs per side). Enter the chest at the highest point of the chest wall. Direct tubes in cranioventrally (toward the head and sternum) direction. Place entry point cranially over ribs to avoid vessels and nerves. Have an assistant pull the loose skin cranial before the incision is made in the 7th or 8th intercostal space to obtain a better seal.

6. **Circulation:** Make sure there is not major bleeding and control as necessary. Penetrating wounds to the neck that you believe communicate with the thorax (or severe major vasculature of the neck), obvious penetrating wounds to the chest, abdomen, or hip are all considered significant mechanisms of injury. Treat for hemorrhagic shock if two or more clinical signs below are seen):
   a. Pulse > 160bpm
   b. Loss of consciousness
   c. Weak femoral pulse
   d. HR > systolic BP
   e. Systolic BP < 90
   f. Tacky mucous membranes
   g. $EtCO_2$ < 35mmHg
   h. Estimated 400mL blood loss or more (one saturated roll of Kerlix)
   i. Mechanism of injury includes a penetrating wound to the neck, chest, abdomen, or hip

Resuscitate until femoral pulses are palpable or systolic pressure > 90mmHg. Intravenous route is preferred; Secondary route is IO (lateral humoral head or tibial crest). Incorporate fluid therapy as needed. Resources will often limit canine blood availability to 1 unit, which is generally with the Ranger MEDEVAC asset in theater. Encourage handlers to manage and carry that unit of blood on target OR convince the company commander to take the Battalion's animal care tech. If blood products are unavailable, make sure that it is asked for in line 4 of the 9-line request so other assets in theater can begin to pull blood from their walking canine blood banks before your patient arrives. Absolutely no human blood product should go to a Ranger MPC; it has contributed to the death of a Ranger MPC as recently as 2017. If no canine blood is available, then bolus 500–700mL of crystalloid over 20–30 minutes, reassess vitals, and repeat only if no change in vitals and there is no foreseeable extraction for the MPC within the next 15 minutes. Do not exceed 2L in 1 hour. Follow fresh whole blood transfusion protocol if second dog is available. This is most practical after evacuation to higher care. Monitor for circulatory overload the same as humans.

7. **Hypothermia:** Dry the animal's coat as much as possible. Prevent loss of body heat using warming blankets. Use fluid warming devices if saline lock initiated. Protect against wind and elements.

AND

Head Trauma: The most common cause for head trauma/TBI may occur with blast injuries. Of the six blast injuries sustained so far by our MPCs, two died immediately and the other four did not report any issues related to head trauma and returned to duty. Suspect head trauma/TBI if the MPC is in close proximity to explosions/blasts or other nearby Rangers are affected. Altered consciousness and pupillary function (equality and reactivity) are vital when assessing the patient.

a. Key to field management is prevention of hypoxia (maintain SpO_2 > 90, preferably > 95) and hypotension (maintain systolic > 90mmHg). Maintain an airway and ventilate at 12–20bpm with approximately 400–500mL tidal volume. Do not hyperventilate.
b. Elevate the head/body upward 30° if hemodynamically stable. Keep the body and neck in a straight line by placing the patient on a board or litter and propping up the end toward the head. Do not place material directly under the head causing a bend in the neck, which may decrease venous return to the heart.
c. Levels of consciousness: Alert, obtunded (verbal), stuporous (pain), and comatose (unconscious) is similar to AVPU. An obtunded animal should still respond to noise or touch. Stupor indicates a loss of consciousness (LOC); they respond only to noxious stimuli (pinch across the toes with fingers). Comatose dogs exhibit no response to repeated noxious stimuli.
d. Perform a full exam for other injuries, especially thoracic auscultation, and perform regularly throughout the mission. Treat subsequent injuries as needed.
e. Ruptured tympanic membranes require veterinary-specific otic cones to diagnose. The canine ear canal is extremely long and has a 90° bend.
f. All blast injuries and/or suspected head trauma/TBI require follow-up with a veterinarian for monitoring, thoracic radiographs, and TM assessment

RAC (Only on the Stuporous or Unconscious MPC)

Always try to consider what is killing the animal and treat that first. Use the algorithm when you are not sure.

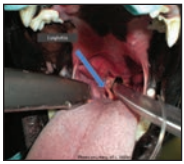
Ten of 18 combat deaths in Ranger MPCs involved penetrating wounds to the thorax, making up 55% of all our KIAs. These wounds are 35% of all combat-related injuries sustained by Ranger MPCs. No Ranger MPC has survived a penetrating chest wound to date. Dogs often die quickly from chest wounds because they have no functional body armor, a larger heart (dog at 7g/kg bwt, so 223g vs a human at 5g/kg bwt and a 247g heart), and they are almost always shot through both sides of their chest, which doubles the chance of pulmonary vessel involvement. Half of our MPC combat-related deaths are because they bleed out into their chests. In contrast, 4/29 MPC combat-related injuries were to the extremities alone and none of those animals died. This deviation in protocol from M³ARCH is one attempt to save more dogs with a penetrating GSW to the thorax wound pattern. We are also awaiting the development of lighter and more flexible, thoracic body armor.

The new algorithm is used only in the stuporous or unconscious dog (both indicate LOC). **Check pulse and breathing for signs of life** before wasting resources and time on a dead animal. If the animal is apneic and pulseless – perform a bilateral finger thoracostomy in the 6th or 7th ICS, look for blood and reassess.

1. **Respirations (Alive)**

The goal is to identify any chest or neck (neck wounds often communicate with the chest wounds in our MPCs) wound while also paying attention to respirations during your search. **If there is no wound in the chest or neck, move back to M³ARCH.** If there is an assistant, have them look for massive hemorrhage while you roll through RAC. If there is a wound in the chest, make a mental note, check for the exit wound, but do not bother covering them with a chest seal in this algorithm. A thoracic wound with either progressively rapid shallow breathing or no breathing with a distended/swelling chest needs decompressed with a 14G needle. This enters at the 6th or 7th ICS on the highest point/mid-point (of the chest). If the first NCD needle fails, try once more on the opposite side of the chest and move on to airway. Place chest tubes, if necessary, only after airway and circulation have been addressed.

2. **Airway**



Obviously look for an airway obstruction and clear it if present or if it is possible. To date, the Regiment has had one significant MPC airway obstruction, it never lost consciousness, never received a tracheotomy, and survived. The idea in this algorithm is to quickly secure an airway in an apneic canine patient that has been shot in the chest. Intubation is much faster and easier in a dog than a tracheotomy. In the unconscious animal insert a 10mm ET tube using your large Rochester Curved Carmalt (or Penn) forceps (found in your chest tube kits) to flip the epiglottis down. Visualize the arytenoids with a head lamp and insert the ET tube to the level of the thoracic inlet. If carried, place a roll of Coflex or Elastikon over the end of the ET tube to the back of the mouth and tape in place with athletic tape to create a bite block. If the animal wakes up this will prevent him from chewing through the tube until you can sedate him. Apply your Emma and bag when indicated. If bagging is necessary (Apneic, $EtCO_2$ above 50mmHg) – be sure to pay attention to bag compliance (you do not want to push through a pneumothorax). If the animal is breathing move on to circulation. If the animal is apneic while intubated and there is resistance to bagging, consider NCD or finger thoracostomies for pneumo/hemothorax. Finger thoracostomies would require bagging the apneic patient and likely require assistance in a canine patient that is breathing.

3. **Circulation**

By this point you have already checked a femoral pulse and know whether it is weak or not. An unconscious dog with a penetrating chest wound automatically makes the animal a candidate for hypovolemic shock and should be treated for it. IV catheterization > IO. TXA may be given (5mL or 500mg IV) in the flush once followed by canine blood > canine fresh frozen plasma > Plasmalyte A or LR > 0.9% saline. Give 1 unit of blood or a quarter shock dose of crystalloids (app 700mL) and reassess. After RAC, move back to MARCH.

NO HUMAN BLOOD WILL BE ADMINISTERED TO MPC.

Antibiotic Therapy for Penetrating Wounds: There are very little data on the use of ertapenem (Invanz) in dogs. Plumb's recommended dose is 15mg/kg IV or IM so about 450mg IV/IM (4.5mL once reconstituted) twice a day.

Canine Casualty Card: Medics must complete a casualty card provided by the handler or found on the unit portal under the RMED/RVET section. Send casualty assessment and AAR through appropriate channels with inclusion of the RVET and Bn Vet Tech. MPC casualties are stored in the PHTR the same as Rangers'.

Evacuate: Evacuate to a veterinary treatment facility with surgical capabilities or human equivalent (FH, FST) depending on MEDEVAC times and patient precedence. Canine casualties may be evacuated with human casualties. A MEDEVAC/CASEVAC plan MUST be worked out for the dog during mission planning. Make sure either the handler or platoon Medic briefs what facility will be used during the mission brief so the GFC and MEDO know where to send it. There is ALWAYS confusion with what evacuation asset will be used and where a dog casualty will go after extracted from combat. Most commanders are not willing to risk the lives of air crewmen for a lone dog casualty on a hot LZ. This means the MPC often extracts with unit. Make sure the driver or pilot of the CASEVAC platform knows where to take dog casualties before the mission starts. Ensure the MEDO relays line 4 information (e.g., canine blood!) to the receiving veterinarian. Ensure any handler not on the mission knows he needs to take a (spare) MPC to the veterinarian in case blood is needed. Finally make sure everyone has the veterinarian's contact information and calls them immediately.

4. Handlers or a trained representative should always escort MPC casualties.
5. Conscious canines are difficult to evacuate on human litters (even if strapped down). Most handlers carry canine specific litters.

Splinting/bandaging: Immobilize fractures when packaging for MEDEVAC to alleviate pain and reduce further soft tissue damage. One joint above and one joint below the fracture require stabilization to be effective.

1. This effectively limits splinting to fractures below the elbow and the stifle.
2. Use a Telfa on open wounds followed by white conforming gauze or kerlix to hold in place. Leave the center two toes exposed. Always start bandaging at the toes and wrap proximally, regardless of the fracture location.
3. Place a second layer over the holding gauze (second roll of Kerlix, cast padding, or cotton). Compress (do not constrict) with Coflex (or VetWrap) leaving a ½" of the gauze exposed on each end. A final wrap around the chest or pelvis (usually with Elastikon carried by the handler) will help hold in place.
4. Place a SAM splint, or equivalent devise, the entire length of the leg. Place on the lateral aspect of the limb from the toes to above the shoulder or hip joint.

Canine Field Blood Transfusion Procedure

Coordination WILL be made with either the RVET, Battalion 68T, or deployed veterinary assets to maintain at least 1 unit of whole blood at all times. Do not ever let a human receive dog blood. One unit of whole dog blood should be drawn every 3 weeks and (if a blood bank is not available) stored at 2–4°C (35.6–42.8°F). This blood will be clearly marked "K-9" and travel with the handler, 68T, designated dog blood mule, or MEDEVAC asset in an approved container while MPC teams are on mission. Follow temperature recommendations for each product. It must then immediately be transferred back into the designated blood refrigerator upon RTB. Three Ranger MPCs had no drop off in performance (after a 450mL donation) when given 24 hours to recover and no crystalloid fluids to replace the loss. Each dog went through this protocol for two blood draws 3 weeks apart and were not affected when compared to controls. Two dogs on deployment will have no issue alternating blood donations every three weeks. One-dog deployments occur and they cannot donate every 3 weeks for themselves. Coordinate with the RVET to have canine plasma available if no other MPC are available for whole blood donations during single MPC deployments.

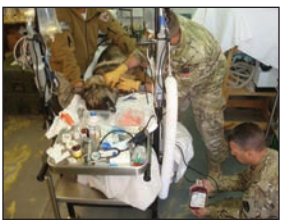
Indications for transfusion are the same as for people (i.e., hemorrhagic shock therapy). This protocol is designed for use on the battlefield using the standard collection set. However, situations may occur in which the Medic must perform these procedures while assisting at veterinary or medical treatment facilities following MEDEVAC. Any healthy MPC is authorized as a donor because the risk of infectious disease is presumably low. Do not use indigenous dogs for fear of personnel safety, bloodborne disease transmission, and zoonotic diseases, such as rabies.

Dogs have eight identified blood types. They do not have naturally occurring antibodies, and the first transfusion usually does not cause allergic reactions (the first one is "free" in an emergency) within the first 3 days. Meaning, there is no need to blood type or cross match the first transfusion a dog receives on the battlefield. An MPC that previously received a transfusion will be identified on his medical card. Discuss their medical requirements with the RVET prior to deployment.

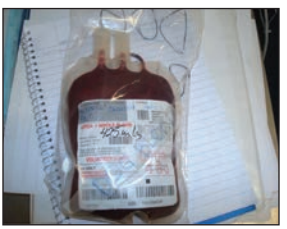
Donor:

1. Shave the hair and aseptically prep the skin over the jugular furrow as much as possible.
2. Prepare the collection system.
3. Handler places the dog in a sit if trained, or lateral recumbency. Tilt the head up straightening the neck to expose the jugular vein.
4. Occlude the jugular vein by holding firm pressure at the thoracic inlet (clavicle region).
5. Insert the needle (not a catheter – they tend to coagulate) into the jugular vein (toward the head).
6. Collect the standard 450mL (weighs 474g). To speed up the process place the bag below the collection site.
7. Hold pressure at the collection site after removing the needle until bleeding stops.
8. An IV catheter can be placed to replace volume. Give 1L of crystalloids to replace volume, if time allows.

**Dogs have a large splenic blood reserve and recover faster than humans after donating. Work performance does NOT deteriorate following donation if the animal is given 24 hours to recover. The MPC donor will usually have to be sedated. If two dogs are being used for a mission, pulling blood from a donor on the battlefield leaves you with potentially two compromised animals for at least 40 minutes. Donating in the field can only occur if the unit is stationary long enough to pull blood and/or has the personnel to carry or recover the second dog. Ensure handlers clip their dog's jugular and cephalic vein access sites every 2 weeks if a second dog is an option.



NOTE: When needed use dexmedetomidine, ketamine, midazolam combo dose. Reverse dexmedetomidine's effects with an equal volume of antisedan **IM** after collection if necessary. Consider the tactical situation and use your judgment when considering the sedation of a second dog.



Recipient:

Set up and administer in same fashion as for people.

1. Initiate an IV or IO .
2. Gather baseline vitals. (If in a controlled environment, collect a serum separator and CBC blood vial.)
3. Do not give acetaminophen.
4. Give 50mg diphenhydramine IM if signs of reaction occur.
5. Administer antibiotics if aseptic collection from the donor is impossible.
6. Submit AAR to the RVET and/or Bn Vet Tech.

Canine Injection & IV Sites

IM INJECTION SITES:

Use a 20–22 gauge, 1-in. needle for IM and IV injections.

1. Thigh muscles: back of hind limb. Isolate the muscle belly mid-thigh and insert the needle at a 45-degree angle to avoid hitting the sciatic nerve.
2. Back muscles: inject approximately three finger widths cranial to the wing of the ileum in the muscle on either side of the spinous processes. Insert the needle at a 45-degree angle to avoid hitting bone.

IV SITES:

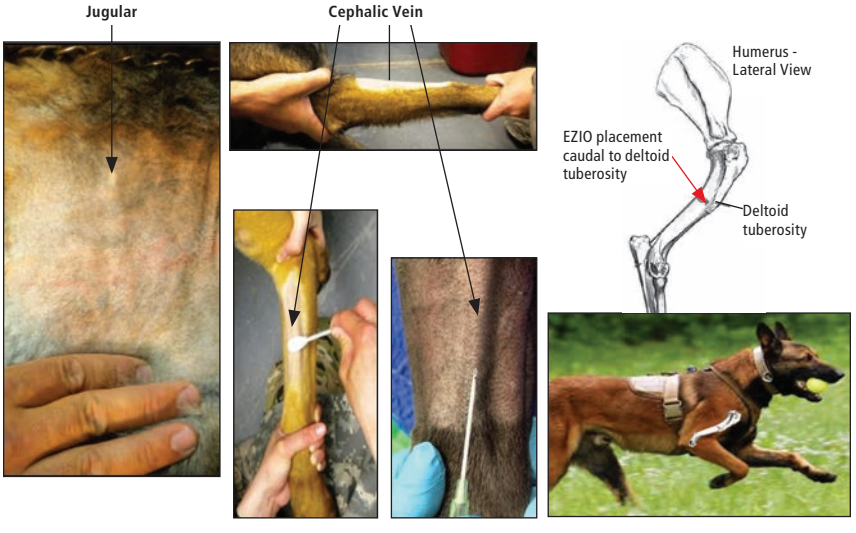
Use an 18-gauge IV catheter for MPC. Shave the area and clean before placing a catheter, if possible. Placement sites listed below in order of ease and precedence.

1. Cephalic vein: located on the front of the forelimb between the elbow and carpus (wrist).
2. Lateral saphenous: vein on outside of the hind limb can be used if access to the cephalic vein is unsuccessful.
3. External jugular: located in jugular furrow on either side of the trachea. Pressure must be placed at the cardiac inlet (near clavicle in people) to cause distension. Insert the catheter down away from the head. Insert blood collection needle up toward the head.

IO SITES:

Easy IO 15mm or 25mm (either hand or power driven) work best. They cannot be used in the sternum of a dog. Humeral head and proximal tibia are best, similar to human applications. Insert and set up the same as for humans. Placement listed below in order of best flow.

1. Humerus: Place patient in lateral recumbency and kneel with spine against your legs. Firmly grasp the front limb at the elbow to stabilize the limb. Drive the IO device into the flat, dorsolateral surface of the humeral head (top outside surface) just behind the deltoid tuberosity (notch).
2. Tibia: Flat area on dorsomedial aspect of tibia (top inside shin near the knee joint) on the hind leg.



Canine Tactical Medical Emergencies

C1. Canine Heat Injury

DEFINITION: Hyperthermia as a result of heavy physical exertion and/or extended exposure to hot environments. Normal temperature range for a dog is 99.5°–102.5°F, most acclimated/conditioned dogs can work up to 106°F. Dogs not affected by heat injury normalize their temperature within about 15 minutes.

S/Sx: Mild Heat Injury (Heat Stress): Excessive thirst, can still control panting (will stop panting when exposed to stimulus such as a ball or treat for instance), discomfort associated with physical activity (wants to hide, go lay down).

Management Mild Heat Injury: Remove MPC from the heat source/stop exercise, cool with fans or move to an air-conditioned area. Monitor for several hours by taking rectal temperature. Watch for progression by looking for changes in mentation, blood in the urine, petechiae, weakness, collapse, signs of shock (rapid breathing, rapid heart rate, weak pulse, pale membranes, anxiety or restlessness.

S/Sx Moderate Heat Injury (Heat Exhaustion): Signs of mild heat injury are present but include weakness anxiety and **UNCONTROLLED panting** (pants through exposure to stimulus such as a ball or treat). CNS signs are **not** present. Temp is often over 106°F.

MANAGEMENT: Moderate Heat Injury: Remove MPC from the heat source/stop exercise, cool with fans or move to an air-conditioned area. **Wet the fur with lukewarm water. Caution:** Using high pressure to hose down animals can cause stress and anxiety, compounding the problem. Wet towels, bottles, or low-pressure hosing can be used. Ice baths and ice sheets may cool the animal too fast and can only be used if core temperature is monitored intensely. All cooling must stop at 104°F. Once the animal's body temperature is below 103°F provide supportive warming and dry the animal to prevent rebound hypothermia. Give small, frequent drinks of cool water; do not give a full bowl – vomiting may occur. If water is unavailable for soaking the fur of the animal, then apply copious amounts of isopropyl alcohol on the inguinal and axillae areas. Intravenous fluid may be given to replace dehydration losses and help cool the animal. These can be found at the back of this section on the MPC card (for instance, a 70lb dog can receive 560mL/hr of LRS for 2 hours if he is assessed 5% dehydrated). IV fluids at room temperature will also help cool the animal. Monitor the temperature frequently and discontinue cooling once achieving 104°F; rebound hypothermia may result with rapid cooling.

S/Sx Severe Heat Injury (Heat Stroke): Includes many of the signs of moderate heat injury but the difference includes varying degrees of **CNS signs**. CNS signs include changes in mentation and level of consciousness (from depressed looking to coma), seizures, abnormal pupil size, blindness, head tremors and ataxia. Most temperatures are above 107°F, but it has occurred as low as 105.8°F. Severe heat injuries are associated with a 50–64% mortality rate

Management Severe Heat Injury: Any animal considered a severe heat injury should be evacuated as an URGENT patient when feasible. Treatment in severe heat injury is the same for a moderate heat injury (remove from heat source/stop exercise, **wet the fur with lukewarm water**, etc.) but may require other measures to treat shock, dehydration, protect the airway (if there is loss of consciousness), or treat seizures. Treat concurrent shock (e.g. weak femoral pulses, MAP < 60, systolic BP < 90) with room temperature fluid therapy (1/4 shock dose of crystalloid fluids is approximately 700mL then reassess). Warm fluids are required after the animal's temperature drops below 103°F. Again, in the absence of shock use the MPC card and replace dehydration loses with fluid therapy (i.e., at 560mL/hr for 2 hours if 5% dehydrated). Intubation (use a bite block) in the apneic, unconscious patient may be necessary, especially while cooling an unconscious patient down with running water. Monitor mental status closely and initiate the seizure protocol (10mg of midazolam or diazepam IV, IO or intranasal as needed) if necessary. Discontinue cooling at 104°F. Begin drying and warming at 103°F. Keep systolic BP > 90mmHg, MAP > 65mmHg, RR 8–10 bpm, $EtCO_2$ 25–60mmHg, SpO_2 > 95% with supplemental O_2. If cerebral edema is suspected 30–60g of mannitol IV over 30 minutes with 15mg of dexamethasone IV (or 900mg of methylprednisolone IV) once. If ventricular arrhythmias are recognized/present only treat them if animal is hemodynamically unstable at 1.5–2.3mg/min (2mg/kg IV bolus, then 50–75mcg/kg/min) of lidocaine in a CRI/syringe pump. Monitor blood glucose for hypoglycemia q4–6hr if possible (normal glucose is 60–110mg/dL). Supplement maintenance IV fluids with dextrose to 5% and with KCl at 20mEq/L routinely to maintain normoglycemia and normokalemia (normal potassium is 3.7–5.8mmol/L). Vomiting and/or diarrhea often occurs (sometimes with gastrointestinal **bleeding**), begin famotidine at 30mg IV or PO q12hr, 16mg of ondansetron IV or PO q12–24hr and 1g of sucralfate PO q8hr. No food or water until vomiting has resolved. Antibiotic treatment may begin with cefazolin (Ancef) 600mg IV over 5 minutes q8hr **OR** ertapenam 500mg IV q12hr if GI hemorrhage is present.

DISPOSITION: Evacuate to veterinary treatment facility for further treatment.

SPECIAL CONSIDERATIONS: Critical care monitoring from veterinary personnel required after initial resuscitation due to sepsis and/or DIC.

C2. Canine Gastric Dilatation Volvulus (GDV)

DEFINITION: GDV is an ***urgent surgical*** condition in which the stomach becomes distended by excessive gas (dilatation) and can then twist (volvulus), cutting off blood supply returning to the heart. All Ranger MPCs have a surgery to prevent the volvulus; however, dilatation may still occur. This is an emergency condition resulting in profound shock, leading to death.

S/Sx: Abdominal distention, nonproductive vomiting/retching, abdominal pain, signs of agitation/discomfort, SHOCK, may lead to DIC.

MANAGEMENT:

1. Treat for shock first: Insert a large bore catheter in each CEPHALIC vein and start resuscitative fluid therapy. Treat to a systolic BP above 90mmHg; does not require hypotensive resuscitation.
2. Decompress the stomach: Usually you need to lay the dog in left lateral recumbency (with the right side up). Anatomically in GDV, the big fundus of the stomach will most often be located on the right side. Auscultate the right side (should sound like a basketball when your finger flicks or "pings" it) and palpate for gas distention, this helps identify the optimal location for trochar placement. Make sure you insert where the ping is loudest, a dull thud may indicate the presence of the spleen. Do not insert the needle near a thud. Hold pressure underneath the stomach on the downside, pushing the stomach upward against the body wall. Insert a 14G, 3-in. catheter two finger widths past the last rib at the highest point on the side. You must go through the abdominal wall and stomach wall, meaning it must be a quick, forceful movement. Remove the metal stylet when in the stomach, and air should escape. If not, remove the catheter and try again.

*To increase speed of air evacuation place a 60mL syringe with 3-way stopcock to the catheter to facilitate faster aspiration.

NOTE: It is common for the spleen to block access to the stomach. If blood is seen in the catheter, remove it immediately, then try again in a different location.

DISPOSITION: Evacuate immediately to veterinary care even if stable. Surgical correction is required.

SPECIAL CONSIDERATIONS: MEDEVAC at a low altitude to reduce further expansion of air in the stomach. Dilatation of the stomach may recur, be prepared to decompress again.

C3. Canine Altitude Sickness And Pulmonary Edema

To date no Ranger MPC has had a recognized issue with altitude in training or while deployed.

DEFINITION: Hypoxia and/or pulmonary edema usually occurring at altitude above 8,000 ft. Clinical signs **uncommon** in dogs, but possibility increases with greater activity levels.

S/Sx: Reduced appetite, listlessness, decreased coordination, dark tongue coloration, cough, dyspnea.

MANAGEMENT:

1. Descend from altitude.
2. Provide flow-by supplemental oxygen at 5L/min if available (place oxygen tubing near the nose and secure on the muzzle; or make an oxygen mask with a cut plastic bottle running the oxygen tubing through the bottom). 3. Administer 3–4mL (0.5mg/kg) Dexamethasone SP (4mg/mL) IV or IM.

DISPOSITION: Evacuate to veterinary care if nonresponsive to treatment.

SPECIAL CONSIDERATIONS: PROPHYLAXIS: Acetazolamide (Diamox) 250mg q12hr orally beginning 24 hours prior to ascent, and continue 48 hours after reaching maximum altitude. If using 500mg sustained release tablets, give one 500mg tablet q24hr. Prophylaxis is not needed for K9s if providers do not prescribe medication for Rangers.

C4. Canine Seizure Management

DEFINITION: Emergency seizure treatment required for status epilepticus or seizures secondary to other injuries. Status epilepticus is a seizure caused by abnormal electrical activity in the brain that is unprovoked. Provoked seizures may be caused by head trauma, heat stroke, toxin ingestion, etc.

S/Sx: Status epilepticus is seizures lasting more than 5 minutes or 2 or more seizures occurring without recovery (return to consciousness) in between.

MANAGEMENT:
1. Gain IV access.
2. Treat underlying cause, if possible.
3. Monitor body temperature; treat hyperthermia if temperature rises above 104°F.
4. Administer an anti-convulsant– diazepam (Valium) 15–30mg (0.5–1mg/kg) IV or 30–60mg (1–2mg/kg) per rectum (2–3 minutes onset) **OR** midazolam (Versed) 7.5mg (0.25mg/kg) IV/IM. **Levetiracetam (Keppra)** 30–60mg/kg (600–900mg) IV for status epilepticus or acute repetitive seizures. For refractory epilepsy: regular tablets 20mg/kg (600mg – use of 750mg tab is safe) PO q8hr, extended-release tablets 30mg/kg (900mg – use of 1,000mg tab is safe) PO q12h.

DISPOSITION: Evacuate to veterinary care as soon as possible. Requires critical care monitoring.

SPECIAL CONSIDERATIONS: Seizures may recur. Contact a veterinarian for guidance if one is not located in your location.

C5. Canine Toxicities – Explosives, Others

Training Aid/Agent Toxicosis: Our MPC are exposed to certain small quantities of explosives known as training aids and may accidently ingest them which could lead to toxicosis in the animal.

1. **Nitrate/nitroglycerin-based explosives (C4, TNT, water gel, dynamite, RDX, det cord):**
   Clinical signs – Ingestion may result in hypersalivation, severe CNS abnormalities (ataxia, incoordination, seizures, tremors), gastrointestinal irritation (nausea, vomiting), and methemoglobinemia (signs of methemoglobinemia include: cyanosis, weakness, syncope = loss of consciousness, respiratory distress). Onset of signs usually occurs between 3 and 12 hours after ingestion.
2. **Smokeless powder explosive**
   Clinical signs – Ingestion may result in hypotension, CNS depression (which manifests as ataxia, depressed mentation, incoordination), and methemoglobinemia (cyanosis, weakness, syncope, respiratory distress).
   Treatment – Monitor blood pressure and fluid resuscitate as needed. Close monitoring of CBC's necessary for potential methemoglobinemia.
3. **Potassium and sodium chlorate explosives**
   Clinical signs – Ingestion may also result in methemoglobinemia (cyanosis, weakness, syncope, and respiratory distress), CNS abnormalities (ataxia, incoordination, and depressed mentation), gastrointestinal irritation (nausea, vomiting, abdominal cramping and pain, **hemorrhagic diarrhea** with **melena or hematochezia**), hematuria, hemoglobinuria, and renal and liver failure.

Treatment of Training Aid Toxicosis

1. If ingestion occurred ≤ 4 hours before presentation and the MPC is conscious and has normal CNS responses, induce vomiting.
   a. Apomorphine is first choice. ¼ (6mg) tablet in the conjunctival sac or 0.03mg/kg IV.
   b. Hydromorphone is second choice 3mg IM
   c. 3% hydrogen peroxide (household formula is 3%) Maximum of 30mL can be given orally as the last option. This method will create esophageal erosion.
   d. Don't try to make an MPC gag manually
2. If ingestion occurred > 4 hours before presentation, or if the dog has abnormal mentation or is unconscious or seizing, do not induce vomiting.
   a. 45g of activated charcoal with sorbitol as an initial dose. Sorbitol is a laxative. This is about 30mL of Toxiban (w/ sorbitol). May require sedation with cuffed ET tube, orogastric intubation and a funnel to get the slurry in.
   b. A second dose 4–6 hours later without sorbitol
   c. If seizures are present give 10mg of midazolam IV or IN or 10mg of diazepam IV, IN or per rectum. Alternatively 600–900mg of levetiracetam (Keppra) IV can be given.
   d. If methemoglobinemia is present (blue tinge to unpigmented skin, brown blood, brown urine, tachypnea, tachycardia, lethargy, recumbence) 30–60mg of methylene blue (MB) 1% (3–6mL) can be given as a slow bolus IV. If respiratory distress persists then repeat dose once or twice. MB will cause a Heinz body anemia so CBC must be monitored every 8 hours if used.

Rat Poison: Is a vitamin K antagonist so it interferes with the production of coagulation proteins. This eventually inhibits hemostasis.

Clinical signs – Some form of hemorrhage is often seen such as bruising of skin and mucous membranes, especially the axillae and inguinal regions. Blood may be seen in the urine or coming from the nose. It can also cause weakness, a painful abdomen, pale mucus membranes, coughing, wheezing, and (rarely) petechiae. Dyspnea can occur from intrathoracic or intrapulmonary bleeding. Collapse is possible if pericardial hemorrhage occurs. Pale mucous membranes will occur if anemia is severe.

Treatment – 1.5–2.5mg/kg (45–75mg) of vitamin K_1 (phytonadione) supplementation BID PO in a fatty meal for up to 4 weeks may be required. Supplied as 25–50mg tablets or 10mg/mL injection that must be given IM or SC. Have a veterinarian check PT time 72 hours after last dose to know when to stop. Canine FFP or whole blood may be required to replace clotting factors and/or RBCs.

Antifreeze: Minimum lethal dose of undiluted ethylene glycol (what makes up most antifreeze) in an MPC is about 132mL.

Clinical signs – within 1 hour of exposure vomiting, polydipsia, polyuria, and neurologic signs such as ataxia, stupor, and knuckling can occur. Oliguric (abnormally small amounts of urine). Renal failure occurs between 36 and 72 hours. These animals are lethargic, dehydrated, vomit, can have diarrhea, salivate excessively, sometimes have oral ulcers, breathe fast, can seizure, or present in a coma.

Treatment – Generally requires veterinary care facility. If unavailable: Induce vomiting if within 2 hours of ingestion. Activated charcoal is ineffective. If the animal is still producing urine and not already oliguric or anuric, then 4-methypryrazole (fomepizole – costs $1,000) can be given IV at 20mg/kg (600mg) initially then 15mg/kg (940mg) 12, 24, and 36 hours later to block metabolism of ethylene glycol by alcohol dehydrogenase. 5.5mL/kg (165mL) of 20% ethanol (e.g., 40 proof "everclear") in IV fluids can be given over 6 hours for five treatments and then over 8 hours for 4 more treatments. It competitively inhibits ethylene glycol from getting broken down by the enzyme (alcohol dehydrogenase). The metabolites are the problem. Metabolic acidosis likely needs monitored and treated with $NaHCO_3$ in fluids. Use 0.3 – (0.5 × 30kg) × (24 – plasma HCO_3) gives you the mEq of bicarbonate to administer. Give half this dose IV slowly and monitor plasma bicarbonate every 4 hours. Fluid therapy to replace dehydration (% dehydrated × bwt in kg × 0.6, so 5% dehydrated × 30kg × 0.6 = 0.9L) can be administered over 2–4 hours while simultaneously monitoring urine output (normal urine output is 30–60mL/hr). If urine output is less than 15mL/hr the MPC is oliguric. Oliguria and anuria in dogs with ethylene glycol toxicity have a poor prognosis. Anuric animals should only have small amounts of fluid given to replace loses from respiration, defecation etc. If the animal is not anuric, continue kidney diuresis at maintenance rates of 60mL/kg/day (75mL/hr) with LR or Plasma-Lyte, continuing to monitor urine output.

C6. Canine CBRNE

Triage: Take care of yourself and other Rangers first. Move affected Soldiers first. Use the following guide when manpower can be spared for an MPC.

$M^4A^2R^2C^2H^2$ In a CBRNE environment terminate the exposure first. Move out of the contaminated area. Dogs do not have masks so inhalation is a major concern. Consider what is killing the animal and treat that first. Use the algorithm when not sure.

M^1ove the MPC out of the affected area (terminate the exposure). **M^2uzzle** the MPC. **M^3assive** hemorrhage (treat). **M^4edicate** (consider sedation and pain Medication, again – not needed if there is a loss of consciousness).

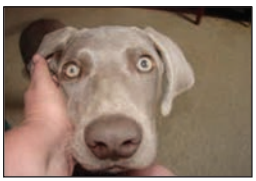
A^1ntidote (which antidotes depend on the signs, symptoms and knowledge of the agent(s) being used against you via M8 paper or JCAD reading) **A^2irway** (check that it is clear – choking agents need intubated early on).

R^1apid Decontamination There is not really a spot decon for the dog. A full decontamination can occur while awaiting evacuation to the decontamination site. Full decontamination should occur again at the designated decon site – see at the end of this section. **R^2espirations** If there is no physical wound, wheezing or coughing could be a choking agent or nerve agent; hypoventilation could be from an opioid agent; apnea or dyspnea could be from cyanide; tracheal/pulmonary rales (clicking) could be from mustard exposure.

C^1irculation treat hypovolemia as before **C^2ountermeasures** (oxygen, ventilation support and albuterol may be required for Lewisite/Mustard or choking agents).

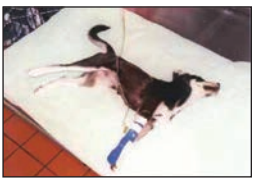
H^1ypothermia and **H^2ead Trauma:** Same as before.

Nerve agent signs: DUMBBBELLSS (Diaphoresis is sweating – dogs do not sweat!, **Urination, Miosis –** pinpoint pupils, **Bronchospasm –** tightness of chest cannot be conveyed to you by the dog but you may hear wheezing when auscultating the chest, **Bronchorrhea –** excess watery discharge from lungs leads to productive cough, **Bradycardia** (Normal dog 70–120bpm) **Emesis –** vomiting, **Lacrimation, Loose stool, Salivation, Spasms/Seizures**. Remember that miosis is not an early sign if it is absorbed dermally.



Miosis of R eye. Nerve agent would cause miosis in both

Example of a Seizure in a Dog



Nerve Agent Tx: You have minutes to hours depending on what agent, where the animal absorbs it (inhaled vs absorbed) and how much was absorbed.

Antidote: Mild signs 1–2 ATNAA (2.1–4.2mg atropine and 600 to 1,200mg pralidoxime chloride), 1 CANA (10mg diazepam), **Severe signs** (i.e., respiratory coughing and seizing) give 3–4 ATNAAs (6.3 – 8.4mg atropine and 1,800–2,400mg pralidoxime chloride), 2 CANAs (20mg diazepam). Scopolamine at 0.03mg/kg (about 0.9mg for an MPC) PO q12–24hr can be used as an alternative to atropine. Scopolamine acts as an antimuscarinic like atropine but may have better CNS effects.

Decontaminate: 4% chlorhexidine and water (process described at the end of this section). Do not use RSDL, it may react when bound with a chemical agent to bleach if bleach is used at the decontamination site. RSDL also only works in short haired areas or the hairless areas of the abdomen of a dog.

Treat to ease of breathing or cessation of secretions (do not worry about fixing miosis or muscle fasciculation initially, this response is usually delayed sometimes by months)!

Long-term: Atropine (0.4mg/mL) × 50mL in 250mL NaCl (20mg/300mL). Drip rate is 300mL/hr. When the pupils finally begin to dilate and/or heart rate normalizes reduce drip rate to 30–60mL/hr and continue to monitor.

PREVENTION: No mask. Pyridostigmine bromide 0.5mg/kg (15mg) PO q8hr (half the human dose).

BZ Agent Signs: Almost the opposite of nerve agent. BZ agent will cause mydriasis (dilated pupils), dry mucus membranes, tachycardia, hyperthermia, hypertension, warm skin, and seizures are possible.

BZ Agent Tx: Physostigmine at 0.025–0.5mg/kg (7–15mg) given slowly IV or IM. Do NOT sedate patient. Remove from the exposure.

Decontaminate: Route of absorption is by inhalation only, removing from the source is all that is necessary.

Blister Agent Signs: Can be immediately painful (Lewisite) or delayed (Sulfur mustard). In dogs the hair stands up (piloerection). Blisters do NOT occur. The skin becomes moist and hyperemic instead. Sloughing can occur later. **Lewisite –** immediate pain, restlessness vomiting, bloody diarrhea, shock, weakness, anemia, pulmonary edema, blepharospasm (squinting). **HD and HN (Mustard) –** asymptomatic latent period for a few hours then: Skin redness/ulcers, respiratory – cough, nasal discharge, difficult breathing, tracheal and pulmonary rales (clicking), GI – oral ulceration, abdominal pain, vomiting, bloody diarrhea, systemic – excitation, salivation, bradycardia, decreased WBC and platelet count, shock.

Blister Agent (Lewisite) Tx: Dimercaprol (BAL) 2.5–5mg/kg given IM q4hr for 2 days, topical BAL ointment as needed. Use a chelating agent: 1) CaEDTA at 1% (10mg/mL) in 5% Dextrose at 27.5mg/kg q6hr for 2 to 5 days or 2) Sodium Thiosulfate at 150mg/kg (4.5g). Adding 18mL of 25% (250mg/mL) Na Thiosulfate into 250mL of NaCl and bolus that over 10min gives the patient 4.5g.

Blister Agent (Lewisite and Sulfur Mustard) Tx: Provide topical ocular analgesia, early intubation and use of ventilator/PEEP and CPAP machine. Albuterol at 0.05mg/kg PO, antiemetic and antibiotics when secondary lung infections occur. Control of bronchospasm may require more than just albuterol, if steroid is used be aware that secondary lung infection risk is increased. Dexamethasone (0.025mg/kg q24 hours PO so about a 0.5mg – 1mg tablet) or prednisolone (1mg/kg q12hr for up to a week PO then 0.5mg/kg for another week)

Decontaminate: RAPID Decon (within 2 minutes) is vital! **4% chlorhexidine** (process described at the end of this section). Do not use RSDL, it may react when bound with a chemical agent to bleach if bleach is used at the decontamination site. RSDL also only works in short haired areas or the hairless areas of the abdomen of a dog. Flush the eyes with large amounts of water. Eye ointment for pain control only after thorough decon and examination. Steroid/antibiotic combination eye ointment works best for saving the eye.

Cyanide Signs: Generally not used as a munition due to insufficient amounts delivered and the nature of the chemical. Exposure more likely through ingestion poisoning or possibly by inhalation within enclosed spaces (tunnels/gas chambers). **Inhalation:** effects begin within 15 seconds, death within 6–8 minutes of a lethal dose.

Ingestion: Upset stomach for 7 minutes followed by increased depth and rate of breathing. Within 15 minutes the animal will likely lose consciousness. Convulsions/seizures, apnea, then the heart stops within 30 minutes. The loss of consciousness and seizures shortly after inhalation is similar to nerve agent inhalation; however, the cyanide casualty is not cyanotic (blue), pupil size is normal or dilated, and there are no secretions and no muscle fasciculation.

Cyanide Tx: Hydroxocobalamin (vitamin B12a) complexes with cyanide to form cyanocobalamin (vitamin B12). Requires IV access. 150mg/kg (4500mg or 1 cyanokit). It must be reconstituted/shaken for 30 seconds. More effective when combined with sodium thiosulfate 12.5g IV over 30 minutes. Second treatment option requires a two-step process: 1) amyl nitrite (crush an ampule and find a way to get the dog to inhale) or sodium nitrite at 300mg IV or IO over 5–10 minutes. These agents create a methemoglobinemia. The ferric ion (Fe^{3+}) in methemoglobin has a higher affinity for cyanide than the cytochrome oxidase molecule in the mitochondria. 2) sodium thiosulfate (12.5g over 30 minutes) which is a sulfur donor. The sulfur is used as a substrate to eventually convert cyanide to thiocyanate. Remember, the antidotes have to be given slowly, nitrite can cause hypotension and too much will overproduce methemoglobin causing a decrease in oxygen carrying capability. Administration of 100% O_2 is significantly helpful despite the fact that the poison prevents the use of oxygen in cellular respiration. Mechanical ventilation may be needed, circulatory support with crystalloid fluid administration, vasopressors if fluid administration does not correct hypovolemia. Dopamine at 10mcg/kg/min is probably ideal as it is a less potent inotrope than epinephrine or dobutamine and less vasoconstricting than norepinephrine.

Decontamination of Cyanide: Self-protection and then remove animal from the exposure source to fresh air. Dermal absorption does not occur and the substance is highly volatile. Decontamination is generally unnecessary unless liquid contamination has occurred to the coat. If this occurs, wash with water alone or water and soap.

Opiate Toxicity Signs: May occur if the animal is exposed to heroin or fentanyl/carfentanyl when clearing a building that turns out to be a drug facility or has a drug cache. Could be a weaponized agent someday. Occurs within 1–2 minutes by inhalation, 1–2 hours by ingestion. Altered mental status, animal may look dizzy or lethargic and end up in a coma, hypersalivation, hyperthermia, ataxia, bradycardia (normal HR 70–120), hypotension (normal systolic BP > 90mmHg, MAP > 65mmHg), hypoventilation, neck rigidity, and seizures.

Opiate Toxicity Tx: Naloxone is a pure opiate antagonist. It reverses most of the effects of high-dose opiate administration to include respiratory and CNS depression. Dose in dogs is 0.04mg/kg to 0.1mg/kg (or about 1.2mg to 3mg for an MPC) IV, IN (atomizer), IM, SQ recommendation is to give a ¼ of the max dose and repeat every three minutes until desired affect is achieved (half-life is about 1 hour in humans). Naltrexone 2–5mg/kg (60–150mg for an MPC) PO q24hr may be used when injectable naloxone is not available. Nalmefene 0.03mg/kg (0.9mg) IV has a much longer plasma half-life (11 hours) than naloxone. It is no longer available in the United States. It is/was used as an opiate reversing agent and to manage human alcohol dependence and addictive behaviors.

Choking Agent Signs: Ammonia, chlorine, phosgene, HC smoke, PFIB (perfluoroisobutylene), nitrogen oxide and phosgene. Ammonia (as well as sulfur mustard) work on the central airways and burn the tissue. This can cause laryngospasm and eventual collapse. Sulfur mustard will block airways when pseudomembranes slough off within the airway. The others are all peripheral acting agents except for chlorine which affects the patient peripherally and centrally. PFIB is released when Teflon burns (lines many military vehicles). Nitrogen oxide is released when gunpowder burns. **Central agents** tend to have immediate effects that include laryngospasm, sneezing that is painful, hoarseness to their bark, noise on exhalation, coughing and wheezing while breathing. **Peripherally acting agents** can have a latent period of 30 minutes to 72 hours. Major effects do not occur until hours later. If major signs show in less than 4 hours the prognosis is lower. Shortness of breath from pulmonary edema occurs. As damage progresses, this dyspnea becomes more severe and coughing develops with a clear foamy sputum. Phosgene patients can lose as much as 1L of serum into their lungs from protein denaturation.

Choking Agent Tx: Terminate the exposure. No mask for a dog so the animal must be moved from the contaminated environment. Establishing an airway in an animal that has stridor is important but may require sedation and the use of a bite block. Airway/trachea may require frequent suction with a squib to keep it clear. Ensure normovolemia and treat with crystalloid fluids if the animal seems dehydrated. 100% oxygen if needed. Enforce rest. Reserve antibiotics for confirmed secondary infections when possible. Steroid or albuterol therapy may be necessary for bronchospasm (albuterol at 0.05mg/kg PO, dexamethasone 0.025mg/kg q24hr PO; so about a 0.5–1mg tablet or prednisolone 1mg/kg q12hr for up to a week PO, then 0.5mg/kg for another week). Positive airway pressure helps oxygen delivery in the face of pulmonary edema but can decrease thoracic venous return and contribute to hypotension. Ensure blood pressure which may require fluid therapy. If a ventilator can be used, set as suggested below. Some BVMs have a PEEP setting.

Table 7: Mechanical Ventilator Settings & Key Parameters		
PARAMETER	**NORMAL LUNGS**	**ABNORMAL LUNGS**
FiO_2	100%, then reduce to < 60%	100%, then reduce to < 60%
Tidal Volume (V_T)	5–15mL/kg	5–15mL/kg
Breathing Rate (f)	8–20bpm	8–20bpm
Minute Ventilation (V_E)	150–250mL/kg/min	150–250mL/kg/min
Peak Inspiratory Pressure (PIP)	10–20cmH_2O	15–25cmH_2O
Positive End-Expiratory Pressure (PEEP)	0–2cmH_2O	2–8cmH_2O
Trigger Sensitivity	–2cmH_2O or 2L/min	–2cmH_2O or 2L/min
Inspiratory:Expiratory Ratio (I:E)	1:2	1:2
Inspiratory Time	≈ 1 sec	≈ 1 sec

Decontamination of Choking Agents: Not absorbed dermally, decontamination is only necessary to remove fluid, if present from the coat/skin of the animal and prevent vapor exposure from that source.

Biological Agents: Among likely biowarfare agents, MPCs may be susceptible to plague (*Yersinia pestis*), tularemia, brucellosis, Q-fever, and anthrax. Dogs are believed to be less susceptible than humans to all of these diseases.

PREVENTION: Doxycycline (6mg/kg or about 180mg/d). Doxycycline is generally considered efficacious against all biowarfare agents of concern, and the prophylactic dose may provide additional protection for MPCs. Ciprofloxacin (20–25mg/kg or about 600–750mg) q12hr may also be used.

Decontamination: Soap and water. MPC equipment should be decontaminated with 5% hypochlorite solution.

Nuclear and Radiologic Agents: Dogs exposed to nuclear weapons or radioactive material will have blast injuries, thermal and radiation injuries. Acute Radiation injuries will include those to the:

1. Bone marrow/hematopoietic system (0.3 and 10Gy). Survival rates decrease as the dose increases. Animals die from infection or hemorrhage (no platelets or WBCs).
2. GI tract (6 to greater than 10Gy). Survival is unlikely, changes to bone marrow and GI tract are destructive and generally irreversible. Death from infection, dehydration, and electrolyte imbalance generally within 2 weeks.
3. Neurologic and cardiovascular system (20 to greater than 50Gy). Death from circulatory collapse and increased pressure from edema, vasculitis and meningitis inside the cranial vault. Death can occur within 3 days.

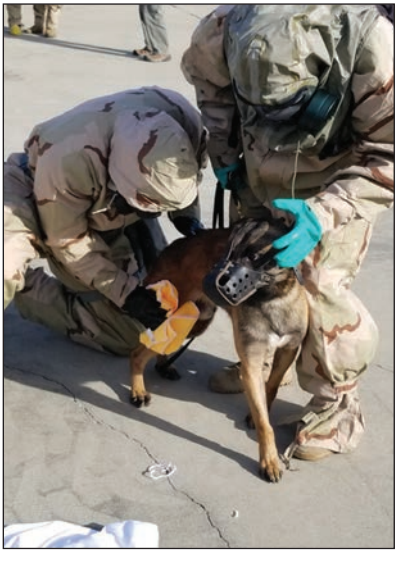
Burns will occur even without acute radiation injuries. Blistering, redness, itching, and ulceration occur. Healing occurs but large doses can cause hair loss, fibrosis, increased or decreased skin pigmentation.

Management and Treatment of Nuclear and Radiologic Injury: Remove from the source, M³ARCH for major trauma, decontaminate, then monitor airway, circulation, and breathing (check blood pressure, electrolyte status and urine output for radiation injuries) IV fluids may be necessary, anti-emetics and analgesia. Long term CBC count for lymphocytes or possible transfusion of dog blood when necessary. Dose can be estimated in humans based on lymphocyte count over the first 8–12 hours after exposure (taken every 2–3 hours or after every 6 hours for the next 2 days. Treat vomiting and track time of onset for vomiting, diarrhea, and itching, reddening, and blistering of the skin. It may be possible to use an Andrews Lymphocyte Nomogram to extrapolate dose/prognosis from the human chart. Radioactive iodine is associated with nuclear energy, Medical diagnostic and treatment procedures, and natural gas production. In a nuclear weapon detonation, it is produced as a byproduct from the fission reaction of uranium. It is released in the fallout and is a hazard to those that survive the initial blast. In the body the thyroid will take up radioiodine along with normal iodine. Taking potassium iodide (KI) fills up the thyroid with normal iodine preventing the damage it would receive from radioactive iodine. For MPCs, KI should be administered within 4 hours before or after the exposure. KI is generally issued in 130mg tablets. Administer half a tablet (65mg) once a day to a MPC by mouth until told to discontinue. Evacuate when possible and safe to do so. Protect yourself and the dog from KI and other radionuclides in the fallout by remaining inside and minimizing the opening of doors and windows, turning off fans, air conditioners, and forced-air heating units that bring fresh air in from the outside Humans (and animals) should avoid fruits, vegetables, and milk from the area until shown to be free of contamination.

Interesting facts: Hiroshima was a 15KT bomb. Ninety percent of people within 500 meters of ground zero died. At 1 mile from the center, two-thirds were casualties and one-third died. At 1.2 miles, half were casualties and 10% died. At 2.4 miles, 10% were casualties. Cumulative death rates rose dramatically in the first 2 weeks, with 90% of them within the first 3 weeks. Time shielding and distance from the center mattered for survival. Those in solid concrete buildings had better chances of survival than those in wooden building. Large numbers of deaths were caused by houses collapsing.

Canine Chemical Protective Equipment: Currently there is no issued equipment for MPCs. Protective gear is limited to booties and eye protection (RexSpecs) if the unit purchases this itself. The outer bag from an MRE, extra butyl-rubber protective gloves or JSLIST gloves, tape, or canvas over wrap may be used in place of booties. SERPACWA (skin exposure reduction paste against chemical warfare agent) may be used in nonhaired areas. There is no chemical protective suit or mask for a dog at this time. Due to the inhaled risk of most chemical agents, the use of a MPC in an environment known to have been exposed to a chemical warfare agent is not recommended. Any handler team inadvertently exposed to a chemical environment may use MRE bags/gloves/booties/eye protection and SERPACWA for the animal in an attempt to mitigate contamination while evacuating.

Generalized Canine Decontamination: CBRNE-contaminated animals will only be handled by individuals in MOPP4 and may require plastic aprons to prevent the suit from getting wet. An alert MPC will need to be sedated. Immediate decontamination can occur as soon as the animal can be removed from the contaminated environment, even before evacuation. This would be done to mitigate the rapid effects of nerve and mustard agent when there is any delay in transport to a larger patient decontamination site. Another thorough decontamination then occurs at the patient decontamination site.



MPC Immediate Decontamination: METT-TC will determine when these supplies are carried. Only one 500mL bottle of water is needed. A chlorhexidine surgical scrub brush, a small bottle of 4% chlorhexidine scrub and a microfiber towel are required. If mustard is suspected, flush the eyes with bottled water. Remove and discard the animal's vest. Four percent chlorhexidine is used and suds are generated over the entire body of the animal using the surgical scrub brush with minimal water from the 500mL bottle. It is not a bath, no rinse occurs. The suds are worked directly onto the dry hair of the rest of the animal's coat. The soft plastic teeth side of the brush does not abrade the skin and helps work the suds into the coat. RSDL is not required and may react with bleach needed later. After 5 minutes the chlorhexidine suds are wiped off the coat with a dry microfiber towel. Remember it only requires a tsp of mustard agent (to cover 20% of the body surface area) to be lethal for a human. That amount can be absorbed in less than 2 minutes.

MPC Patient Thorough Decontamination: When the MPC patient is evacuated to the patient decontamination site, the same decontamination process will occur as accomplished during immediate decontamination. This is done to remove anything that was missed. As the animal is brought in to the warm zone two extra handlers (ideally the battalion animal technician and another dog handler) dressed in MOPP4 and plastic aprons will need to be available. Again, alert animals will be sedated to keep them from licking themselves and soaking the JSLIST suit of the decon team. One individual will hold the dog, protecting the airway while the other decontaminates the animal as described above in initial decontamination. After the chlorhexidine has set for the required five minutes, and the animal is sufficiently sedated, remove the collar, intubate if necessary, rinse off (use the 0.5% bleach water if that is all that is available) if necessary (determine via JCAD) and moved through the shuffle pit. A half-gallon of 5% (house hold) bleach goes in a 5 gallon bucket, then fill the bucket to the top with clean water to reach 0.5% bleach solution. Once cleared by JCAD (with or without the bleach wash) the animal is handed over the Hot Line to two other individuals in the cold zone (ideally the regimental veterinarian and the regimental animal tech). A clean chain/biothane leash with a chain/biothane collar (from the cold side) will be applied in the cold zone. The animal will then be checked for residual agent using the Joint Chemical Agent Detector Monitor and moved to the triage and treatment area. After treatment the animal should be rinsed with plain water to remove any excess chlorhexidine or bleach to prevent a skin reaction. The contaminated handler would simultaneously proceed through the ambulatory patient decontamination area but likely be decontaminated by others. Care must be taken such that the animal, in its excitement, does not soak and contaminate the chemical protective suits of the handlers in the warm zone.

MPC Reference Card

Below is a quick reference of the most commonly used drugs and resuscitative fluid calculations for MPC triage and POI care. This reference is precalculated for the average, 31.8kg MPC and is a condensed version of the actual MPC Reference Card each handler carries for their specific MPC.

MWD Name:	CLYDE	Weight:	70.0 lb	31.8 kg
Gender	MI	Date Card Created: 27 JAN 2019		**Normal Values**
Breed	Belgian Malinois	ET Tube Size: 10mm		**Temp:** 99–102.5°F
DOB	12-Jun-11			**Pulse:** 70–120 bpm
Microchip number				*Anticipation/Excitement/Pain:* 100–160 bpm
Permanent duty site	FT. BENN, GA			*Exercising:* Up to 300bpm (sled dogs)
Deployment status	CAT I			**Shock:** Usually 160–200bpm
Last FAVN (date and pass/fail)	JAN 2019: PASS			**Resp:** 16–30 bpm (resting) Usually panting after exercise or hot outside temp
Most recent vaccinations:	Rabies: 25 JAN 19	DA2PP: 25 JAN 19	Lepto: 25 JAN 19	**BP:** 110–160 Sys/60–90 Dia/85–120 MAP Resusitation End Point MAP > 65
Gastropexied?	YES			**Shock Index:** HR/SBP < 1.0
Previous heat injury?	NONE			**PCV:** 35–45%
Master problem list				**TP:** 6.5–8g/dL Acute blood loss often has normal PCV and low TP
Diet (type and amount)				**Lactate** < 2.5mmol/L
Current medications	None			

Emergency Drug	Dosage	Units	MWD's dose	Units	Route
Atropine (bradycardia, bronchoconstriction)---------->	0.04	mg/kg	1.3	mg	IV or IM
Atropine (organophosphate, carbamate toxicity)---------->	0.2-0.5	mg/kg	6.4	mg	1/4 dose IV, rest IM or SC
Epinephrine (Hrt stopped, unresp CPR, shock from allerg rxn)	0.01-0.02	mg/kg	0.3	mg	IV, IT, IM or SC
Levetriacetam/Keppra seizures (Can use diazepam/midazolam)	30mg/kg IV / 20	mg/kg PO	954.5	mg IV	636.4 mg PO q 8hr
Diphenhydramine (Benadryl) Allergic Reactions---------->	4	mg/kg	127.3	mg	IM
Dexamethasone SP (Allergic Reactions)---------->	0.5	mg/kg	15.9	mg	IM or SC
Tranexamic Acid (TXA) (Massive Hemorrhage)	15	mg/kg	477.3	mg	IV intitially, then same amt over 24hrs
(Abbreviations):	IV= intravenous, IM= intramuscular, SC= subcutaneous, IT= intratracheal, PO=oral				
Emergency Fluid Considerations	L/per day		mL/per hour		
Maintenance fluid needs (60mL/kg/day)	1.9	L	79.5		
1/4 Shock dose IV Fluids (crystalloid - Plasmalyte, LRS, etc)	700	mL - Give this as fast as possible, then re-assess heart rate, mm, pulse, etc			
Full Shock dose of IV fluids (crystalloid - Plasmalyte, LRS, etc)	2864	mL			
Hetastarch dose of IV fluids	159	mL	Max Dose/24hr:	636	mL

MWD Name:	CLYDE	Weight:	70.0 lb	31.8 kg	
Sedation Mild (Losing consciousness, bleeding, weaker pulse, still moving but doesn't hold still & needs treatment)	Dosage	Units	MWD's dose	Units	Route	mL
Midazolam OR diazepam (if 5mg/mL)	0.3	mg/kg	9.5	mg	IM, SC, IV	1.909090909
Ketamine (if 100mg/mL)	5	mg/kg	159.1	mg	IM, SC, IV	1.590909091
Sedation Deep (Alert animal, normal pulse that needs treated)	Dosage	Units	MWD's dose	Units	Route	mL
Dexmedetomide (dose range is 0.001-0.020mg/kg)	0.008	mg/kg	0.3	mg	IM, SC	0.509090909
Midazolam OR diazepam (if 5mg/mL)---------->	0.3	mg/kg	9.5	mg	IM, SC, IV	1.909090909
Ketamine (if 100mg/mL)---------->	5	mg/kg	159.1	mg	IM, SC, IV	1.590909091
Sedation (For alert animal, normal pulse when no ket/mid available)	Dosage	Units	MWD's dose	Units	If 0.5mg/mL	Units/Route
Dexmedetomide (dose range is 0.001–0.020mg/kg)	0.013	mg/kg	0.4	mg	0.8	mL IM
Analgesia (pain mgmt) NO Advil (ibuprofen) or Tylenol!	Dosage	Units	MWD's dose	Units	Route	mL
2% Lidocaine Max Dose (local/skin/nn blocks for lacs) 5 min	5	mg/kg	159.1	mg	SC, IM	7.95454545
Bupivacaine (0.5% Marcaine) Max Dose (nerve blocks) 30 min	2	mg/kg	63.6	mg	SC, IM	12.7272727
Rimadyl (carprofen/NSAID)---------->	2.2	mg/kg	70.0	mg	PO, SC	Every 24 hr
Mobic (meloxicam/NSAID) Don't combine w/other NSAIDs-->	0.1	mg/kg	3.2	mg	PO,	Every 24 hr
Hydromorphone ---------->	0.1	mg/kg	3.2	mg	IV, IM	Every 2–6 hr
Naloxone (opioid overdose)	0.04–0.16	mg/kg	1.3	mg	IV, IM, SC	3.181818182
Fentanyl 50mcg/mL loading dose - excruciating pain	0.01	mg/kg	0.3	mg	IV, IM	6.363636364
CRNA Ax in a syringe for dogs	**Induction Dose / Route**					
Fentanyl 150mcg (3mL) + **midazolam** 5mg (1mL) + **ketamine** 200mg (2mL) + **dexmedetomidine** 0.25mg (0.5mL)	**3mL** IM, IV, IO lasts 20-30 minutes Dex will cause bradycardia (40–60 bpm) - Okay as long as BP is good					
For reference, the CRNA Ax in a syringe human mix is:	**Maintenance Dose**					
Fentanyl 100mcg (2mL) + **midazolam** 5mg (1mL) + **ketamine** 100mg (1mL)	**1–2mL** as needed IM, IV, IO (App every 20–30 minutes)					
(Add 1mL fentanyl, 1mL ketamine, 0.5mL dexmedetomidine) to this mix						

Chemical Attacks (Save yourself first, MOPP gear then decon the MPC)	
Nerve Agent Attack (Sarin, Soman Tabun, Vx)	Signs: Constricted pupils, difficult breathing, secretions, rapid pant, decr HR, muscle fasciculations. Tx: 1-3 ATNAA injectors + 1 CANA injector IM. Add 1 Atropen q 3min until secretions stop breathing eases.
BZ Agent Attack	Signs: Dialated pupils, incr HR, Behavioral changes, incoordination may not respond to commands Tx: Physostigmine salicylate 1-10mg IV Slow, IM Decon and DON'T SEDATE!
Arsenic Blister Agent Attack (Lewisite)	Signs: Redness, edema of the skin, cough nasal disch, restlessness, bloody diarhea, vomiting Tx: 100mg dimercaprol IM (aka BAL) 4.5g Na thiosulfate IV, 1.5mg albuterol PO
Cyanide Tx: 21mg Na nitrate IM, 600mg Na thiosulfate IM/4500mg hydroxocobalamin IV	Signs: Stops breathing, seizuring coma within minutes, death in 5-10 minutes. 300mg (10mL ampule of 3%) sodium nitrate IV followed by 12.5g sodium thiosulfate IV over 30 min

SECTION 7

PEDIACTRIC TACTICAL COMBAT CASUALTY CARE

Pediatric Tactical Combat Casualty Care Guidelines

Patient assessment and TCCC application largely remain unchanged for pediatric prehospital trauma patients, as compared to adults, except for the following considerations:

Massive hemorrhage: Owing to much smaller blood volumes in children than in adults, immediate control of massive hemorrhage is necessary to prevent hemorrhagic shock, and blood-based resuscitation must begin rapidly with any significant loss of blood. Use tourniquets high and tight. U.S. military-approved tourniquets are effective in children with limb circumferences ≥13cm (around 5 inches), generally children aged 2 years and over. Use of commercial windlass tourniquets will likely require more wraps around the limb and more turns of the windlass to achieve hemostasis as compared to adults. If the tourniquet is ineffective, use direct pressure, hemostatic gauze, and/or pressure dressings to stop life-threatening extremity hemorrhage. If the casualty is younger than 2 years of age or has a limb circumference < 13cm, use an improvised windlass tourniquet or elastic (ACE) bandage wrapped tightly. Circumferential and direct manual pressure is highly recommended at arterial pressure points.

Airway: A crying pediatric casualty's airway is intact. If the child is semiconscious or unconscious, their tongue is the most common source of airway obstruction. The younger the child, the larger the occiput compared to the rest of the body and the greater the importance of ensuring full head extension (by using a shoulder roll). Inadequate head extension results in airway occlusion. Although TCCC should always consider cervical spine injury in trauma, survivable pediatric cervical spine fractures are extremely rare and should not take precedence over establishing a patent airway.

Airway adjuncts (oropharyngeal/nasopharyngeal airways) can be used to maintain a patent airway. An adult bag valve mask (BVM) can be used for pediatric ventilatory support, but only use enough pressure to generate adequate chest rise, which is much less than required for an adult (avoid hyper- or overinflation). In extreme circumstances, surgical cricothyroidotomy can be performed on casualties younger than 8 years old, but caution must be taken in younger children because of immature thyroid cartilage and the small size or limited space of the cricothyroid membrane. Standard adult cricothyroid tubes are too large to fit a pediatric trachea, but pediatric endotracheal tubes can be modified to fit the cricothyroid membrane.

Resuscitation: Unlike in adult shock, hypotension is a late finding in the pediatric population. Children should be resuscitated early, before the onset of hypotension. Early signs of shock (before hypotension) include tachycardia and capillary refill ≥ 3 seconds. Signs of uncompensated shock include altered mental status, weak distal pulses, and hypotension. Permissive hypotension after hemorrhage is *NOT RECOMMENDED* in children. Adequate blood-based resuscitation should improve heart rate, respiratory rate, capillary refill, mental status, hypotension, and urine output (goal = 1mL/kg/hr).

Respiration: A pediatric respiratory rate is normally higher compared to an adult (Figure 1). Prehospital preventable death due to tension pneumothorax is exceedingly low and therefore, in the setting of hemorrhagic shock, resuscitation with blood products should be given before attempting chest decompression. When present, tension pneumothorax can

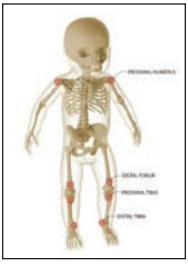
Figure 1: Range of Normal Pediatric Vital Signs

Age	Heart rate, bpm	Respiratory rate, breaths per min	Systolic/diastolic blood pressure, mmHG	Mean arterial pressure, mmHg
Newborn (birth–28d)	100–205	40–60	**65**–85/35–55	45–60
Infant (1–12mo)	100–180	30–55	**75**–105/35–55	50–60
Toddler (1–3yr)	95–140	22–40	**85**–105/40–65	50–60
Preschooler (3–5yr)	80–120	20–30	**90**–110/45–70	60–70
School-aged child (5–11yr)	75–120	18–25	**95**–120/55–75	65–70
Adolescent to adult (12–18yr)	60–100	12–20	**110**–130/60–90	70–85

BPM = beats per minute.

present dramatically in pediatric patients, where chest asymmetry may be significant. The limited intercostal space of the pediatric thorax makes finger thoracostomies difficult; therefore, forceps-assisted thoracostomy and/or needle decompression devices should be the first approach. The fourth intercostal space, mid-axillary line, to a depth of 1–1.5 inches is preferred over the second intercostal space, mid-clavicular line, because of the thymus. Fourteen- or 16-gauge, 1.5-inch needles are of adequate length to access the pleural cavity for all pediatric casualties weighing 36kg or less. The NDC catheter may act as a tube thoracostomy and may not require an additional chest tube in infants.

DIAGRAM 1: PEDIATRIC INTRAOSSEOUS SITES.



Circulation: Establish intravenous/interosseous (IV/IO) access and administer blood products as required to treat shock. Pediatric IV access is often hard to obtain in hypovolemic shock, given the small size of their veins. Early use of pediatric IOs is encouraged. Fifteen-millimeter (pink) IO needles are rarely helpful, as they tend to fall out due to the infant's underlying subcutaneous fat. Larger adult IO needles can be used in pediatric casualties, but these will likely stand outside the skin. Blue needles are preferred. Extra caution with yellow needles, as through-and-through potential in small limbs can lead to compartment syndrome from infused fluids. Be aware to stop the introduction when the bone marrow is reached. As such, hand twist IO needles into place, rather than using a drill, and pad the exposed needle with large amounts of gauze to prevent needle dislodgement. Proper placement becomes more important to avoid the growth plates. Based on locations of the injuries, consider bilateral proximal/distal tibial and bilateral distal femur IOs, as the primary sites in pediatrics (Diagram 1). If these sites are distal or not available due to the injury pattern, humeral IO needle placement in younger children may be considered.

Pediatric hemorrhagic shock should always be treated with blood products, preferably with whole blood and tranexamic acid: start with blood products at 10–20mL/kg in a bolus and tranexamic acid at 15mg/kg in a bolus (max 2g); administer a slow IV/IO push within 3 hours of injury, and avoid crystalloids/colloids if possible. Resuscitate to normal vital signs based on age (Figure 1) and improving physical examination findings, such as distal extremity capillary refill, cyanosis, mottling and pallor, and mental status. Hypocalcemia may occur in children with massive transfusion. Consider administering calcium to these patients. Calcium gluconate is preferred over calcium chloride due to the risk associated with extravasation in smaller pediatric veins.

Head Injury/Hypothermia: If unable to accurately capture pediatric blood pressure and pulse oximetry (evaluating for hypotension and hypoxia), normalize adequate circulation and respiration to prevent worsening of traumatic brain injury. A brief neurological assessment should be performed using AVPU (Alert, Verbal, Pain, Unresponsive; Figure 2), validated as a better tool than the Glasgow Coma Scale for pediatric neurologic assessment. If the pupils are sluggish, nonreactive to light, or dilated, head injury and/or inadequate brain perfusion should be suspected. In severe head injury, consider weight-based hypertonic saline administration.

Pediatric casualties have a higher body surface area to mass ratio, contributing to difficulty in maintaining their body temperature (lethal triad of trauma). Keep them warm with blankets, warmed fluids, and a warm environment. Their glycogen stores are also lower than those of adults, leading to decreased metabolic compensation during trauma and thermoregulation, especially in infants.

Vital Signs: Pediatric patients may not manifest significant changes in vital signs until they are in severe shock. Vital sign ranges vary by patient age (Figure 1). The lowest acceptable systolic blood pressure is calculated by multiplying the patient's estimated age by 2 years and adding 70 (i.e., 5-year-old: 5 × 2 = 10, + 70 = 80mmHg). Adult pulse oximetry finger probes may be used on children (≥ 10 years of age and/or 30kg) if their finger reaches the end of the probe. Younger children require a pediatric pulse oximeter to prevent inaccurate readings.

Estimate of Pediatric Weights: Obtain a dosing weight as soon as possible using adjuncts such as a Broselow™ tape, PAWPER, or CoTCCC Pediatric Trauma Tape (PTT). Direct measurement of weight is always preferred. Length-based weight estimates/tools are more accurate than age-based methods. In low- and middle-income countries, weight is often overestimated by the Broselow™ tape in these populations. For children who appear over- or underweight, consider adjusting to a lower or higher weight category for medications. For equipment sizing, length-based weight estimates are adequate.

Analgesia: Pain is often undertreated in pediatric casualties due to poor recognition and underdosing. In patients who cannot communicate, use an assessment tool such as the revised Face, Legs, Activity, Cry, and Consolability scale (FLACC-R; Figure 3) to improve recognition of pain. Pain medications should always be given using weight-based dosing.

Ibuprofen (if > 6 months of age) and acetaminophen are appropriate for mild pain and should be used as adjuncts in severe pain. Ketamine and opioid medications can be introduced for moderate to severe pain. Pediatric patients have a higher volume of distribution and are more prone to side effects or oversedation. Consider pre-treating for nausea with

ondansetron. Also, provide frequent reassessments of cardiopulmonary status through vitals and AVPU assessments after giving ketamine or opioids. Intranasal and rectal routes of medication administration are very effective in children. Transmucosal fentanyl lozenges should not be given to casualties under the age of 16. Have naloxone available for reversal of opioid medications to manage respiratory depression if it occurs.

Antibiotics: Recommended for all combat wounds. If a child can take oral medication, start with the same adult guidelines: cephalexin, 25mg/kg orally every 6hr (max 500mg/dose). If IV/IO/IM dosing is necessary, give ceftriaxone, 50–100mg/kg IV/IO/IM, every 24hr (max 2g/dose). Consider ertapenem for all abdominal or polytrauma wounds, where both aerobic and anaerobic organisms could be the source of infection (< 12 years: 15mg/kg IV/IM every 12hr: > 12 years: 20–40mg/kg IV/IM once).

Burns: Children have smaller airways than adults, making them more susceptible to edema and obstruction from inhalation injuries. Be vigilant for signs of respiratory distress / evidence of burns in the oropharynx, and be prepared for early airway intervention.

Given their higher body surface to mass ratio, children are more prone to hypothermia and fluid loss from burns. The estimation of total body surface area (TBSA) differs from that used for adults because of children's larger heads and smaller thighs. To estimate burn size, use the Lund and Browder chart, or use the child's palm and fingers, which equals 1% of their body surface area. Only include partial thickness (or worse) burns in the fluid resuscitation calculation.

Children have a higher fluid requirement per kilogram of body weight than adults. Greater than 10% TBSA of partial thickness (or worse) burns requires IV fluid resuscitation. If the child is not taking oral fluids well, shows signs of dehydration, or has other injuries, consider fluid resuscitation and/or maintenance fluids even with smaller burns. Calculate initial fluid needs based on the Pediatric Parkland formula (3mL × kg × % TBSA burned = total mL in first 24 hr). For children over 40kg, use "rules of 10s." Remember that children are especially susceptible to abdominal and respiratory fluid overload during resuscitation. If an escharotomy is indicated, be aware that children have thinner skin, smaller limbs, and different body fat distribution than adults. The margin for error is extremely small, especially in infants.

Splinting: Most pediatric fractures are not surgical and will only require splinting or casting. Ensure there is additional padding to protect bony prominences. SAM splints can be bent into shape, but do not cut them to size as internal aluminum can cause skin and soft tissue injuries. Pediatric fractures are a risk for compartment syndrome, including supracondylar and tibial fractures.

Given the emotional immaturity of some children, they will require sedation in addition to pain control during reduction and splinting. IN/IV fentanyl and midazolam are ideal for simple reductions/procedures. Ketamine is recommended if reduction is anticipated to take more than 20min or if pain cannot be adequately controlled by other means. Gross deformity of the elbow often require urgent surgical intervention. Consider hematoma or peripheral nerve blocks as adjuncts to pain control.

Triage

Communication: Regardless of age and injury, children may feel upset or have strong emotions after an emergency. It is important to explain the "need to know" information in simple terms, so the child can understand. Sit down or squat to be at the child's eye level. Allow time for the child to ask questions and be patient with the child's responses. Medical providers should acknowledge the child's feelings and reassure the child that it is okay to feel their emotions. If possible, use the parents/caregivers to comfort the child and use visual aids to explain medical concepts. Do not talk down to the child or make false promises, like stating that an intervention will not hurt if it is likely to cause some degree of pain.

Evacuation: Most existing litter systems are not pediatric-size specific, making safely securing casualties challenging. Consider using ACE wraps, rolled towels/clothes/medical tape or modified straps to adequately secure children. Before evacuating a child, consider the medical rules of engagement and the type of facility the child will be relocated to.

Class VIII Considerations and Modifications of Adult Equipment

- Recommended minimum equipment: 100mL normal saline bags, 10mL normal saline pre-filled syringes, 3mL or smaller syringes, intranasal mucosal atomizer device.
- Oral/nasal gastric tubes are required for effective positive-pressure ventilation and can facilitate rehydration and feeding in severely injured patients (i.e., those with burns).
- Adult needle decompression devices may be used for pediatric tension pneumothoraces. Adult BVMs may be rotated 180° and used as a full-face mask (with the rounded portion covering the nose/eyes). Remember to only use enough pressure to generate adequate chest rise, much less than required for an adult.
- An aluminum malleable splint can be used for pressure points into the femoral triangle and combined with a U.S. military approved tourniquets as a pelvic binder.

Figure 2: AVPU Mental Status Exam

AVUP: A quick method to evaluate pediatric mental status, Alert = best, Unresponsive = worst.
The four possible recordable outcomes are as follows:

- **Alert:** The patient is fully awake but may not necessarily be oriented. The child will spontaneously open eyes, respond to voice (may be confused), and have bodily motor function.
- **Verbal:** When you talk to the child, they respond in some manner, categorized as any measures of eyes, voice or motor response. For example, the response by eyes opening, moaning/grunting, or slight movement of extremity.
- **Pain:** The child responds to pain stimulus through any measures of eyes, voice, or motor response.
- **Unresponsive:** No response to verbal or pain stimulus.

Figure 3: FLACC-R Pain Assessment

	0	1	2
Face	Smile or no expression	Occasional grimace, withdrawn, disinterested, appears worried	Frequent or constant chin quivering, clenched jaw, panicked expression
Legs	Normal position, relaxed, normal tone	Uneasy, restless, tense, occasional tremors	Kicking or legs drawn up, constant tremors
Activity	Lying quietly, normal position, moves easily, breathing normally	Squirming, shifting, tense, shallow respirations	Arched, rigid or jerking, gasping respirations or breath holding
Cry	No cry	Moans or whimpers, occasional complaints	Crying steadily, screams, sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching or talking, distractible	Difficult to console, resists comfort attempts

0–3 = mild pain; 4–6 = moderate pain; 7–10 = severe pain.
FLACC-R = Face, Legs, Activity, Cry, and Consolability scale (revised).

Commonly Used Weight-Based Medications

Resuscitation		Analgesia/sedation	
Whole blood	10–20mL/kg IV/IO	Ketamine Analgesia	• 0.5mg/kg IV • 1mg/kg IM/IN*
Plasma	10–20mL/kg IV/IO		
Tranexamic acid	15mg/kg IV/IO	Sedation	• 1–1.5mg/kg IV • 4–5mg/kg IM*
Calcium gluconate	60mg/kg IV/IO		
Calcium chloride	20mg/kg IV/IO		
Opioid analgesia		**Sedation**	
Fentanyl	• 0.5–1µg/kg IV+ • 2µg/kg IN*	Midazolam	• 0.05–0.1mg/kg IV++ (first dose max 2.5mg) • 0.05–0.15mg/kg IM* • 0.2–0.3mg/kg IN*
Hydromorphone	0.01–0.015mg/kg IV+		

+Given higher concentrations of opioid analgesia commonly available through the military Authorized Medical Allowance List, dilution with normal saline may be necessary to obtain appropriate dose.
*All intranasal/intramuscular administration of medications, use the highest concentration available. If > 0.5mL of total IN volume, split the dose between nostrils, as too much volume in a single nostril will not be absorbed but swallowed.
++Start all pediatric single doses no more than 2.5mg and repeat every 3–5 minutes as necessary, to maximum of 10mg.
IM = intramuscular, IN = intranasal, IO = intraosseous, IV = intravenous.

NOTES

SECTION 8

MEDICAL PLANNING & CASUALTY COLLECTION OPERATIONS

Casualty Response Planning Overview

In planning and training for combat casualty management, the focus is on the possible, not the impossible. Essentially, there are three groups of casualties that will be encountered. In the first group, no matter what you do, the wounded will live. In the second group, no matter what you do, the wounded will die. In the third group, if you do the right thing, at the right time, your treatment and evacuation will make the difference between life and death, or between greater and lesser disability. The Casualty Response System is focused on this third group as there is a much greater probability of positively affecting mission and patient outcomes.

Decisions in tactical casualty management are not made by persons far removed from the event. The casualty response system will be a flattened organization with decentralized decision-making that empowers first responders, tactical leaders, and medical providers at all levels. As all will have direct ownership of the system, they will invest in realistic casualty management training in order to become more efficient and effective at and near the point of injury. Ultimately, this will equate to lives saved.

Medical planning in Ranger units depends heavily on the experience and knowledge of the Ranger medical Team. **ALL Tactical Medics, from the most junior to the most senior, must become skilled planners.** Effective medical planning requires that the planner be well integrated into the unit's (platoon/company/battalion/regimental) mission planning staffs. Many medical issues that arise during planning are regulated, decided or solved by other members of the unit staff including the S3 (operations), S3 (air), S4 (logistics), commanders, executive officers, first sergeants, and platoon sergeants. Good working relationships and effective communications must be maintained for successful medical planning. Medical planners must be fluent in the unit's planning sequences (compressed or deliberate) and have a good understanding of the role they play therein. Medical planners must be involved as early as possible in planning sequences for ALL training exercises and real-world contingencies.

The medical plan will include an overall "casualty response" plan in which every unit member has a role. When a casualty occurs, it is not just the Medic's problem; it is a tactical problem that must be planned for and solved by the entire unit. Units will integrate a casualty response phase into all of their tactical battle drills. Unit members and leadership must be well versed in the casualty response plan. Medical personnel have a tendency to focus on providing critical patient care once they begin treating casualties, and as such may not be able to maintain sufficient situational awareness to execute the plan. The unit must be able to execute the casualty response plan around the Medic while the Medic treats the wounded. Battlefield distracters, wound distracters, and C2 issues and shortcomings all have an impact on both the commander's and Medic's decision-making during an ongoing mission.

Ranger Casualty Response Planning

The backbone of this section is based on the intricacies of a forced-entry combat operation or the execution of a special operations contingency. For Ranger and SOF units, the initial entry into combat operations is likely to be in a new theater of operations or one of extended distances to casualty care assets. As additional military forces follow-on and develop a theater, the medical support becomes much simpler to plan as there are more assets available. During combat operations in which the Ranger unit is deploying to a developed theater (such as Iraq or Afghanistan), the unit can quickly adapt to existing medical assets and resources to develop the casualty response plan.

The compressed time nature of contingency operations requires the medical planner be well versed in the unit planning methodology and the high expectations of a developed plan. Using the planning methodology outlined here for any type of exercise or deployment, the medical planner will gain better understanding and habits to execute such a plan under any circumstances. However, there is no such thing as a "usual" planning technique. Every mission, regardless of timeline, assets, or constraints, is unique and must have a developed casualty response plan.

Predeployment Requirements

The 75th Ranger Regiment has very specific predeployment Soldier readiness processing (SRP) requirements, allowing the unit to be deployed on a compressed time sequence anywhere in the world. Prior to any deployment or assumption of OPALERT, unit Medics should review the current Regimental Medical SOP (RTC 350-29) that outlines SRP requirements. Rangers will be briefed on the medical threats and preventive medicine measures that will keep them healthy in a particular area of operations. If a compressed time sequence deployment, Rangers will be briefed on critical preventive medicine measures significantly different than normal operating procedures. Also, during the predeployment phase is the time to conduct predeployment inspections of individual Ranger's IFAKs, Advanced-RFR Bags, active Ranger O Low Titer (ROLO) rosters (battalions conduct ROLO within 30 days prior to assuming OPALERT; active ROLO roster is valid for 120 days), and squad casualty evacuation equipment serviceability and to verify the ability to draw medical chemical defense material (MCDM)from the installation MTF and blood products from the partnering blood donor center.

Medical Threat Assessment

The medical planner must assess all medical threats the unit may face during the operation. This assessment includes environmental health hazards as well as specific threats from enemy weapons systems. Through the medical threat assessment, the medical planner will identify preventive measures the unit can employ to minimize these threats. Once the preventive measures appropriate to the mission have been selected, medical planners must be prepared to make recommendations to unit commanders, leaders, and Rangers on how to employ them. The overall goal is to have healthy Rangers ready to perform a mission, keep them healthy during the mission, and safely bring Rangers back home.

Identify the Area of Operations (AO). The medical planner must develop a clear understanding of medical threats and assets in the countries, regions, and environments where the operation will be conducted. The locations of targets, staging bases, etc. must be known in order to adequately plan for medical threats. The most important area to assess is the target area. This is the area or region in which the unit will be conducting tactical missions. The host country or staging area must also be evaluated. This is the secure region used as a base of operations. The threats here may or may not be the same as those of the target area.

The following websites are good sources for determining host nation clearance guidelines:

Electronic Foreign Clearance Guide (NIPR): https://www.fcg.pentagon.mil; (SIPR): https://www.fcg.pentagon.smil.mil

Identify Medical Intelligence and Health Threats. Medical Intelligence is a key component of all training and contingency operations. Information on hazardous plants & animals, prevalent diseases, required immunizations & chemoprophylaxis, climatology, and medical & hospital capabilities in the areas involved should be gathered. The National Center for Medical Intelligence (NCMI) is a primary source for medical intelligence. NCMI collects and disseminates information on disease occurrence, medical capabilities, health services, and environmental health hazards specific to regions around the world.

The unclassified NIPR internet address for the NCMI is https://www.intelink.gov/ncmi/index.php. The classified SIPR internet address for NCMI is http://www.afmic.dia.smil.mil

Another good open source website for determining host nation sustainment preparation and medical infrastructure is https://www.pixtoday.net

MEDCOP (health services placemat) – (SIPR): https://hqsaid01.ds.centcom.smil.mil/medcop/# (health services placemat), is helpful for determining current conventional and SOF medical assets in theater.

Some other sources for medical intelligence are:
Centers for Disease Control and Prevention (CDC) http://www.cdc.gov/
U.S. State Department Travel Warnings & Consular Information https://www.state.gov/travel/
World Health Organization (WHO) Homepage http://www.who.int/en/
U.S. Army Public Health Command (formerly known as the Army Center for Health Promotion and Preventive Medicine)
NIPR: http://phc.amedd.army.mil/ SIPR: https://phc.army.smil.mil

The medical planner must also maintain an awareness of the unit's medical readiness status. A review of immunization and health records should be conducted well before the operation begins.

The types of enemy weapons the unit may encounter, including chemical and biological weapons must also be determined. The planner will make recommendations to prevent and treat the injuries these weapons may inflict, such as the use of body armor, chemoprophylaxis, or protective masks.

MEDICAL THREAT ASSESSMENT

- NCMI SIPR/NIPR website – find country/area of operations
  - + Host country (ISB/FSB) and https://www.pixtoday.net
  - + Target country
- Determine known health threats & risks
  - + Diseases/illnesses
  - + Environmental threats (plants, animals, climate, terrain)
- Current unit SRP status
- Preventive medicine guidelines (what is required before, during, and after)
- Enemy weapons, munitions, and tactics, to include CBRN?
- How ready is the unit if it encounters diseases/illnesses?
- What preparation is needed by the unit?
- Do Rangers need special preventive medicine items issued?

Higher Headquarters Orders and Guidelines

Higher Headquarters Medical Guidelines and Requirements. The operational headquarters will often publish specific guidelines regarding casualty evacuation and hospitalization as well as preventive medicine requirements in its operations orders (OPORDs). The planner must determine if unit members will have to take medications before, during, and after the mission to prevent illnesses such as malaria. A key question asked is, "Does the unit need to change normal procedures to meet higher headquarters mission guidelines or requirements?"

HIGHER MEDICAL GUIDELINES & REQUIREMENTS

- Chemoprophylaxis
  - + Antimalarial drugs
  - + Other preventive measures
- Special SRP requirements
- WHO Traveler Advisory
- USSOCOM/USASOC/theater guidelines
- Regiment/battalion guidelines
- Do we need to change anything in the way we normally do business?

Requests for Information (RFI). Medical planners will be familiar with the processes for requesting updates to dated information about disease or environmental threats. Sources for such periodic reports and publications may lie within the chain of command, or may be external, such as international health organizations. Maps, imagery, and information on medical facilities in the staging or target areas will also be needed for planning.

REQUESTS FOR INFORMATION (RFI)

- Request updates to NCMI information
- Maps/imagery
- Host nation (ISB) medical capabilities
  - + Hospitals/medical facilities
  - + Nationwide medical training/competency
- Any information not covered in NCMI online resources or higher guidelines
- Submit through medical, intelligence (S2), and/or operations (S3) channels
- Ask for more information for what you need to know

Determine Medical Assets

On a given operation, the unit will be supported by its internal medical assets. External medical personnel, equipment, or units may also be attached or used as needed. A thorough understanding of all medical assets available to the mission is crucial. This includes the proper unit designations or names, number of personnel by specialty, treatment & evacuation capabilities, logistical requirements, task organization, and command & control. It is important to ensure that all external medical assets are well connected into the unit's structure operationally, logistically, and administratively.

Evacuation Assets. There are two types of evacuation during tactical evacuation (TACEVAC) operations: casualty evacuation (CASEVAC) and medical evacuation (MEDEVAC). CASEVAC implies the use of nonmedical platforms to evacuate casualties. These mission platforms are ground vehicles, watercraft, or aircraft typically used by the unit for infiltration, exfiltration, or resupply. These vehicles do not usually have organic medical personnel or equipment onboard unless prepositioned in the operational plan. These assets are more suited for routine evacuation of nonemergent casualties, but prestaged medical personnel and equipment can facilitate the treatment and transport of the more seriously wounded. Medical planners should plan for the use of CASEVAC assets as much as possible, as these assets are often the most readily available for rapid evacuation.

Furthermore, CASEVAC assets are usually armed and are thus better prepared to conduct evacuation while the fight with the enemy is still ongoing. MEDEVAC refers to the use of dedicated medical platforms whose primary mission is the evacuation of casualties. Most often conducted by aircraft, MEDEVAC can also be carried out using medically staffed and equipped front line ambulances (FLAs, MRAP, Stryker). MEDEVAC platforms are usually assigned to a regulated region, are not under the direct control of the tactical unit and must be requested through operational channels in the execution sequence. Controllers in operations centers receive MEDEVAC requests and launch or divert MEDEVAC assets as required on a prioritized basis.

Unit medical planners will determine the casualty evacuation assets that will likely be needed to support the unit's mission whether by air, ground, or water. Assets should be matched to the expected needs in pre-mission planning.

Med planners should also be knowledgeable of Strategic evacuation (STRATEVAC) from the joint operations area (JOA) MTF to a home or allied nation MTF with higher capability of care (e.g., transfer to a Role 4) through the Theater Patient Movement Requirements Center TPMRC (a component of USTRANSCOM). TPMRC assist patients who require transfer to a military treatment facility. Coordination with TPMRC may be necessary IOT decompress casualties from the JOA MTF for patient holding capacity.

DETERMINE MEDICAL ASSETS

- Organic, attached, air, ground, theater, JTF, host nation, ISB, FSB, etc…
- CASEVAC/MEDEVAC support
  - + How many and what type?
  - + Capabilities and limitations?
  - + Hoist and high angle extraction?
  - + Medical personnel and equipment on board? Level of training?
- Determine nearest surgical capability
  - + Where are your casualties being evacuated to?
  - + What are the capabilities/limitations?
  - + What is their MASCAL or overload plan for their system?
- Determine staging base area medical support
  - + Can they provide labs, x-rays, medications, preventive medicine, etc?
- What are the gaps in care or requirements that exceed tier medical capabilities?
- Are there conventional assets aligned to that combatant command that can meet those requirements?
- Discuss request for force options with the S3/G3 cell to determine feasibility (e.g., mobilization and command/support relationship considerations).

Familiarization with Evacuation Assets. In premission planning, there are key questions that must be answered concerning CASEVAC and MEDEVAC. How many and what type of platforms are available? What are the capabilities, limitations and restrictions of the platforms? Are air evacuation assets capable of hoist or high-angle extractions? What medical equipment is on board each platform? Who are the assigned medical personnel and to what levels are they trained?

Requesting Evacuation. MEDEVAC requests are normally transmitted using the standard NATO 9-Line MEDEVAC Request Format. The MEDEVAC request provides controllers in operations centers with the critical information needed to launch and manage MEDEVAC platforms. The standard format can be used to request any kind of evacuation asset: air, ground, or waterborne. CASEVAC requests can be tailored specifically to the unit mission and operating area, but typically consist of the first 5 lines of a MEDEVAC request. This works for CASEVAC platforms since they are normally already part of the tactical operation, and the pilots/drivers have a clear understanding of the battle space through previous coordination and ongoing communications. Though the request from the tactical element on the ground is normally transmitted by radio; the request from the unit's C2 may be by other means such as e-mail, operational chat room (mIRC or TransVerse) or telephone. The unit C2 must be aware of these requirements to better streamline the evacuation request process during the execution phase.

MEDEVAC REQUEST 9-LINE	
LINE 1: LOCATION OF UNIT	HLZ GRID (MGRS):
LINE 2: CALLSIGN AND FREQUENCY AT THE PZ	CALLSIGN: FREQUENCY:
LINE 3: NUMBER AND PRECEDENCE OF CASUALTIES	A: Number of Urgent Casualties B: Number of Urgent-Surgical Casualties C: Number of Priority Casualties D: Number of Routine Casualties E: Number of Convenience Casualties
LINE 4: SPECIAL EQUIPMENT REQUIRED	A: None B: Hoist C: Extraction D: Ventilator E: Other (specify)
LINE 5: NUMBER OF CASUALTIES BY TYPE	L: Number of Litter Casualties A: Number of Ambulatory Casualties E: Number of Escorts
LINE 6: SECURITY AT PZ	N: No enemy P: Possible enemy E: Enemy in area X: Armed escort required
LINE 7: PZ MARKING	A: Panels B: Pyrotechnics C: Smoke (designate color) D: None E: Other (specify)
LINE 8: CASUALTIES BY NATIONALITY/STATUS	A: US/Coalition Military B: US/Coalition Civilian C: Non-Coalition D: Non-Coalition Civilian E: Opposing Forces/Detainee F: Child
LINE 9: DESCRIPTION OF TERRAIN (In peacetime, description of terrain)	Brief description of significant obstacles on approach/departure headings and type of predominant terrain for the HLZ

Additional Evacuation Request Information. Depending on how developed the theater of operations has become or the number of units being supported by a particular evacuation asset, there may be additional information requirements. Such requirements can both allow evacuation C2 to better prioritize assets and notify receiving facilities of patient conditions. After a patient is assessed, a MIST report will be transmitted in the same manner as the 9-line MEDEVAC. The MIST report both informs the MEDEVAC crew of patient status and notifies the receiving facility of incoming patient requirements. The MIST report is not required to launch an evacuation asset but is to be transmitted as soon as possible.

MIST REPORT	
M – MECHANISM OF INJURY AND TIME OF INJURY (IF KNOWN)	Mechanism of injury and time of injury (if known)
I – INJURY OR ILLNESS	Injury or Illness
S – SYMPTOMS AND VITAL SIGNS	A – Airway status B – Breathing rate C – Pulse rate D – Conscious/unconscious E – Other signs
T – TREATMENT GIVEN	Such as tourniquet/time applied Drugs administered

Rehearsals with External Assets. The unit's leaders and tactical Medics will coordinate face-to-face with external evacuation personnel prior to mission execution to assure a clear understanding of procedures by all personnel. The rule, not the exception, is that live rehearsals with evacuation assets are conducted to prepare for smooth handover of casualties. Unit Operators, medical teams, aid & litter teams, and C2 must practice with the evacuation platforms prior to mission execution. During the real evacuation of a wounded Ranger is not the time to learn how to position and secure a litter to the evacuation platform.

Surgical and Area Medical Support Assets. The medical treatment facilities to which combat casualties will be transported must be identified. Their capabilities and capacities (especially surgical) should also be documented. With this knowledge, planners can predict how many of what type of casualties could overwhelm a given facility, and casualty flow can be directed accordingly. Furthermore, casualties can be routed directly to facilities with greater capabilities if dictated by the severity of their injuries. For casualties with severe injuries, evacuation to a fully capable field hospital has been found to produce better outcomes than evacuation to a treatment facility with limited surgical and intensive care capabilities if the evacuation times are comparable.

MEDICAL TREATMENT FACILITIES

Per Allied Joint Publication-4.10(A), the following define the levels of medical treatment facilities in a theater of operations.

ROLE 1 MTF (Maritime Echelon 1) – provides primary health care, specialized first aid, triage, resuscitation and stabilization. The basic Role 1 capabilities include basic occupational and preventive medical advice to the chain of command, routine sick call and the management of minor sick and injured personnel for immediate return to duty, as well as casualty collection from the point of wounding and preparation of casualties for evacuation to the higher level MTF. *Nearly all Ranger health care capabilities are considered Role 1 unless augmented by external assets made organic to the task force. Generally, the Regiment maintains role-1 capability within the confines of tactical health care/ casualty response on target and aid stations established at forward operating bases.*

ROLE 2 MTF – A Role 2 medical facility is an intermediate structure capable of receiving casualties, providing triage and stabilization for further evacuation, treatment and holding of patients until they can be returned to duty or evacuated. Role 2 minimum capability includes: Re-supply to Role 1, Evacuation from Role 1, Limited holding capacity, Personnel reinforcement to Role 1, Patient record maintenance, Tracking of evacuated patients, Operational stress management, Laboratory capability, Basic imaging capability (e.g., radiology, ultrasound), and emergent dental. *Under specific conditions, Ranger units may be augmented by other units to have a Role 2 capability organic to a special operations task force.*

ROLE 2 (+) MTF (Maritime Echelon 2) – Augmented Role 2 (Role 2+) medical facilities consist of Role 2 minimum capability augmented by any or all the following: Emergency surgery, Intensive care, Essential post operative care, and Blood replacement.

ROLE 3 MTF – Facilities include the capability of Role 2 extended by surgery, intensive and post-operative care, medical, dental and nursing care, and relevant diagnostics. Role 3 units can provide lower level units medical personnel replacement. Resupply of Role 2 facilities and either control of or ready access to patient evacuation assets are included within the minimum capability. In addition to beds required for the seriously ill, the holding capacity will be sufficient to allow diagnosis, treatment and holding of those patients who can receive adequate treatment and be returned to duty within the evacuation policy.

ROLE 3 (+) MTF (Maritime Echelon 3) – Augmented Role 3 (Role 3+) medical facilities include one or more of the following: specialist surgery (neurosurgery, maxillofacial, burns, etc.), advanced and specialist diagnostic capabilities (CT scan, arthroscopy, sophisticated lab tests, etc.), major medical, dental and nursing specialties, preventive medicine, and environmental health capability.

ROLE 4 MTF (Maritime Echelon 4) – A facility that provides definitive care of patients for whom the treatment required is longer than that dictated by the theatre evacuation policy or for whom the capability usually found at Role 3 is inadequate. This would normally include definitive care specialist surgical and medical procedures, reconstruction and rehabilitation. This care is usually highly specialized, time consuming, and normally provided in the casualty's country of origin. Under very unusual circumstances, a Role 4 medical facility may be established in the Theater of Operations.

Face-to-face coordination with appropriate external medical assets is critical. The medical planner must visit the supporting medical facilities to gain an understanding of their physical layouts, unique equipment, procedures, casualty management, and patient accountability. Also, unit medical personnel must know how to follow up with the unit casualties as commanders will require serial reports on their status.

Deployed troops will suffer routine illnesses and noncombat injuries that may require medical attention exceeding the tactical Medic's scope of practice. Area medical support assets are those facilities that provide medical services other than combat trauma care to meet these needs. Established policies and procedures for Operators' care at area medical support facilities should be conveyed to unit leaders and medical personnel.

FAMILIARIZATION WITH MEDICAL ASSETS

- Published references
  - + Field Hospital
  - + Forward Surgical Resuscitative Detachment (FRSD)
  - + Medical Company Area Support (MCAS)
- Review these key Army Health System and Force health Protection publications at https://armypubs.army.mil/:
  - + FM 4-02 Army Health System
  - + ATP 4-02.3 Army Health System Support to Maneuver Forces
  - + ATP 4-02.55 Army Health System Support Planning
- Can you see their layout/equipment?
- Can you conduct familiarization training as required?
- What are their capabilities and limitations?
- Can you talk to them and what can they know about you and your mission?

Special Operations and Augmentation of Surgical or Medical Support Assets. In special operations contingencies, the evacuation and receiving facilities options may be greatly different from the medical support in a developed theater. The "golden hour" can be significantly extended in distance and time from the point of injury to an established medical or surgical facility with proper implementation of special operations surgical assets. The current battlefield and future contingency operations nullify the option of calling in a MEDEVAC or quickly evacuating a casualty to a field hospital. The evacuation and long-range care capability may need to be completely planned and coordinated using the assets organic to the special operations task force. In these cases, it is critical that these capabilities be augmented into the special operations task force when time and OPSEC allows. The intent remains to get a traumatized casualty appropriate en route care to an advanced surgical or medical capability as quickly as possible. Such contingencies will require augmentation from other units or attachments to conduct en route casualty stabilization on a designated platform or sequence of platforms until the casualty reaches a fixed facility. Augmentation capabilities requirements must be identified early in the planning process to allow adequate time for the planning and coordination. Once this medical asset is identified, it must integrate early into the planning and synchronization process. Assets will need to be prestaged at specific locations or on evacuation platforms in order to provide the unit with the upmost capability. Unit leadership will develop a thorough understand that these special medical assets become part of the overall unit plan and execution. The unit may have to adjust combat loads in order to stage or infiltrate medical support assets as required. Ultimately, the unit commander is responsible for the allocation, synchronization, and employment of all the augmented medical resources available to complete the unit's mission. The medical planner's responsibility is to ensure the commander and staff is well informed of requirements, capabilities, limitations, and employment methods of medical augmentation. Subsequently, the medical planner must provide the medical augmentation with the constraints and restrictions that they must operate within the mission. Special operations, by its very nature, tend to be a joint, interagency, and international affair. Therefore, the medical planner must widen their viewpoint to all available medical resources and capabilities within reach. Familiarization with the medical unit capabilities of other military services and international assets is imperative to mission success. Additionally, the use of host-nation medical capabilities must be factored in as an option if necessary.

Primary and Alternate Planning. As with all military operations, the unit and the medical planner will develop back-up plans. A unit should never launch on a combat mission with a single planned means of casualty evacuation. Alternatives for all possible routes of evacuation to and from the objective (e.g., air, ground, water) should be written into the medical plan. Alternate receiving facilities should be identified in case mass casualty situations occur or conditions prohibit evacuation to primary facilities. Additionally, weather and environmental conditions can have detrimental effects on pre-planned evacuation operations that can be mitigated by a good alternate plan. As the medical planner develops the tactical medical support plan the following must be considered: Primary and alternate means of evacuation including the capabilities, limitations, distances and communications methods; primary and alternate receiving medical treatment facility to include capabilities, limitations, bed status and mass casualty over-flow contingencies.

Tactical Medical Support Plan Development

Understand the Tactical Commander's Plan. The tactical medical planner must understand the overall scheme of maneuver of the forces arrayed on the battlefield. This understanding is gained by attending all of the operations planning meetings and ensuring that medical operations are well synchronized into the tactical plan. Tactical plans may evolve rapidly, so the medical planner must keep abreast of changes, and should participate in course of action development to determine how the various options can be supported medically.

Casualty Estimation. Medical and tactical planners should predict where casualties are likely to occur and develop casualty management and evacuation plans for all phases of the operation (infiltration, assault, clear/secure, consolidation, exploitation, defense, and exfiltration). Other key elements to consider are the layout of the target and template of enemy positions as projected by intelligence and operations staffs. Understanding the commander's tactical plan will indicate how best to develop the medical support plan.

Casualties should be expected and planned for in all phases of any tactical operation from en route, infiltration, assembly, assault, actions on the objective, consolidation, defense, exfiltration, and return to base.

The casualty estimation also includes projecting possible disease nonbattle injuries (DNBI). Based on known medical threats, unit activities, previous events, and individual health profiles, determine the potential nonbattle injuries that may occur. DNBIs can also include traumatic injuries that did not occur as a result of firefights such as parachute landing injuries or vehicle accidents. Keep in mind that some minor casualties may not come to the attention of the Medic until post mission after return to base. Include in your plan a post mission screening for potential casualties who may require medical treatment.

To assist medical planners with causality estimation, ATP 4-02.55 recommends the medical casualty estimation tool (MACE). The United States Medical Center of Excellence developed the automated MACE tool to assist medical planners with medical and casualty estimation. The MACE tool provides medical and casualty estimates based on parameters such as length of operations and engagements, weather, and terrain based on historical casualty data.

The requesting individual must contact the Computational Sciences Division for access to the MACE tool via email (NIPR) mail to: usarmy.jbsa.medical-coe.list.cdid-ops-admin@mail.mil; usarmy.jbsa.medical-coe.list.cdid-ops-admin@mail.mil and address your request with ATTN: CSD.

CASUALTY ESTIMATION

- Analyze the target and the templated enemy positions
- Analyze the commander's assault plan
- **Plan to take casualties during every phase of the operation (infiltration, assault, clear/secure, consolidate, defend, exfiltration).**
  - + Where do you foresee taking casualties?
  - + Where is it most critical for the Medics to be located?
  - + Do you need to task organize your medical team?
  - + Where does the unit need to establish CCP's?
  - + What evacuation methods need to be considered?
  - + Where is the closest HLZ or AXP?
  - + Where do you emplace and preposition medical assets/augmentation?
- Review preventive medicine issues and anticipate DNBI
  - + What are the health threats?
  - + What actions will prevent or decrease disease and non-battle injuries?

In addition to casualty estimates, the U.S. Army Combined Arms Support Command (CASCOM) has developed supplemental planning tools to forecast CLS VIII requirements, water consumption, and fuel consumption calculators for evacuation planning. CASCOM website: https://cascom.army.mil/asrp/sust-est.html

Tools:

1. QLET – Quick Logistics Estimations tool (has CLS I water and CLS VIII forecasting based on unit UIC)
2. Food and Water Tool (may assist with nutrition planning to prevent DNBI, confer with S4/G4 unit commodity specialist

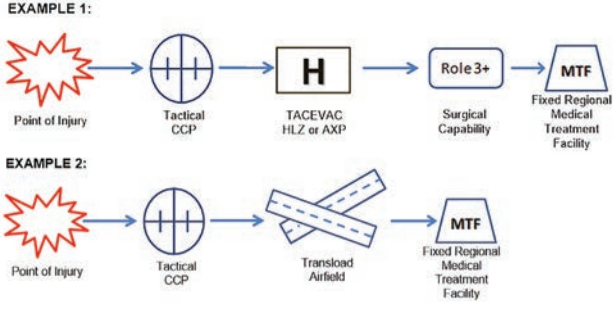
The Special Operations Forces (SOF) Logistics handbook is also available on the website for reference.

Issue Initial Medical Planning Guidance to Subordinates. Medical planners should constantly disseminate information to subordinate elements and junior Medics. Information provided should be as comprehensive as possible consistent with operational security considerations. Planning guidance should include the medical threat, medical assets, copies of higher OPORDs/OPLANs, and information that will assist subordinates with medical planning at their level. Guidance from above helps junior Medics better prepare themselves and their equipment for tactical operations.

Determine Casualty Flow from Target to Hospitalization. The tactical Medic will always have a detailed understanding of the casualty flow up to two levels above themselves, including patient regulating, casualty accountability, and hospitalization requirements. Furthermore, casualty flow is planned from the point-of-injury all the way back to admission to a Continental United States (CONUS) medical facility. However, in an established combat theater, a casualty may be admitted, treated and even released from an intermediate facility between the battlefield and CONUS.

CASUALTY FLOW CONSIDERATIONS

- Where will the unit's casualties be evacuated to?
- Will evacuation be conducted by ground or air (or water) assets to a casualty collection point?
- How will evacuation be conducted to casualty transload points?
- What are the distances and times of travel?
- Will expected casualties be able to make it that far? If not, what parts of the plan need to be adjusted?
- Who will evacuate the casualties (unit, frequency, callsigns)?
- Will medical assets be properly positioned to ensure continuity of care?



Determine Key Locations. Key locations for medical assets are determined based upon the casualty estimation and the commander's tactical assault plan.

DETERMINE KEY LOCATIONS

- Based on your casualty estimation and the tactical assault plan…
  - + Where should the CCP be located?
  - + Where should patient exchanges be located? (CEP, CCP, HLZ, AXP)
  - + Where are the projected blocking positions, fighting positions, etc…?
  - + Where is the CP/TOC?
  - + Who is in charge of each key location?
  - + Primary and alternate locations?
  - + What are the ground movement routes?
  - + What are the main and alternate routes (BLOC/supply bundles)?
  - + Is there a decompression plan (e.g., STRATEVAC) to sustain patient holding capacity for the MTF?
  - + Do the fuel capacities of the evacuation assets support the plan (confirm with S3/G3 air on FARP requirements).

Establish the Tactical Medical Support Plan. The medical support plan can be developed alongside tactical plans, but often it is difficult to lock in the medical plan until tactical planners have settled on the preferred course of action. A basic tactical medical support plan should include the following elements:

3. The distribution, task organization, and tactical movement (infiltration/exfiltration) of medical elements, all synchronized with each other and the overall tactical plan;
4. The casualty flow plan from point of injury, through evacuation, to a medical treatment facility, including primary and secondary evacuation routes, method, and modes (aid & litter, air, ground, water);
5. Primary and alternate sites for CCPs, casualty evacuation locations;
6. A medical communications plan;
7. A medical re-supply plan if the operation will continue for a length of time; and
8. Management plans for wounded hostile combatants and noncombatant casualties.

Air Tactical Evacuation Plan. The following information should be gathered in the formulation of a tactical air evacuation plan:

AIR CASEVAC PLAN

- What is the type of air CASEVAC mission?
  - + Dedicated – an air asset whose purpose after infiltration is casualty evacuation. It is outfitted and manned for casualty management.
  - + Designated – an air asset that will be the aircraft instructed to evacuate casualties. May be equipped for casualties if requested.
  - + On-call – air assets that are held in reserve or must be launched to respond to casualty evacuation. May also apply to MEDEVAC covering the area.
- Aircraft type?
- Maximum casualty load?
- How are casualties to be loaded?
  - + Packaging requirements: litters, Skedcos, etc.?
  - + Is the aircraft equipped with litter stanchions?
  - + Loading procedures? Approach procedures?
- What medical capability is on the aircraft?
  - + Flight Medic or medical officer?
  - + Casualty management equipment?
  - + Medical resupply bundles?
  - + Does the unit need to outfit the platform with medical capability?
- Request procedures?
  - + Procedures for requesting CASEVAC?
  - + 9-Line MEDEVAC request versus modified format?
  - + Communication requirements?
- Launch authority?
  - + Who is the launch authority for the aircraft?
  - + What are the impacts on Ranger CASEVAC operations?
- Landing requirements?
  - + Special HLZ considerations?
  - + Special markings required?
- Special equipment required?

Ground Tactical Evacuation Plan. There are two major components of a ground tactical evacuation plan. The first is ground evacuation in the target area and the second is from the target area to higher echelon of care. The security of the ground element is a critical aspect of moving casualties within or out of the target area. The unit must ensure that a fighting element will protect the evacuation asset from enemy attack.

Ground tactical evacuation at the objective consists of moving casualties from their points of injury to casualty collection points or evacuation points. Aid & litter teams will be formed by personnel within the fighting elements. These personnel will be trained, equipped and rehearsed to conduct this mission prior to launching the tactical mission. Vehicles of opportunity such as abandoned or captured enemy vehicles on the target can be used to move casualties. For instance, in an airport/airfield seizure, the unit could use baggage carts to move casualties.

Planning for evacuation by ground from the objective to a medical facility incorporates the same kind of information as planning for air evacuation, except for questions unique to the vehicles. One critical aspect of ground evacuation, however, is whether the unit will conduct the evacuation using its own assets or call on another unit.

GROUND CASEVAC PLAN – TWO PHASES

1. Actions required on the target.

- How should Rangers move casualties on the target to the CCP?
  - + Aid & litter teams
  - + Skedco, litter, etc…
  - + Ranger ground mobility (Quad, MEDSOV, GMV, RSOV, Stryker, MEV, MRAP)

2. Actions required for evacuation away from the target.

- What is the type of ground CASEVAC mission?
  - + Dedicated – a ground asset whose purpose after infiltration is casualty evacuation. It is outfitted and manned for casualty management
  - + Designated – a ground asset that will be the vehicles instructed to evacuate casualties. May be equipped for casualties if requested.
  - + On-call – ground assets that are held in reserve or must be launched to respond to casualty evacuation. This may be vehicles of opportunity (tactical or captured).
- Vehicle type and maximum casualty load?
- How are casualties to be loaded?
  - + Packaging requirements: litters, Skedcos, etc.?
  - + Is the vehicle equipped with a carrying configuration?
  - + Loading procedures?
- What medical capability is on the vehicle?
  - + Medics? Medical officers?
  - + Casualty management equipment?
- Request Procedures?
  - + Procedures for requesting ground CASEVAC?
  - + 9-Line MEDEVAC request versus modified format?
  - + Communication requirements (freq/callsign)?
- Launch authority?
  - + Who is the launch authority for the vehicles?
- Link-up requirements
  - + At your CCP or an AXP?
  - + Marking/signaling procedures?

QRF Capabilities and Integration

Medical Communications. The Tactical Medical Support Plan includes a plan for medical communications. In formulating this plan, the following should be considered:

COMMUNICATIONS REQUIREMENTS

- Do all Medics have radios?
- Can a Medic contact a higher care provider for guidance?
- Types of radios/COMSEC?
- Medical command & control delineation
- Callsigns/frequencies/SOI
- Evacuation request frequencies?
- Evacuation asset frequencies?
- Casualty reporting/accountability?
- What is the PACE plan (primary, alternate, contingency, emergency)?
- Re-supply requests

Medical Re-Supply Requirements & Methods. Medical planners must develop a thorough understanding of the unit's normal medical equipment, supplies, load plans, and premission shortages. For the development of the medical support plan, determinations are made regarding the equipment and supplies that will be initially carried onto the target, and a further plan established for a first and second echelon of re-supply. The tactical medical planners should also understand the acquisition and availability of blood products, special vaccines, antidotes, and antivenins as required.

CLASS VIII RE-SUPPLY REQUIREMENTS & METHODS

- How do you request re-supply?
- Resupply can be requested via line 4 of the MEDEVAC request if the configured CLS VIII has been precoordinated
- What are the re-supply methods?
  + Speedballs?
  + Drag-off bundles?
  + CDS?
- Medical packing lists? Do you need to reconfigure/repack (aid bag, pelican)?
- How do you request specific line items?

Briefs, Rehearsals, and Precombat Inspections

The operations order (OPORD) at all levels will include the tactical medical support plan. For forced-entry type missions in which the assault force is making an initial entry into an operational area, the medical component must be extensive and informative.

MEDICAL & CASUALTY RESPONSE OPORD BRIEFING AGENDA

- Health threat
- Casualty response concept of the operation
- Key locations (CCPs, HLZs, AXPs, etc)
- Casualty flow (to key locations to HLZ/AXP to MTF)
- Requesting procedures (CASEVAC, MEDEVAC, assistance, re-supply, including net/freq/callsign of supporting elements)
- Medic callsigns/frequencies
- Casualty accountability

Rehearsals. Rehearsals familiarize unit members with the mission plan and visualize the expected action. Depending on the level and repetition of rehearsal, unit members can develop a thorough familiarity with the sequence of events that will be executed. A rehearsal should be conducted as a scripted event that lays out the operational plan in a sequence of overlapping events. Contingencies and complications can be injected to assess unit member reactions and to practice alternate plans.

Full dress rehearsals provide the most detailed understanding of the operation and involve all unit members executing their expected tasks flowing through the expected timeline of the event. A full dress rehearsal is a military field exercise; a training event preparing for the real event at a similar location layout. A Reduced Force Rehearsal involves only key leadership of subordinates and operational units. Terrain model rehearsals, also known as ROC drills or sandbox drills, use miniature depictions of the operational area. Terrain model rehearsals are historically the most commonly used method for rehearsal of military operations. Map rehearsals can be used virtually anywhere using actual maps, imagery or sketches of operational areas.

A communications rehearsal, also known as a COMMEX, is a combination of testing communications systems as well as unit members running through the sequence of events through radio calls. For the communications equipment tests, using the same equipment, same frequencies, and same distances specified in the operational plan will provide the unit with the best insight into whether their equipment will function properly. If possible, line-of-sight obstacles such as buildings or terrain should be interposed between radios to exactly replicate conditions at the target. Casualty response specific execution checklist calls must be integrated into the overall unit EXCHECK. Example calls may be CCP established, evacuation asset in place/on station, casualty HLZ (CEP or AXP) established, and most importantly the radio notification call for a casualty report. Contingency or deviation calls may be required for mass casualty situations, accidents/incidents involving aircraft or vehicles, and changes from primary to alternate aircraft/vehicles, key locations, evacuation assets, or receiving medical facilities.

REHEARSALS

- RFR drills
- Squad casualty response drills (care under fire, TFC and evacuation)
  - + Each element should rehearse alerting aid & litter team and movement of a casualty
- Aid & litter team drills
  - + Alert and movement
  - + Evacuation equipment prep
  - + Clearing/securing weapons
- Evacuation request and loading procedures
- COMMEX
- Unit-wide casualty tracking/accountability
- CCP operations
  - + Assembly, security & movement
  - + Recon, clear and secure CCP location
  - + CCP markings, link-up procedures, and vehicle parking
  - + Choke point/CCP command post
  - + Triage, treatment and management of casualties
  - + Casualty accountability & reporting
  - + Marking & tagging
  - + Equipment removal tagging/consolidation
- Review of execution checklist calls pertinent to the casualty response plan

Precombat Inspections. Every combat unit will conduct precombat inspections (PCIs) prior to launching on a mission. PCI are conducted from the lowest leadership levels to the highest; no individual will be exempt.

PRE-COMBAT INSPECTIONS

- Individual Rangers
  - + Ranger Bleeder Kits (BCKs)
  - + TQ on kit serviceable
- Squad casualty response kit
  - + ARFR bag
  - + Evacuation equipment (Skedco, litters, etc.)
  - + Vehicle mounted aid bags
- Ability to store and transport blood with proper cold-chain management
- RMED individual equipment (weapon, NVG, radio, packing list, mission specific)
- RMED aid bags (pack and/or reconfigure as required)
  - + Select appropriate aidbag system per mission requirements
  - + Ensure packing list IAW recommended Ranger Medic standards
- Re-supply packages (pack and/or reconfigure per mission requirements)
  - + Reconfigure per mission specifics (ground, air, etc.)
  - + Utilize speedballs, bundles, or pull-off configured as required
  - + Pre-position as required with aircraft and vehicles or at staging base with BLOC and logistics teams
- Evacuation assets (quads, vehicles, etc.)
- Pre-mission conditions check with supporting MTF and evacuation assets

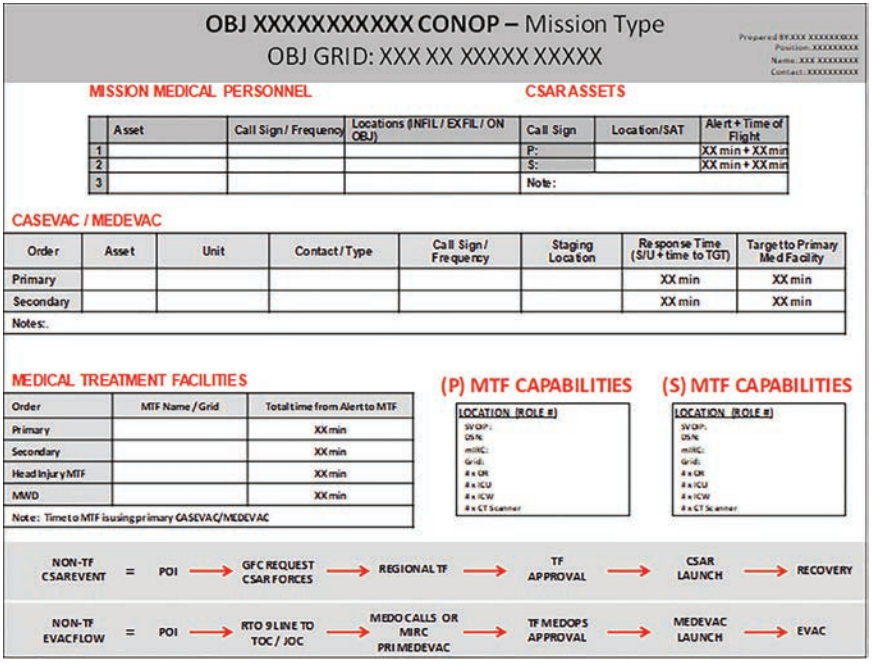
Sustained Combat Operations & Time-Sensitive Targets

When a unit is deployed and operating in a particular area of operations, several planning mechanisms will become more streamlined and habitual. The casualty response brief will be minimized to essential changes of information. While still covering the essential information, the brief will be tailored to a single slide within the overall OPORD or CONOP. This is especially useful in time sensitive operations in which there may be only a few hours to minutes prior to launching the assault force on the mission. It is best to maintain a single slide in which critical information is routinely updated. This allows for making specific minimal changes based on the mission at hand.

Time Sensitive Targets (TST). The key to successful time sensitive target planning is maximizing coordination's prior to the unfolding events. The medical planner should have already made face-to-face or phone contact with evacuation assets, receiving hospital facilities and other unit planners.

The essentials of planning TST casualty response remains consistent with normal planning except that it is done rapidly and heavily based on precoordinated activities. The planner must be well versed in the unit compressed planning sequence and use of appropriate computer software, communications capabilities and methods to check status of assets. As soon as the unit receives the WARNORD of an upcoming mission, the medical planner must immediately initiate their planning sequence of events. WARNORD briefs are usually conducted quickly upon receipt from the higher HQ or the unit commander. The medical planner must be considered a key leader in the unit planning sequence for TST missions. Critical pieces of information are the target location, projected HLZs, and available evacuation and treatment facility assets.

Generally, the primary means of evacuation will be CASEVAC using the mission platforms used for infiltration and exfiltration. The alternate evacuation means will mostly be using the conventional assets from their bed down locations. However, each mission must be tailored to available assets. Unless the unit is augmented, the receiving facility will be the nearest Role 2 or higher capability within range of the target. The planner must be careful in selecting the receiving MTF while considering distances, capabilities, and the current status of each facility. The planner must always establish a primary, alternate, and perhaps a tertiary receiving facility. Ensure you have a good understanding of which facilities should receive casualties with specific injuries such as head injuries or burns.



OBJ XXXXXXXXXX CONOP – Mission Type

OBJ GRID: XXX XX XXXXX XXXXX

Prepared BY:XXXX XXXXXXXXX
Position: XXXXXXXXXX
Name: XXX XXXXXXXX
Contact: XXXXXXXXXX

MISSION MEDICAL PERSONNEL

	Asset	Call Sign / Frequency	Locations (INFIL / EXFIL / ON OBJ)
1			
2			
3			

CSAR ASSETS

Call Sign	Location/SAT	Alert + Time of Flight
P:		XX min + XX min
S:		XX min + XX min
Note:		

CASEVAC / MEDEVAC

Order	Asset	Unit	Contact / Type	Call Sign / Frequency	Staging Location	Response Time (S/U + time to TGT)	Target to Primary Med Facility
Primary						XX min	XX min
Secondary						XX min	XX min
Notes:.							

MEDICAL TREATMENT FACILITIES

Order	MTF Name / Grid	Total time from Alert to MTF
Primary		XX min
Secondary		XX min
Head Injury MTF		XX min
MWD		XX min
Note: Time to MTF is using primary CASEVAC/MEDEVAC		

(P) MTF CAPABILITIES

LOCATION (ROLE #)
SVOP:
DSN:
mIRC:
Grid:
x OR
x ICU
x ICW
x CT Scanner

(S) MTF CAPABILITIES

LOCATION (ROLE #)
SVOP:
DSN:
mIRC:
Grid:
x OR
x ICU
x ICW
x CT Scanner

NON-TF CSAR EVENT = POI → GFC REQUEST CSAR FORCES → REGIONAL TF → TF APPROVAL → CSAR LAUNCH → RECOVERY

NON-TF EVAC FLOW = POI → RTO 9 LINE TO TOC / JOC → MEDO CALLS OR MIRC PRI MEDEVAC → TF MEDOPS APPROVAL → MEDEVAC LAUNCH → EVAC

Once the commander has established the basic tactical CONOP, determine the casualty estimate and select appropriate locations for primary and alternate CCPs as well as evacuation HLZs/CEPs. Identify personnel designated to perform aid & litter team duties on target. Confirm the JOC/TOC battle captain/NCO understands the procedures for requesting external evacuation support and notification of receiving medical facilities of inbound casualties.

Develop the casualty response CONOP based on all information gathered. Modify the one-slide casualty response CONOP and ensure it is integrated into the unit CONOP. Disseminate all information to subordinate Medics and unit personnel. Brief the casualty response plan in the unit brief and send the medical CONOP to higher HQ as required. When feasible and approved within OPSEC guidelines, notify receiving medical facilities and evacuation assets of the upcoming mission.

Conduct pre-combat inspections of individual Rangers, Medic aid bags, squad ARFR kits, aid & litter team equipment, CASEVAC platform medical equipment, and re-supply packages.

Postmission, ensure that all medical supplies and equipment is refit and restocked. Conduct postmission screening of all assault force members for unreported injuries. Follow-up with receiving facilities on status of any casualties evacuated. Provide an update to the commander on casualty status. Conduct an AAR of the mission to identify any lessons learned and/or modifications to future CONOP plans. Additionally, a casualty after-action review/report will be submitted on each Ranger/MWD casualty within 72 hours post mission.

TST Planning

- Receive WARNORD of pending TST mission
  - + Confirm target location grid
  - + Confirm preliminary HLZ information (or infiltration locations/methods)
  - + Confirm status of task force organic medical personnel and evacuation capabilities
  - + Determine any medical augmentation requirements and initiate appropriate requests
- Assess distances and response times based on target location and/or HLZs (based on appropriate routes through terrain obstacles such as mountains or around enemy areas)
  - + Confirm travel distance and time to the target
  - + Confirm distance from target to primary, alternate, and tertiary receiving facilities
  - + Confirm distance to target, response time, distance to destination and time to destination for primary, secondary and tertiary forms of evacuation. Ensure response time includes notification and spin-up time for launch of the asset.
  - + Determine if specific receiving medical facilities need to be designated for specific injuries (head injuries or burns)
- Confirm readiness of receiving facilities and external evacuation assets
  - + Contact primary and secondary medical receiving facilities to confirm their bed status and readiness to accept casualties.
  - + Contact primary and secondary evacuation assets to confirm their readiness status.
  - + Contact CSAR coverage asset and confirm readiness status and response times.
- Finalize tactical medical support plan based off of commander's tactical CONOP
  - + Conduct casualty estimate on target to determine where casualties are likely to occur
  - + Confirm/Assess best locations for primary and alternate CCPs on target
  - + Confirm/Assess best locations for primary and alternate evacuation HLZs/CEPs
  - + Confirm/Determine personnel tasked to be aid & litter teams on target
  - + Confirm JOC/TOC battle captain/NCO knows appropriate evacuation JOC/TOC drill for requesting external evacuation and notification of receiving facility (to include 9-line MEDEVAC request transmission procedures)
  - + Develop casualty response CONOP using the one-slide with changes as required.
- Perform pre-combat inspections
  - + Check individual Rangers for bleeder control kits, squad casualty response kits, and identified aid & litter team equipment
  - + Check individual medic aid bag and kit
  - + Check CASEVAC assets equipment and re-supply packages
- Post-mission activities
  - + Restock and refit any expended medical supplies and equipment in RFR kits, Medic aid bag or CASEVAC platforms.
  - + Conduct AAR of mission to gather lessons learned and/or modifications to future CONOPS
  - + Follow-up on casualties with receiving facilities and provide an update to the commander
  - + Perform maintenance on Medic equipment to include weapons, NVGs, radios, and medical equipment
  - + Conduct screening of mission personnel for any injuries sustained and not previously reported to include post-blast assessments

Casualty Collection Point Operations

Casualty collection point (CCP) operations must be a well-planned and rehearsed. In the planning phase, both unit leadership and members of the CCP element have critical responsibilities. In the execution phase, the members of the CCP must act as a cohesive team with every member fulfilling his responsibilities. A CCP will never be exactly the same as it was on a previous mission. However, there are critical guidelines in the planning and execution of any CCP.

CCP SITE SELECTION

- Reasonably close to the fight
- Near templated areas of expected high casualties
- Cover and concealment
- In building or on hardstand (exclusive CCP building limits confusion)
- Access/trafficable to evacuation routes/assets (foot, vehicle, aircraft)
- Proximity to lines of drift on the objective
- Adjacent to objective choke points (breeches, HLZs, etc.)
- Avoid natural or enemy choke points
- Area allowing passive security (inside the perimeter)
- Good drainage
- Expandable if casualty load increases
- Consider placement of CCP locations near recognizable landmarks such as airfield control towers, fire stations, religious buildings, or local medical facilities.

UNIT LEADERSHIP CCP DUTIES & RESPONSIBILITIES

- **Planning Phase**
  - ➢ Evacuation plan by phase of the operation
  - ➢ CCP locations, HLZ/AXP locations
  - ➢ Security of CCP, security of HLZ/AXP
  - ➢ Allocate aid & litter teams and carry evacuation equipment
  - ➢ Accountability/reporting plan
  - ➢ Distribution/task organization of medical personnel
  - ➢ Pre-combat inspections of junior Medics, Squad Casualty Response Kits, and individual Ranger BCK/RFR tasks
  - ➢ Conduct casualty response rehearsals
- **Execution Phase**
  - ➢ Establish and secure CCP
  - ➢ Provide assistance to Medics with ARFR augmentation and directing aid & litter teams
  - ➢ Gather and distribute casualty equipment and sensitive items
  - ➢ Accountability and reporting to higher
  - ➢ Request evacuation and establish CASEVAC link-up point
  - ➢ Manage KIA remains (or as coordinated by BLOC/S4)

BATTALION-LEVEL MEDICAL PERSONNEL CCP DUTIES & RESPONSIBILITIES

- **Planning Phase**
  - ➢ Provide recommendations and advise to leadership on medical support
  - ➢ Recommend to the unit leadership & coordinate as required:
    - CCP Locations of subordinate units by phase
    - Medical task organization & distribution
    - Ground (on the target) evacuation plan & assets for all targets
    - Air/ground (off the target) evacuation plan & assets for all targets
    - CCP, HLZ, and evacuation asset security for all targets
  - ➢ Augmentation requirements of subordinate units
  - ➢ Link-in with the tactical operations center
- **Execution Phase**
  - ➢ Triage, treatment, monitoring, and packaging
  - ➢ Delegation of treatment
  - ➢ Request assistance from other medical or platoon assets
  - ➢ Provide guidance and recommendations to leadership on casualty management

UNIT MEDICS CCP DUTIES & RESPONSIBILITIES

- **Planning Phase**
  - ➢ Provide recommendations and advise to leadership on medical support
  - ➢ Medical support planning by phase of the operation
  - ➢ Casualty response & evacuation plan by phase of the operation
  - ➢ Recommend to the unit leadership & coordinate as required:
    - CCP locations by phase
    - Medical task organization & distribution
    - Ground (on the target) evacuation plan & assets
    - Air/ground (off the target) evacuation plan & assets
    - CCP, HLZ, and evacuation asset security
  - ➢ Pre-combat inspections of junior Medics, Squad Casualty Response Kits, and individual Ranger BCK/RFR tasks
- **Execution Phase**
  - ➢ Triage, treatment, monitoring, and packaging
  - ➢ Delegation of treatment
  - ➢ Request assistance from other medical or unit assets
  - ➢ Provide guidance and recommendations to leadership on casualty management & evacuation

CCP OPERATIONAL GUIDELINES

- 1SG/PSG is responsible for casualty movement and everything outside the CCP
  - ➢ Provides for CCP structure and organization (may be color coded with Chemlights)
  - ➢ Maintains C2 and battlefield situational awareness
  - ➢ Controls aid & litter teams, and establishes security
  - ➢ Strips, bags, tags, organizes, and maintains casualty equipment outside of treatment area as possible
  - ➢ Ensures reallocation of equipment as required (weapons systems, etc.)
  - ➢ Accountable for tracking casualties and equipment into and out of CCP and provides reports to higher
  - ➢ Casualties move through CCP entrance/exit choke point which should be marked with an IR Chemlight
- Medical personnel are responsible for everything inside the CCP
  - ➢ Triage officer sorts and organizes casualties at choke point into appropriate treatment categories
  - ➢ Medical officers and/or Medics organize medical equipment/supplies and render treatment to casualties
  - ➢ Directs ARFRs, RFRs, A&L Teams assist with treatment and packaging of casualties
- Minimal casualties should remain with original element or assist with CCP security if possible
- KIAs should remain with original element or be transported to the BLOC
- All CCP personnel:
  - Maintain security
  - Maintain adequate treatment
  - Maintain situational awareness
  - Maintain organization
  - Maintain control of equipment & supplies

CCP WITHIN A BUILDING GUIDELINES

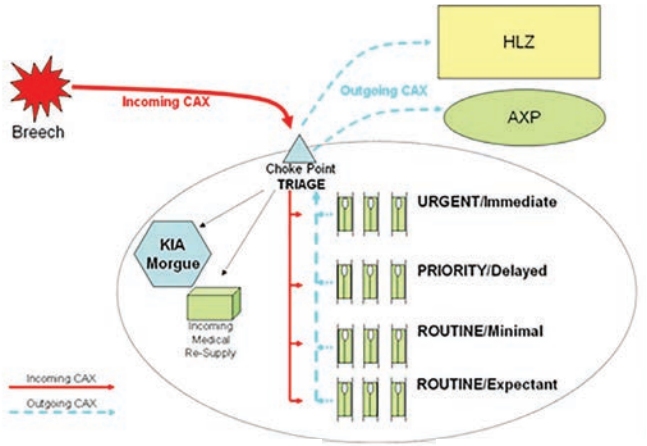
- Ensure building is cleared and secured
- Enter and assess the building prior to receiving casualties
  - ➢ Use largest rooms
  - ➢ Consider litter/Skedco movement (can you do it in the area?)
  - ➢ Separate rooms for treatment categories?
  - ➢ Determine location of choke point/triage
  - ➢ Minimize congestion
- Remove/re-locate furniture or obstructions
- Color-code rooms to treatment categories (mark doors, etc.)

EVACUATION GUIDELINES

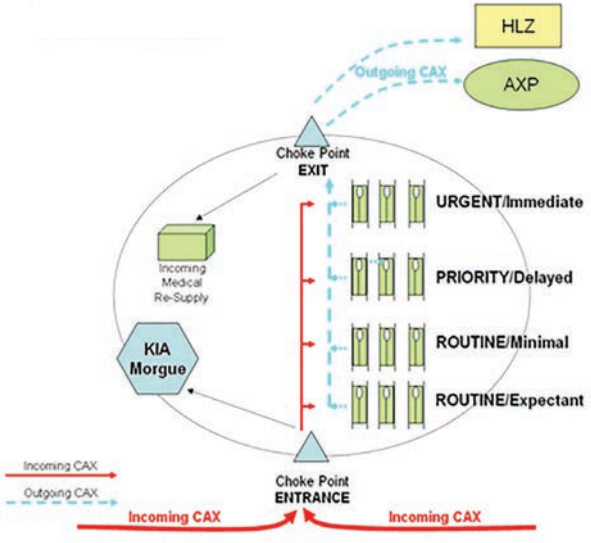
- Know the evacuation asset
  - ➢ Medical provider on board?
  - ➢ Monitoring equipment on board?
  - ➢ How many CAX can evacuate on asset?
- Packaging requirements for asset
  - ➢ Type litters?
  - ➢ Are there stirrups? Floor-loading?
- Determine flow of casualties to the asset
  - ➢ Large asset (multiple CAX)
    - Routine on first
    - Priority on next
    - Critical (urgent) on last, so they are first off at destination
  - ➢ Small asset
    - Critical (urgent) and priority evacuated first

The following diagrams are common templates for the layout and organization of casualty collection points. No template is perfect and it should be reasonably modified based on the setting, terrain, and mission circumstances.

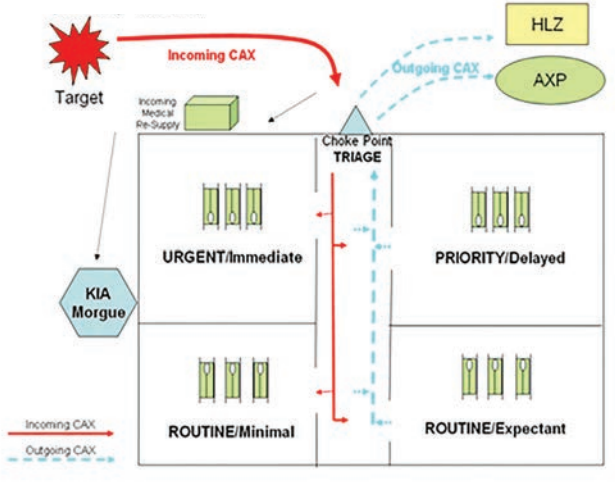
CCP/CEP Template 1 (Adjacent to Breech)



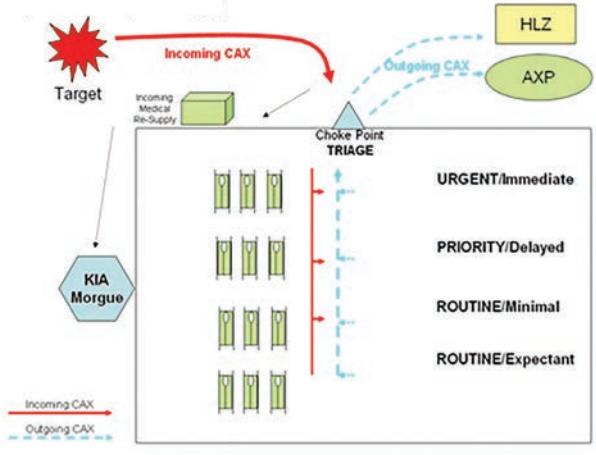
CCP/CEP Template 2
(Flow Through Style)



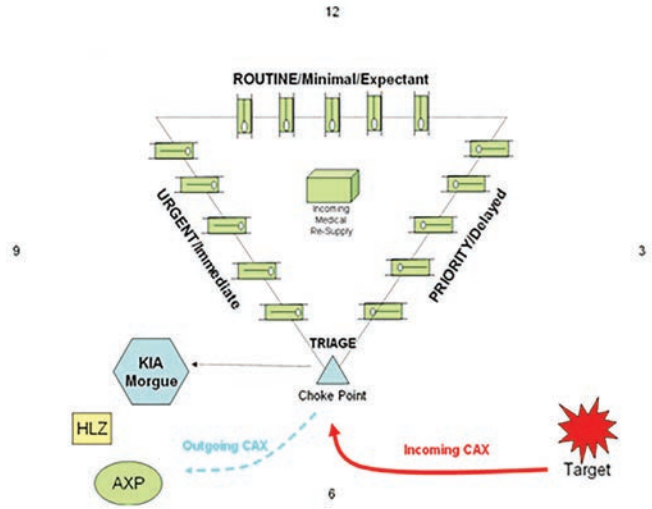
CCP/CEP Template 3
(Building – Rooms)



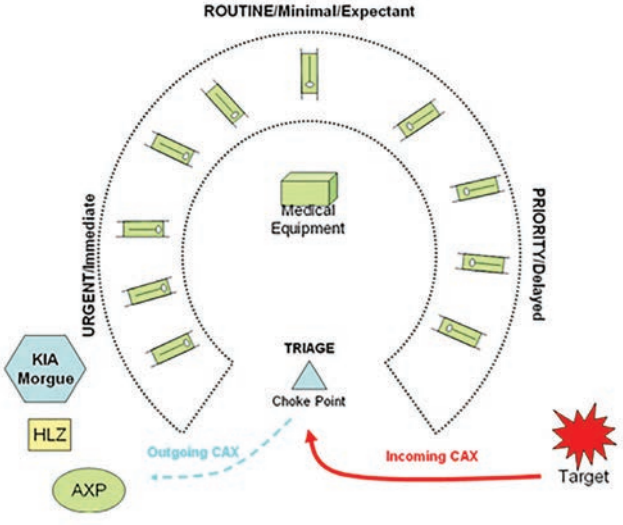
CCP/CEP Template 4
(Building – Open/Hanger)



CCP/CEP Template 5
(Open Area/Filed)



CCP/CEP Template 6
(U-Shaped)



After Action Review. No mission (training or combat) is complete until an after action review (AAR) has been completed. After each operation, an assessment of its conduct from beginning to end is conducted to gather all possible lessons. Units will often need to provide detailed reports to higher headquarters about the conduct of a combat operation. The planning and execution of the unit's casualty response will often bring critical lessons learned to the forefront. Keep in mind that a lesson is not learned until the problem has been identified, the unit has solved the problem, and the solution becomes the normal way of operating in the future. The list of questions below is a basic topic list for the AAR.

AFTER ACTION REVIEW (AAR) IN TRAINING OR COMBAT

- Was the mission executed as planned?
- What went right?
- What went wrong?
- What could have been done better?
- What could be fixed by planning/preparation?
- What could be fixed by training?
- What could be fixed by equipment modification?
- Identify and record sustains & improves by phase of the operation

Relief-in-Place Operations

Staging Base Relief-in-Place

Ranger units have been continuously deployed to combat since October of 2001. Units conduct relief-in-place operations as Ranger units deploy to and re-deploy from the area of operations. It is critical that the unit pass on everything possible that it has learned, experienced and coordinated with the incoming unit. By no means does this relinquish responsibility of the incoming unit to confirm and conduct further coordination. Ensure you provide a good turnover to the incoming team. Keep in mind, you will be the incoming Medic on your next rotation and would expect the same.

Tactical Relief-in-Place

Ranger units may turn over a target or seized terrain to a follow-on unit. Until the incoming unit makes adjustments to its tactical plan, it is best for them to assume the positions and procedures previously conducted. The senior Ranger tactical medical provider will link up with their counterpart of the incoming unit and provide as much information as possible

TACTICAL RELIEF-IN-PLACE

- Current primary and alternate CCPs and HLZs
- Current external evacuation assets and receiving medical facilities supporting the area and any problems encountered.
- Ensure the incoming unit understands the capabilities and limitations of supporting evacuation and medical treatment facilities.
- Where, how many, and what types of casualties sustained during the previous operation.
- Any health trends that the relieving unit should be aware of.
- Potential hazards to unit personnel such as contaminated water or HAZMAT.
- Turnover of detainees or EPWs should include any medical conditions noted.

NOTES

SECTION 9

HAZARDOUS TRAINING MEDICAL COVERAGE

HAZARDOUS TRAINING MEDICAL COVERAGE DUTIES & RESPONSIBILITIES

Senior Coverage Medic

- Plan & coordinate medical support requirements & considerations
- Identify hospitals and evacuation routes
  Conduct hospital site survey as required
  Conduct face-to-face with hospital ER
  Conduct route recon from target to hospital
- Establish target medical coverage plan and casualty flow
- Brief OIC/NCOIC medical support plan
  Clarify OIC/NCOIC responsibilities and guidance
  Clarify medical responsibilities and guidance
- EXECUTION duties:
  Patient treatment & monitoring on target and en route
  Advise OIC/NCOIC as required
  Update OIC/NCOIC/higher HQ on condition of evacuated casualties
  Inform unit medical officer of all casualties
- After training event
  Follow-up any evacuated casualties and update C2 and medical director
  Clean, refit, store all coverage equipment
  Submit AAR IAW unit or event-specific requirements

OIC/NCOIC of Event

- Overall responsible for administrative coverage (including medical)
- Request/track external medical support requirements
- Ensure appropriate type and number of vehicles with assigned drivers are dedicated to medical coverage
- Ensure appropriate communications equipment is allocated to medical personnel.
- Link medical coverage plan with overall administrative coverage plan.
- EXECUTION duties:
  Collect casualty data and report to higher HQ
  Request MEDEVAC
  Identify and establish MEDEVAC HLZ

HAZARDOUS TRAINING MEDICAL COVERAGE PLANNING

Maps & Route Recons

- Request/purchase/acquire appropriate maps of training areas, adjacent military installations, and cities
- Conduct map and ground recon of training areas (specifically key entrance & exit points).
- Identify hospitals/fire/EMS locations

Identify Special Coverage Considerations

- Weather
- Animals
- Plants
- Terrain hazards (high angle or high altitude)

Identify Hospitals

- Primary and alternate evacuation hospital (one should be a Level 1 trauma center)
- Conduct hospital site survey and face-to-face
- Determine hospital communications: o ER phone line
  - ➢ ER ambulance line
  - ➢ Patient admin phone line
  - ➢ Security line phone line
- Determine routes and directions to hospitals
- Where are special injuries evacuated?
  - ➢ Neurosurgical
  - ➢ Burns
  - ➢ Trauma centers
    - Level 1 (neurosurgeon on staff 24 hours)
    - Level 2 (neurosurgeon on call, but not on site 24/7)

Vehicle Requirements

- **Driver:** A dedicated driver – NOT the medic covering the event. Must be familiar with training area and evacuation routes.
- **Ambulance:** A dedicated, climate controlled, covered vehicle capable of carrying at least 1 litter. The vehicle must provide environmental control and adequate space for medical equipment. Mark vehicle as appropriate (ambulance symbols or lights).
  - ➢ Optimal vehicles:
    - Van (15PAX only)
    - Large SUV (Expedition, Tahoe, etc…)
    - FLA (M996/M997)
  - ➢ Suboptimal vehicles
    - Open HMMWV / GMV
    - MEDSOV (tactical operations only – not for admin coverage)
    - Small SUV (Explorer, Durango, Cherokee, etc…) or small van (7PAX)

Communication Requirements

- Equipment
  - ➢ FM radios or installation “brick” radios
  - ➢ Cellphone
- Radio nets & frequencies
  - ➢ Administrative coverage (DZSO Net)
  - ➢ Exercise/target control or observer/controller nets
  - ➢ Tactical nets
- En route evacuation communications
    - Cellphone to notify receiving facilities
    - Borrowed local radios
- Establish speed dials / specific channels
  - ➢ Receiving medical facilities and evacuation assets

EQUIPMENT REQUIREMENTS

Standard Medical Equipment

- Rigid litter
- Splint sets
- Oxygen/masks/BVM
- Suction, mechanical & manual
- Mechanical traction splint
- Vital signs monitor
- Litters
- Blankets/hypothermia management
- Trauma aid bag
- Pain management

Special Equipment Considerations

- Hot weather
  - ➢ Ice sheets
  - ➢ Fans (battery operated)
  - ➢ Cold packs
- Cold weather
  - ➢ Rescue wraps/patient heaters
  - ➢ IV fluid warmer
- Rescue
  - ➢ High-angle rescue kit
  - ➢ Skedco
- Blood products for high-risk training

MEDICAL COVERAGE DURING TACTICAL EXERCISES

- Plan for all casualties to be evacuated to Level 1 or 2 Trauma Centers ONLY.
- If evacuation time to primary center is more than 20 minutes' training is considered HIGH RISK.
- Obtain PDSS Checklist from MEDO.
- All casualties go through the tactical evacuation channels unless life, limb or eyesight is threatened. A Ranger exercise does not "go admin" unless absolutely required to save the injured Ranger.
- All patients are treated to U.S. Standard of Care and unit protocols.
- Vehicles do not enter or move on drop zones without DZSO permission and notification of the tactical C2.
- Use of white lights during night operations will be minimized to patient care.
- If possible, utilize the tactical unit's capabilities to move casualties to minimize impact on the ongoing exercise.
- Notify receiving medical facilities of incoming casualties and status.
- Keep training event OIC/NCOIC informed of patient status with routine updates
- Vehicles do not enter or move on drop zones without DZSO permission and notification of the tactical C2.
- Inform unit medical officers of casualties and status.

PRE-COVERAGE INSPECTIONS

NO RANGER IS EXEMPT FROM PCIs

Inspect/Inventory Medical Equipment

Inventory IAW Hazardous Coverage Checklist
Function check all mechanical devices and monitors
Check battery charges

Inspect Vehicle(s)

- PMCS of vehicle
- Fuel level
- Dispatch or rental agreement
- Maps/routes posted

Support Equipment

- Communications equipment
- Strobe lights/flashlights/headlamps
- Night vision
- GPS
- Rescue equipment

PRE-COVERAGE REHEARSALS

- Drive routes to hospitals during daytime and nighttime. Determine/record time from training site to hospital. Consider civilian traffic pattern interference on evacuation route.
- Brief OIC, NCOIC, OPFOR, and role-players on medical coverage plan and actions. Specifically, CCP or MEDEVAC locations and casualty notification/evacuation request procedures.
- Conduct rehearsal of casualty movement in the exercise area and prep for evacuation.

75th Ranger Regiment Trauma Management Team

Hazardous Training Medical Coverage Checklist

VEHICLE / AMBULANCE		
CHECKLIST	**INITIALS**	**NOTES / FINDINGS**
Vehicle w/Dispatch (or rental agreement)		Dispatch Date:
Dispatch Book (w/incident forms)		
PMCS of Vehicle		Last PMCS:
Fuel Level (if <1/4 tank, re-fuel)		Fuel Level:
Warning Strobe Light for roof		
Spot Light w/car charger		
EMS Magnetic Symbols (4 sides of vehicle)		
MEDICAL EQUIPMENT		
Account for and test all equipment before and after mission		
CHECKLIST	**INITIALS**	**NOTES / FINDINGS**
Litter w/Straps		
Cervical Collar		
BVM w/ O2 Tubing		
O2 Set (Tank, Regulator, Non-Rebreather Mask)		PSI Level:
Airway Kit		
Suction, Mech (w/ battery and car charger) Function Check		Status:
Suction, manual operated		
Splint Set (Velcro applied)		
Mechanical Traction Splint w/straps		
Blankets (2 each)		
Hypothermia Protection System (HPMK or Rescue Wrap)		
Vital Signs Monitor w/cables, attachments, and car charger (Conduct complete function check)		Monitor Type: Calibration Date:
Thermometer, Electronic w/probe and covers (min 10)		
Blood Glucose Monitor w/test strips and lancets		
Ice Cooler with 50/50 Ice/Water and 15 saturated sheets		
Trauma Hangbag		
Chemlight Set (min 3 ea of 3 colors)		
MEDIC INDIVIDUAL EQUIPMENT		
CHECKLIST	**INITIALS**	**NOTES / FINDINGS**
Trauma Pack		
Ranger Medic Handbook		
Narcotics & Medications Kit		
Admin Head Lamp		
Cell Phone w/car charger (key numbers pre-programmed)		Phone Number:
Field Sick Call Kit (as directed)		
Night Vision Goggles (as directed)		
GPS Navigation System (as directed)		
Radio (as directed)		
EVACUATION SUPPORT EQUIPMENT		
CHECKLIST	**INITIALS**	**NOTES / FINDINGS**
Trauma SF 600 (20 ea) and RGR CAX Card (20 ea)		
Hazardous Training Medical Coverage Checklist (20 ea)		
Map of Training Area		
Hospital Directions w/Strip Map from Training Area		
Hospital Site Survey with phone numbers		
VS-17 Panel		
Strobe Light w/battery		
Evacuation Procedures Checklist		
550 cord (30ft) & Tape, 100pmh		

Medic Name _____ Date _____

Training Event _____ Location _____

SR Medic or Range NCOIC/OIC Name & Countersign: _____

SECTION 10

PACKING LISTS

Kit / Aid Bag Minimum Stock

The following list is what each medic should carry at a minimum and used as a guide to pack their Kit and Aid Bag. The medic must have enough supplies to treat two multi-system trauma casualties. Items packed in the Kit provide immediate initial care to life-threatening injuries on a trauma casualty without external bags and equipment.

Common Name	Quantity	Notes
Massive Hemorrhage Control		
Tourniquet	2	
Hemostatic Dressing	2	
Pressure Dressing	2	
Pelvic Binder with Puck and Pump	1	
Wound Packing Gauze	2	
Airway Management		
Cricothyroidotomy Kit	2	
Nasopharyngeal Airway 28fr w/lubricant	1	
Bougie Device	1	
Suction, Hand-Held Manual Device	1	
$EtCO_2$ Device	1	With EMMA adapter × 2
Respiratory Management		
10G or 14G / 3.25" NCD	4	
Vented Chest Seal	4	
Occlusive Dressing	4	Used for securing chest tube/cric
Bag-Valve Mask	1	
Chest Tube Kit	1	
Pulse Oximetry Device	1	
Stethoscope	1	
Circulation/Fluid Resuscitation Management		
Intraosseous Device	2	Sternal Capable IO × 1, IO × 1
IV Starter Kit	2	
NS Flush 10mL	4	
Fluid Warmer	1	With cartridges × 2
100mL or 250mL NaCl IV Bag	2	
Blood Collection Bag	1	
Filtered Tubing	2	"Y" or "Single"
BP Cuff Manual	1	
Sharps Shuttle	1	
Blood Product Storage	1	Single/Double Unit Containers last approximately 8–12 hr, 4 Unit Container lasts approximately 24 hr
Pressure Infuser	1	
Disability/Immobilization		
Cravat	2	
Splint, Malleable	2	
Ace Wrap	2	
Miscellaneous		
Casualty Card	4	
Marker	2	
Tape	2	
Shears	2	
Scalpels	4	
9" peans	1	
Narcotics Box	1	At the discretion of Senior Medical personnel. Recommended medics carry a minimum of: 1 × Ketamine, 1 × opioid, and 1 × benzodiazepine.
Medication Box	1	At the discretion of the Senior Medical personnel. Recommended medics carry a minimum of: 1 × naloxone, 1 × ondansetron, 1 × antibiotic, 1 × NSAID, 1 × EPI, 2 × TXA, 1 × calcium, 1 × antihistamine, 1 × Albuterol MDI
1mL syringe	3	
3mL syringe	3	
10mL syringe	3	
18G hard needle	5	
23G hard needle	5	
MASCAL Card	1	
Chem Lights (Red, Blue, Green)	1 Set	2 × Red, 2 × Blue, 2 × Green
Light Source	2	
Gloves		
Spare batteries for electronics		
Sterilization equipment	4	(i.e. alcohol, betadine, etc.)

Advanced Ranger First Responder Medical Kit Contents

The following list is what each Advanced Ranger First Responder should carry at a minimum and used as a guide to pack their medical kit.

Common Name	Quantity	Notes
Massive Hemorrhage Control		
Tourniquet	2	
Hemostatic Dressing	2	
Pressure Dressing	2	
Pelvic Binder with Puck and Pump	1	
Wound Packing Gauze	2	
Airway Management		
Nasopharyngeal Airway 28fr w/lubricant	1	
Respiratory Management		
10G or 14G/3.25" NCD	2	10G preferred
Vented Chest Seal	2	
Finger Thoracostomy Kit	1	
Pulse Oximetry Device	1	
BVM	1	Mission Dependent
Circulation/Fluid Resuscitation Management		
Intraosseous Device	2	Sternal Capable IO × 1, IO × 1
IV Starter Kit	2	
NS Flush 10mL	2	
Blood Collection Bag	1	
Filtered Tubing	1	"Y" or "Single"
Sharps Shuttle	1	
Blood Product Storage	1	Single/Double Unit Containers last approximately 8–12 hr, 4 Unit Container lasts approximately 24 hr
Disability/Immobilization		
Splint, Malleable	1	
Ace Wrap	2	
Miscellaneous		
Casualty Card	2	
TXA with Protective Case	1	
Shears	1	
Marker	2	
3" Tape	1	
10mL syringe	2	
100mL or 250mL NaCl IV Bag	1	
18G Hard Needle	2	
Light Source	1	
Gloves		

Ranger Bleeder Control Kit Contents

The bleeder control kit will be worn on the left side of the body or the lower back.

Common Name	Quantity	Notes
Massive Hemorrhage Control		
Tourniquet	2	
Hemostatic Dressing	2	
Pressure Dressing	1	
Wound Packing Gauze	1	
Airway Management		
Nasopharyngeal Airway 28fr w/lubricant	1	
Respiratory Management		
Vented Chest Seal	2	
10G or 14G/3.25" NCD	1	10G preferred
Circulation/Fluid Resuscitation Management		
IV Starter Kit	1	
Miscellaneous		
Casualty Card	1	

SECTION 11

REFERENCES & ABBREVIATIONS

1SG	first sergeant
1T2X1	USAF AFSC pararescuemen
4N0X1	USAF AFSC aerospace medical specialist
5392	USN NEC naval special warfare medic (SOCM)
61N	USA flight surgeon
65B	USA AOC physical therapist
65D	USA AOC physician assistant
68J	USA MOS medical logistics specialist
68W	USA MOS healthcare specialist
68W-R-W1	USA MOS healthcare specialist – ranger qualified-ranger unit service– special operations combat medic
68W-V-W1	USA MOS healthcare specialist – ranger school qualified – special operations combat medic
68W-W1	USA MOS healthcare specialist – special operations combat medic
68S	USA MOS preventive medicine specialist
68T	USA MOS veterinary specialist
68X	USA MOS mental health specialist
70B	USA AOC medical service corps
70H	USA AOC medical operations officer
70K	USA AOC medical logistics officer
8404	USN NEC field medical service technician
8427	USN NEC special amphibious reconnaissance corpsman
AA	assembly area
AAR	after action review
AAS	acute abdominal series
ABD	abdomen
ABG	arterial blood gas
ABLS	advanced burn life support
Abx	antibiotics
AC	before eating (ante cibum)
A/C	aircraft
ACE	ammunition, casualty, equipment
ACL	anterior cruciate ligament
ACLS	advanced cardiac life support
ACP	alternate command post
AE	aeromedical evacuation
AECC	aeromedical evacuation control center
AELT	aeromedical evacuation liaison team
AF	afebrile
AFSC	air force specialty code (MOS)
AFSOC	air force special operations command
AGL	above ground level
AKA	above-the-knee amputation
ALCON	all concerned
ALS	advanced life support
AMCIT	American citizen
AMEDD	army medical department
AMS	acute mountain sickness
A&O X -	alert and oriented times orientation
AO	area of operations
AOR	area of responsibility
AP	anteroposterior
ARDS	acute respiratory distress syndrome
ARF	airfield reaction force
ASA	acetylsalicylic acid (aspirin)
ASAP	as soon as possible
ASMB	area support medical battalion
ASMC	area support medical company
AT/NC	atraumatic, normocephalic
ATLS	advanced trauma life support
ATM	advanced trauma manager/ management
ATP	advanced tactical practitioner
ATT	…at this time
AWLS	advanced wilderness life support
AXP	ambulance exchange point
BALCS	body armor load carriage system
BAS	battalion aid station
bid	twice a day
BCK	bleeder control kit
Bingo	out of fuel
BKA	below-the-knee amputation
BLOC	battalion logistics operations center
BLS	basic life support
BLUF	bottom line up front
BM	bowel movement
BMNT	before morning nautical twilight
BN	battalion
BP	blood pressure or blocking position
BPM	beats per minute
BRBPR	bright red blood per rectum
BS	bowel sounds
BSI	body substance isolation
BVM	bag-valve-mask
BW	biological warfare
Bx	biopsy
c	with (cum)
C	Celsius or centigrade
C2	command & control
CA	civil affairs
CAD	coronary artery disease
CAM	chemical agent monitor
CAMS	civil affairs medical sergeant
CANA	convulsant antidote for nerve agents
CARP	calculated air release point
CAT	computed axial tomography
CAT	combat application tourniquet
CAX	casualties
CBC	complete blood count
CBRN	chemical, biological, radiological, nuclear
cc	cubic centimeter
CC	chief complaint
CCP	casualty collection point
CDC	centers for disease control
CDR	commander
CENTCOM	United States central command
CEP	casualty evacuation point
CHI	closed head injury
CHOPS	chief of operations
CJTF	combined joint task force
CLS	combat lifesaver
CMB	combat medical badge
CMD	command
CMO	civil-military operations
CNS	central nervous system
C/O	complaining of
CO	commanding officer
CO	carbon monoxide
CO_2	carbon dioxide
COA	course of action

COB	close of business (time of day) or civilians on the battlefield
CONOP	concept of the operation
CONUS	continental United States
COP	command outpost or common operating picture
CoTCCC	committee on tactical combat casualty care
COTS	commercial-of-the-shelf (purchase)
CP	command post
CPAP	continuous positive airway pressure
CPR	cardiopulmonary resuscitation or critical, priority, routine
CQB	close quarters battle
CQC	close quarters combat
CQM	close quarters marksmanship
CR	casualty response
Cric	cricothyroidotomy
CRTRL	casualty response training for ranger leaders
CSAR	combat search and rescue
CSF	cerebral spinal fluid
CSS	combat service support
CTA	clear to auscultation
CTM	combat trauma management
CUF	care under fire
CWIED	command wired improvised explosive device
CWPP	combat wound pill pack
CXP	casualty exchange point
CXR	chest x-ray
DA	department of the army or direct action
DACO	departure airfield control officer/operations
D/C	discontinue or discharge
DDx	differential diagnosis
DEA	drug enforcement agency
DHB	defense health board
DIRLAUTH	direct liaison authorized
DLS	dirt landing strip
DMO	diving medical officer
DMT	diving medical technician
DO	doctor of osteopathy
DOA	dead on arrival
DOB	date of birth
DOD	department of defense
DOE	dyspnea on exertion
DOW	died of wounds
DNBI	disease/non-battle injury
DNR	do not resuscitate
DPL	diagnostic peritoneal lavage
DPN	drops per minute
DPT	diphtheria, pertussis, tetanus
DSN	defense switching network
DTG	date time group DDTTTTZMMMYY
DTR	deep tendon reflex
DVT	deep venous thrombosis
Dx	diagnosis
DZ	drop zone
EA	each
EBL	estimated blood loss
ECC	emergency cardiac care
ECG	electrocardiogram
EDC	estimated date of confinement
EDRE	emergency deployment readiness exercise
EENT	early evening nautical twilight
EFMB	expert field medical badge
EKG	electrocardiogram
EKIA	enemy killed in action
EJ	external jugular
EMG	electromyogram
EMS	emergency medical system or service
EMT	emergency medical technician
EMT-B	emergency medical technician-basic
EMT-I	emergency medical technician-intermediate
EMT-P	emergency medical technician-paramedic
EOM	extraocular muscles
EOMI	extraocular muscles intact
EPW	enemy prisoner of war
ET	endotracheal (tube)
ETOH	ethanol alcohol
EWIA	enemy wounded in action
EXCHECK	execution checklist
Exfil	exfiltration
EXORD	execution order
F	Fahrenheit
FABER	flexion, abduction and external rotation
FARP	forward aerial refueling point
FB	foreign body
F&D	fixed and dilated
FamHx	family history
F/C	fevers, chills
FDA	food and drug administration
FH	field hospital
FITT	frequency, intensity, time, type
FKIA	friendly killed in action
FMC	final manifest call or field medical card
FMED	flight medic
FOB	forward operating base
FOOSH	fall on out-stretched hand
FP	family practice
FRAGO	fragmentation order
FRIES	fast rope insertion/extraction system
FSB	forward staging base
FST FTX	forward surgical team field training exercise
F/U	follow-up
FUO	fever of unknown origin
FWIA	friendly wounded in action
Fx	fracture
g	gram(s)
G	gauge (needle)
G6PD	glucose-6 phosphate dehydrogenase
GAF	ground assault force
GCS	Glasgow coma scale
GERD	gastroesophageal reflux disease
GFC	ground force commander
GI	gastrointestinal
GPS	global positioning system
GRG	grid reference guide
GSW	gunshot wound
gtt	drops
GU	genitourinary
GWOT	global war on terrorism
HA	headache

HACE	high altitude cerebral edema
HAF	helicopter assault force
HAHO	high altitude, high opening (parachute)
HALO	high altitude, low opening (parachute)
HAPE	high altitude pulmonary edema
HAZMAT	hazardous materials
Hct	hematocrit
HE	high explosive
HEENT	head, eyes, ears, nose, throat
Hg	mercury
Hgb	hemoglobin
HLZ	helicopter landing zone
HM3	USN hospital corpsman 3rd class (E4)
HM2	USN hospital corpsman 2nd class (E5)
HM1	USN hospital corpsman 1st class (E6)
HMC	USN chief hospital corpsman (E7)
HMCS	USN senior chief hospital corpsman (E8)
HMCM	USN master chief hospital corpsman (E9)
HN	USN hospitalman (E3) or host nation
HPI	history of present illness
HPS	human patient simulator
hr	hour
HR	heart rate
HS	bedtime (hours of sleep)
HSV	herpes simplex virus
HTN	hypertension
HTS	hypertonic saline
Hx	history
IAPP	inspection, auscultation, palpation, percussion
IAW	in accordance with…
ICRC	international committee of the red cross
ICW	in conjunction with…
I&D ID	incision and drainage infectious disease
IDC	see IDHC
IDHC	USN independent duty hospital corpsman
IDMT	USAF independent duty medical technician
IED	improvised explosive device
IM	intramuscular
IMC	initial manifest call
IN	Intranasal
Infil	infiltration
I&O	intake and output
IO	intraosseous
IOT	in order to…
IPPB	intermittent positive pressure breathing
IPR	in process review
IRF	immediate reaction force
ISB	intermediate staging base
ISO	in support of…
IV	intravenous
IVO	in vicinity of…
JOC	joint operations center
JOMAC	judgement, orientation, mentation, abstraction, calculation
JVD	jugular venous distention
JCCP	joint casualty collection point
JSOC	joint special operations command
JSOM	journal of special operations medicine
JSOMTC	joint special operations medical training center
JSOTF	joint special operations task force
kg	kilogram
K	potassium
KIA	killed in action
L	left
LA	lymphadenopathy
lac	laceration
LASER	light amplification by stimulated emission of radiation
LASIK	laser-assisted in situ keratomileusis
LBP	low back pain
LE	lower extremities
LIH	left inguinal hernia
LLL	left lower lobe
LMP	last menstrual period
LOC	loss of consciousness
LOD	line of duty
LP	lumbar puncture or listening post
LR	lactated ringers
LLQ	left lower quadrant
LTT	live tissue training
LUL	left upper lobe
LUQ	left upper quadrant
MACE	military acute concussion evaluation
MAPCODE	monitor, antibiotics, pain control, contact MO, oxygen, document, evacuate
MARCH	massive hemorrhage, airway, respiration, circulation, head injury/ hypothermia
MAST	military anti-shock trousers
MASSCAL	mass casualty
MASSCAX	mass casualty
MBITR	multi-band intra team radio
MC	medical control
MC	medical corps
MDMP	military decision-making process
MEDLOG	medical logistics
MEDO	medical operations officer
MEDOPS	medical operations
MEDSOV	medical special operations vehicle
MES	medical equipment set
MGMT	management
MI	myocardial infarction
MICH	modified individual combat helmet
mmHg	millimeters of mercury
MMR	measles, mumps, rubella
MOA	memorandum of agreement
MOI	mechanism of injury or memorandum of instruction
MO	medical officer
MOS	military occupational specialty
MOU	memorandum of understanding
MOUT	military operations in urban terrain
MPC	multipurpose canine
MRI	magnetic resonance imaging
MROE	medical rules of engagement
MTF	medical treatment facility

MVA	motor vehicle accident
NAD	no acute distress
NAEMT	national association of emergency medical technicians
NCM	nurse case manager
NEC	naval enlisted classification (MOS)
NEO	non-combatant evacuation operation
NET	no earlier than…
NGO	non-government organization
N-Hour	notification hour
NKA	no known allergies NKDA no known drug allergies
NLT	no later than…
NMA	non-medical attendant
NOK	next of kin
NPA	nasopharyngeal airway
NPO	nothing by mouth (nil per os)
NS	normal saline
NREMT	national registry of emergency medical technicians
NSAID	nonsteroidal anti-inflammatory drug
NSR	normal sinus rhythm
NTG	nitroglycerin
N/V/D	nausea, vomiting, diarrhea
NVG	night vision goggles
NWB	non-weight bearing
OB	obstetrics
OBJ	objective
O/C	observer/controller
OCO	OCONUS contingency operations
OCOKA	observation and fire, concealment and cover, obstacles, key terrain, and avenues of approach
OCONUS	outside continental United States
OD	right eye (oculus dexter), overdose
ODT	orally disintegrating tablets
OE	otitis externa
OEF	operation enduring freedom
OIF	operation Iraqi freedom
OM	otitis media
OND	operation new dawn (Iraq)
OPA	oropharyngeal airway
OPLAN	operations plan
OPORD	operations order
OPREP	operational report
OPQRST	onset, provokes, quality, radiates, severity, time
OPSEC	operations security
OPSO	operations officer
OPV	oral polio vaccine
ORP	objective rally point
OS	left eye (oculus sinister)
OTSG	office of the surgeon general
PA	physician assistant
PALS	pediatric advanced life support
PAX	personnel
PB	patrol base
PC	precious cargo (operational)
PC	after eating (post cibum)
PCI	pre-combat inspection
PCN	penicillin
PDHA	pre/post deployment health assessment
PDHRA	post deployment health reassessment
PDSS	pre-deployment site survey
PE	physical exam or pulmonary embolism
PEA	pulseless electrical activity
PECC	patient evacuation control center
PEPP	pediatric emergencies for pre-hospital providers
PERRLA	pupils equal, round, reactive to light and accommodation
PFT	pulmonary function test
PHA	periodic health assessment
P-HR	parachute hour
PHTLS	pre-hospital trauma life support
PHTR	pre-hospital trauma registry
PIR	priority intelligence requirements
PJ	USAF pararescueman
PLF	parachute landing fall
PM	preventive medicine
PMCS	preventive maintenance checks & services
PMHx	past medical history
PMI	point of maximal impulse
PNOK	primary next of kin
PO	by mouth (per os)
POC	point of contact
POD	period of darkness
POI	point of injury or program of instruction
POW	prisoner of war
PPD	purified protein derivative
PPE	personal protective equipment
ppm	parts per million
PPV	positive pressure ventilation
PR	per rectum or personnel recovery
PRK	photorefractive keratectomy
PRN	as often as needed (pro re nata)
PSHx	past surgical history
PSI	pounds per square inch
Pt	patient
PT	physical therapist or physical training
PTSD	post-traumatic stress disorder
PUD	peptic ulcer disease
PULHES	physical profile factors: P - physical capacity or stamina, U - upper extremities, L-lower extremities, H- hearing and ears, E - eyes, S- psychiatric
PZ	pickup zone
q	every (quaque)
QC	quality control
qd	every day
qhr	every hour
q _hr	every _ hours
q_min	every _ minutes
qid	four times a day (quater in die)
qod	every other day
QRF	quick reaction force
qt	quart
qty	quantity
R	right
RASP	ranger assessment & selection program
RAW	ranger athlete warrior (program)
RBC	red blood cell
RCMS	ranger casualty management system
RC	regional command
RCO	regimental commander
RCP	runway crossing point
R&D	research and development
RDA	recommended dietary allowance

RECC	ranger enhanced care clinic
REM	rapid eye movement
RFI	request for information
RFM	release for medical (standards) or regimental finance management
RFR	ranger first responder
RFS	release for standards
Rh	Rhesus blood factor
RHQ	regimental headquarters
RGR	ranger
RIH	right inguinal hernia
RLL	right lower lobe
RLCS	ranger load carriage system
RLQ	right lower quadrant
RLTW	rangers lead the way
RMAV	ranger medic assessment and validation
RMed	ranger medic
RMED	regimental medical section
RMEDFM	regimental medical force modernization
RMEDO	regimental medical operations officer
RML	right middle lobe
R/O	rule out
ROC	ranger operations company
ROE	rules of engagement
ROM	range of motion
ROS	review of systems
RP	rally point
R-PA	regimental physician assistant
RPSYCH	regimental psychologist
RR	respiratory rate
RRC	regimental reconnaissance company
RRF-1	ranger ready force one
RRF-2	ranger ready force two
RRF-3	ranger ready force three
RRR	regular rate and rhythm
RRT	regimental reconnaissance team
R&S	reconnaissance and surveillance
RSM	regimental sergeant major
RSOV	ranger special operations vehicle
RSRMED	regimental senior medic
RSTB	regimental special troops battalion
RSURG	regimental surgeon
RTB	return to base or ranger training brigade/battalion
RTC	return to clinic
RUL	right upper lobe
RUQ	right upper quadrant
RVET	regimental veterinarian
Rx	prescription, treatment
s	without (sine)
S1	personnel and administration
S2	intelligence and security
S3	operations and training
S4	logistics and supply
S5	civil affairs and information operations
S6	signal and communications
S8	force modernization, plan, R&D
SA	situational awareness
SARC	USN surface amphibious reconnaissance corpsman
SCUBA	self-contained underwater breathing apparatus
SCRK	squad casualty response kit
SEA	senior enlisted advisor
SEM	systolic ejection murmur
SF	special forces
SFG	special forces group
SFMS	special forces medical sergeant
SITREP	situation report
SL	sublingual
SLLS	stop, look, listen, smell (tactical)
SMO	senior medical officer
Sn	signs
SNL	standard name line (last, first, MI, rank, SSN, unit, DOB)
SocHx	social history
SOAR	special operations aviation regiment
SOB	shortness of breath
SOCM	special operations combat medic
SOCMSSC	special operations combat medic skills sustainment course
SOF	special operations forces
SOI	signal operating instructions
SOMA	special operations medical association
SOP	standard operating procedures
SOR	statement of requirements
SP	start point
SQ	subcutaneous
SQD	squad
SRMED	senior ranger medic
SRP	soldier readiness processing
SRT	surgical resuscitation team
S/Sx	signs and symptoms
SSN	social security number
STANAG	standardization agreement
STD	sexually transmitted disease
SURG	surgeon (battalion, regimental, or command)
SURT	small unit ranger tactics
SVBIED	suicide vest borne improvised explosive device
Sx	symptoms
Tab	tablet
TACEVAC	tactical evacuation
TBD	to be determined
TBSA	total body surface area
TCCC	tactical combat casualty care
TC3	tactical combat casualty care
TCR	trauma center rotation
Td	tetanus-diphtheria toxoid
TF	task force
TFC	tactical field care
TGT	target
TIC	troops in contact or toxic industrial chemical
tid	three times a day (ter in die)
TIM	toxic industrial materials
TKO	to keep open
TLP	troop leading procedures
TM	tympanic membrane
TMEP	tactical medical emergency protocol
TMT	trauma management team
TNTC	too numerous to count
TOC	tactical operations center
TOD	time of death
TOT	time on target
TQ	tourniquet
tsp	teaspoon
TST	time sensitive target

TTP	tenderness to palpation or tactics, techniques & procedures
TTWB	toe-touch weight bearing
Tx	treatment
U	army special qualification identifier – ranger qualified & ranger unit service
ud	as directed (ut dictum)
UE	upper extremities
UIC	unit identification code
URI	upper respiratory tract infection
USA	United States Army
USAF	United States Air Force
USAISR	United States Army Institute of Surgical Research
USASOC	United States Army Special Operations Command
USN	United States Navy
USSOCOM	United States Special Operations Command
USUHS	uniformed services university of health sciences
UTI	urinary tract infection
UXO	unexploded ordinance
V	army special qualification identifier for ranger-parachutist
VA	visual acuity
VBIED	vehicle borne improvised explosive device
VD	venereal disease
VDO	vehicle drop off
VOIED	victim operated improvised explosive device
VSS	vital signs stable
W1	special operations combat medic additional skill identifier
WALK	warrior aid & litter kit
WARNORD	warning order
WBAT	weight bearing as tolerated
WBC	white blood cell
WD	well developed
WHO	world health organization
Winchester	out of ammunition
WIA	wounded in action
WMD	weapons of mass destruction
WN	well nourished
WNL	within normal limits
WP	white phosphorus
W/U	wheels up (aircraft departure)
XO	executive officer
Y/O	years old
>, <, =	greater than, less than, equal

LATIN:

dominatus	mastery in
comminus	close combat
rememdium	medicine

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 deferring 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

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.

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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.

Reference Charts

AVPU Responsiveness Assessment

ALERT
VERBAL – Responds to verbal stimuli
PAIN – Responds to painful stimuli
UNCONSCIOUS – Does not respond to any stimuli

OPQRST Patient History

Chief Complaint
O – Onset
P – Provocation
Q – Quality
R – Radiation
S – Severity
T - Time

AMPLE Patient History

A – Allergies
M – Medications
P – Past Medical History
L – Last Meal
E – Events Associated

Glasgow Coma Scale

Eye Opening	Spontaneous	4
	To Voice	3
	To Pain	2
	None	1
Verbal Response	Oriented	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Words	2
	None	1
Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraws (Pain)	4
	Flexion	3
	Extension	2
	None	1

Document as E___ + V___ + M___ =___

Neurological Assessment

Mental Status
- Orientation
- Affect
- Speech (Content & Process)

Cranial Nerves
- I Olfactory (Identify an odor or distinguish between 2 odors)
- II Optic (Visual Acuity test)
- III Oculomotor (Assess 6 cardinal eye movements & pupillary reaction)
- IV Trochlear (Assess 6 cardinal eye movements)
- V Trigeminal (Facial Sensitivity & Biting/Clinching teeth)
- VI Abducens (Eye movement looking left and right)
- VII Facial (Smile, frown, raise brows, and taste)
- VIII Vestibulocochlear (Hearing-rubbing fingers & Equilibrium)
- IX Acoustic (Gag reflex and identify tastes)
- X Vagus (Gag reflex and speech)
- XI Spinal Accessory (Head movement and shoulder shrugging)
- XII Hypoglossal (stick out tongue and move left and right)

Motor Status
- Posture
- Strength in basic muscle movements
- Resistance to passive movement
- Tremors or Involuntary Movements

Sensation Status
- Senses light touch
- Senses pain or pricks
- Senses temperature
- Senses vibration (tuning fork)

Coordination
- Gait and Stance
- Finger to nose
- Heel to shin

Reflexes
- Deep tendon reflexes (biceps, triceps, knees, ankles)
- Plantar reflexes

Capnography / Pulse Oximetry Interpretation

$EtCO_2$	SpO_2	
↑	↓	Respiratory Acidosis
↓	↓	Decompensated Shock
↑	↓	Compensated Shock
↓	↑	Respiratory Alkalosis

$EtCO_2$ Normal Range: 35-45 mmHg
↑ 45 Acidotic
↓35 Alkalotic

Conversion Charts

Length Conversions

1 inch = 2.54 cm	1 mm = 0.1 cm = 0.039 in
1 foot = 30.5 cm = 0.305 m	1 cm = 10 mm = 0.39 in
1 yard = 0.91 m	1 m = 100 cm = 39 in
1 mile = 1.6 km	1 km = 100 m = 1,093 yd

Weight Conversions

1 oz = 30 g	1 g = 001 kg = 0.36 oz
1 lb = 16 oz = 0.45 kg	1 kg = 1,000 g = 2.2 lbs
1 ton = 2,000 lbs = 907 kg	1 ton (metric) = 1,000 kg = 2,200 lbs
1 grain = 65 mg	

Volume Conversions

1 fl oz = 30 ml = 30 cc	1 cc = 0.001 liter
1 US Gal = 128 fl oz = 3785 ml	1 ml = 1 cc = 0.34 fl oz
	1 liter = 1,000 ml = 340 fl oz

Conversion Formulas

WEIGHT	LENGTH
lb = kg X 2.2	Inches = cm X 0.394
kg = lb X 0.45	cm = inches X 2.54

TEMPERATURE

F = (1.8) X C + 32

C = (F – 32) / (1.8)

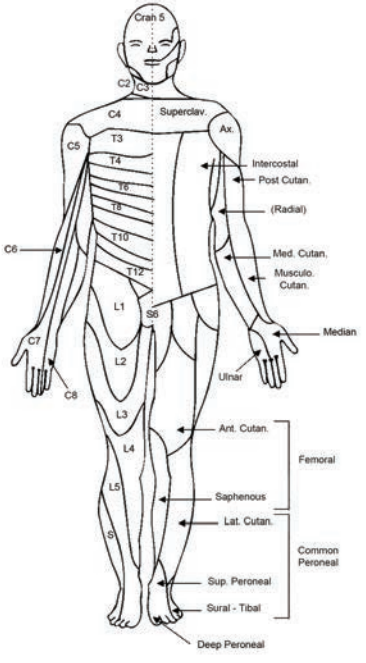
Quick Conversions

HEIGHT			WEIGHT		TEMPERATURE	
ft/in	in	cm	lb	kg	F	C
4'8"	56	142	40	18.2	212	100
4'9"	57	145	50	22.7	108	42.2
4'10"	58	147	60	27.3	107	41.6
4'11"	59	150	70	31.8	106	41.1
5'0"	60	152	80	36.4	105	40.6
5'1"	61	155	90	40.9	104	40.0
5'2"	62	157	100	45.5	103	39.4
5'3"	63	160	110	50.0	102	38.9
5'4"	64	163	120	54.5	101	38.3
5'5"	65	165	130	59.1	100	37.8
5'6"	66	168	140	63.6	99	37.2
5'7"	67	170	150	68.2	98	36.7
5'8"	68	173	160	72.7	98.6	37.0
5'9"	69	175	170	77.3	97	36.1
5'10"	70	178	180	81.8	96	35.6
5'11"	71	180	190	86.4	95	35.0
6'0"	72	183	200	90.9	94	34.4
6'1"	73	185	210	95.5	93	34.0
6'2"	74	188	225	102.3	92	33.3
6'3"	75	191	250	113.6	91	32.8
6'4"	76	193	275	125.0	90	32.1
6'5"	77	196	300	136.4		

IV FLUID RATES IN DROPS PER MINUTE

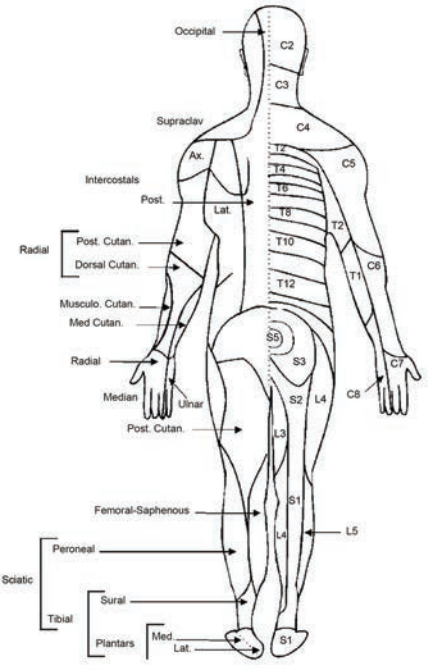
ml/HR	50	75	80	100	125	150	175	200	250
10GTT-	8	13	13	17	21	25	29	33	42
15GTT-	12	19	20	25	31	37	44	50	62
60GTT-	50	75	80	100	125	150	175	200	250

Neuro Exam Reference Chart



Dermatomes of Cutaneous Innervation, Anterior View

(United States Navy Dive Manual)



Dermatomes of Cutaneous Innervation, Posterior View

(United States Navy Dive Manual)

Neurological Assessment

Mental Status
- Orientation
- Affect
- Speech (Content & Process)

Cranial Nerves
- I Olfactory (Identify an odor or distinguish between 2 odors)
- II Optic (Visual Acuity test)
- III Oculomotor (Assess 6 cardinal eye movements & pupillary reaction)
- IV Trochlear (Assess 6 cardinal eye movements)
- V Trigeminal (Facial Sensitivity & Biting/Clinching teeth)
- VI Abducens (Eye movement looking left and right)
- VII Facial (Smile, frown, raise brows, and taste)
- VIII Vestibulocochlear (Hearing-rubbing fingers & Equilibrium)
- IX Acoustic (Gag reflex and identify tastes)
- X Vagus (Gag reflex and speech)
- XI Spinal Accessory (Head movement and shoulder shrugging)
- XII Hypoglossal (stick out tongue and move left and right)

Motor Status
- Posture
- Strength in basic muscle movements
- Resistance to passive movement
- Tremors or Involuntary Movements

Sensation Status
- Senses light touch
- Senses pain or pricks
- Senses temperature
- Senses vibration (tuning fork)

Coordination
- Gait and Stance
- Finger to nose
- Heel to shin

Reflexes
- Deep tendon reflexes (biceps, triceps, knees, ankles)
- Plantar reflexes

ARDSnet Vent Settings

PBW and Tidal Volume for Females

Height (in)	PBW	4ml	5ml	6ml	7ml	8ml
4' 0" (48)	17.9	72	90	107	125	143
4' 1" (49)	20.2	81	101	121	141	162
4' 2" (50)	22.5	90	113	135	158	180
4' 3" (51)	24.8	99	124	149	174	198
4' 4" (52)	27.1	108	136	163	190	217
4' 5" (53)	29.4	118	147	176	206	235
4' 6" (54)	31.7	127	159	190	222	254
4' 7" (55)	34.0	136	170	204	238	272
4' 8" (56)	36.3	145	182	218	254	290
4' 9" (57)	38.6	154	193	232	270	309
4' 10" (58)	40.9	164	205	245	286	327
4' 11" (59)	43.2	173	216	259	302	346
5' 0" (60)	45.5	182	228	273	319	364
5' 1" (61)	47.8	191	239	287	335	382
5' 2" (62)	50.1	200	251	301	351	401
5' 3" (63)	52.4	210	262	314	367	419
5' 4" (64)	54.4	219	274	328	383	438
5' 5" (65)	57.0	228	285	342	399	456
5' 6" (66)	59.3	237	297	356	415	474
5' 7" (67)	61.6	246	308	370	431	493
5' 8" (68)	63.9	256	320	383	447	511
5' 9" (69)	66.2	265	331	397	463	530
5' 10" (70)	68.5	274	343	411	480	548
5' 11" (71)	70.8	283	354	425	496	566
6' 0" (72)	73.1	292	366	439	512	585
6' 1" (73)	75.4	302	377	452	528	603
6' 2" (74)	77.7	311	389	466	544	622
6' 3" (75)	80.0	320	400	480	560	640
6' 4" (76)	82.3	329	412	494	576	658
6' 5" (77)	84.6	338	423	508	592	677
6' 6" (78)	86.9	348	435	521	608	695
6' 7" (79)	89.2	357	446	535	624	714
6' 8" (80)	91.5	366	458	549	641	732
6' 9" (81)	93.8	375	469	563	657	750
6' 10" (82)	96.1	384	481	577	673	769
6' 11" (83)	98.4	394	492	590	689	787
7' 0" (84)	100.7	403	504	604	705	806

PBW and Tidal Volume for Males

Height (in)	PBW	4ml	5ml	6ml	7ml	8ml
4' 0" (48)	22.4	90	112	134	157	179
4' 1" (49)	24.7	99	124	148	173	198
4' 2" (50)	27.0	108	135	162	189	216
4' 3" (51)	29.3	117	147	176	205	234
4' 4" (52)	31.6	126	158	190	221	253
4' 5" (53)	33.9	136	170	203	237	271
4' 6" (54)	36.2	145	181	217	253	290
4' 7" (55)	38.5	154	193	231	270	308
4' 8" (56)	40.8	163	204	245	286	326
4' 9" (57)	43.1	172	216	259	302	345
4' 10" (58)	45.4	182	227	272	318	363
4' 11" (59)	47.7	191	239	286	334	382
5' 0" (60)	50.0	200	250	300	350	400
5' 1" (61)	52.3	209	262	314	366	481
5' 2" (62)	54.6	218	273	328	382	437
5' 3" (63)	56.9	228	285	341	398	455
5' 4" (64)	59.2	237	296	355	414	474
5' 5" (65)	61.5	246	308	369	431	492
5' 6" (66)	63.8	255	319	383	447	510
5' 7" (67)	66.1	264	331	397	463	529
5' 8" (68)	68.4	274	342	410	479	547
5' 9" (69)	70.7	283	354	424	495	566
5' 10" (70)	73.0	292	365	438	511	584
5' 11" (71)	75.3	301	377	452	527	602
6' 0" (72)	77.6	310	388	466	543	621
6' 1" (73)	79.9	320	400	479	559	639
6' 2" (74)	82.2	329	411	493	575	658
6' 3" (75)	84.5	338	423	507	592	676
6' 4" (76)	86.8	347	434	521	608	694
6' 5" (77)	89.1	356	446	535	624	713
6' 6" (78)	91.4	366	457	548	640	731
6' 7" (79)	93.7	375	469	562	656	750
6' 8" (80)	96.0	384	480	576	672	768
6' 9" (81)	98.3	393	492	590	688	786
6' 10" (82)	100.6	402	503	604	704	805
6' 11" (83)	102.9	412	515	617	720	823
7' 0" (84)	105.2	421	526	631	736	842

Source: ARDSNet Studies

ARDSnet Vent Settings

NIH NHLBI ARDS Clinical Network
Mechanical Ventilation Protocol Summary

INCLUSION CRITERIA: Acute onset of
1. $PaO_2/FiO_2 \leq 300$ corrected for altitude
2. Bilateral (patchy, diffuse, or homogeneous) infiltrates consistent with pulmonary edema
3. No clinical evidence of left atrial hypertension

PART I: VENTILATOR SETUP AND ADJUSTMENT
1. Calculate predicted body weight (PBW)
   Males = 50 + 2.3 [height (inches) –60]
   Females = 45.5 + 2.3 [height (inches) –60]
2. Select any ventilator mode
3. Set ventilator settings to achieve initial V_T = 6mL/kg PBW.
4. Reduce V_T by 1mL/kg at intervals ≤ 2 hours until 6mL/kg PBW.
5. Set initial rat to approximate baseline minute ventilator (not > 35 bpm).
6. Adjust V_T and RR to achieve pH and plateau pressure goals below.

OXYGENATION GOAL: PaO_2 55–80mmHg or SpO_2 88–95%
Use a minimum PEEP of 5cm H_2O. Consider use of incremental FiO_2/PEEP combinations such as shown below (not required) to achieve goal.

Lower PEEP/higher FiO_2

FiO_2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
PEEP	5	5	8	8	10	10	10	12

FiO_2	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	14	14	14	16	18	18–24

Higher PEEP/lower FiO_2

FiO_2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
PEEP	5	8	10	12	14	14	16	16

FiO_2	0.5	0.5–0.8	0.8	0.9	1.0	1.0
PEEP	18	20	22	22	22	24

PLATEAU PRESSURE GOAL: ≤ 30cm H_2O
Check Pplat (0.5 second inspiratory pause), at least q4h and after each change in PEEP or V_T.
If Pplat > 30cm H_2O: decrease V_T by 1mL/kg steps (minimum = 4mL/kg).
If Pplat > 25cm H_2O and V_T < 6mL/kg, increase V_T by 1mL/kg until Pplat > 25cm H_2O and V_T = 6mL/kg.
If Pplat > 30cm and breath stacking or dys-synchrony occurs: may increase V_T in 1mL/kg increments to 7 or 8mL/kg if Pplat remains ≤ 30cm H_2O.

pH GOAL: 7.30–7.45
Acidosis Management: (pH < 7.30)
If pH 7.15–7.30: Increase RR until pH > 7.30 or $PaCO_2$ < 25 (Maximum set RR = 35).

If pH < 7.15: Increase RR to 35.
If pH remains < 7./15, V_T may be increased in 1mL/kg steps until pH > 7.15 (Pplt target of 30 may be exceeded).

Alkalosis Management: (pH < 7.45) Decrease vent rate if possible.

B. SPONTANEOUS BREATHING TRIAL (SBT):
If all above criteria are met and subject has been in the study for at least 12 hours, initial a trial of UP TO 10 minutes of spontaneous breathing with $FiO_2 \leq 0.50$ and PEEP ≤ 5:
1. Place on T-piece, trach collar, or CPAP ≤ 5cm H_2O with PS ≤ 5.
2. Assess for tolerance as below for up to two hours.
   a. $SpO_2 \geq 90$: and/or $PaO_2 \geq 60$mmHg
   b. Spontaneous $V_T \geq 4$mL/kg PBW
   c. RR ≤ 35 min
   d. pH ≥ 7.3
   e. No respiratory distress (distress = 2 or more)
      ➢ HR ≥ 120% of baseline
      ➢ Marked accessory muscle use
      ➢ Abdominal paradox
      ➢ Diaphoresis
      ➢ Marked dyspnea
3. If tolerated for at least 30 minutes, consider extubation.
4. If not tolerated, resume pre-weaning settings.

I: E RATIO GOAL: Recommended that duration of inspiration be ≤ duration of expiration.

PART II: WEANING
A. Conduct a SPONTANEOUS BREATHING TRIAL daily when:
1. $FiO_2 \leq 0.40$ and PEEP ≤ 8 **OR** $FiO_2 \leq 0.60$ and PEEP ≤ 5.
2. PEEP and FiO_2 ≤ values of previous day.
3. Patient has acceptable spontaneous breathing efforts. (May decrease vent rate but 50% for 5 minutes to detect effort.)
4. No neuromuscular blocking agents or blockade.

Definition of UNASSISTED BREATHING
(Different from the spontaneous breathing criteria as PS is not allowed)

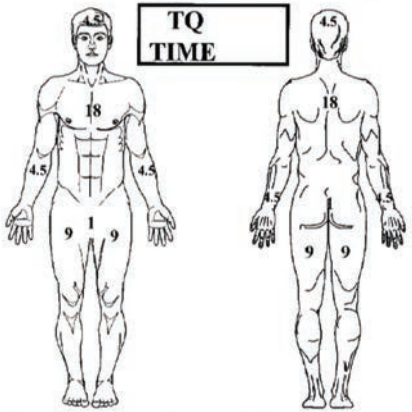
1. Extubated with face mask, nasal prong oxygen, or room air, **OR**
2. T-tube breathing, **OR**
3. Tracheostomy mask breathing, **OR**
4. CPAP less than or equal to 5cm H_2O **without pressure support or IMV assistance**.

Name/Unit _____

DTG:_____ **ALLERGIES:**_____

Friendly Unknown **NBC**

TQ TIME



GSW BLAST MVA Other_____

TIME				
AVPU				
PULSE				
RESP				
BP				

DA FORM 7656, XXX ####

A: Intact Adjunct Cric Intubated

B: Chest Seal NeedleD ChestTube

C: TQ Hemostatic Packed PressureDrsg

FLUIDS: IV IO

NS / LR 500 1000 1500

Hextend 500 1000

Other:

DRUGS (Type / Dose / Route):

PAIN

ABX

OTHER

First Responder's Name_____

Ranger Casualty Card (adopted as DA Form 7656)

Prolonged Field Care Flowsheet v.21.1 (16 Jan 2018)

Name:	Date:	Time:	Weight:	Blood type:	EVAC Category: I D M E

S:

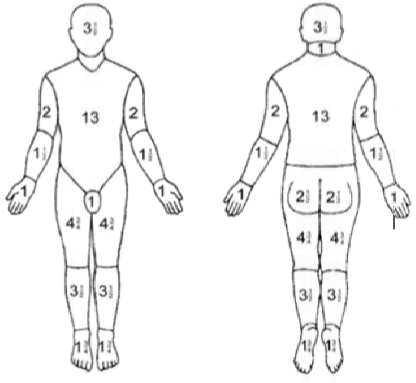
A:

M:

P:

L:

E:



M.I.S.T. Report:

MOI:

Stable or Unstable

	Injuries / Illness / Problems	Treatments - Plans	✓
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

TQ 1 time on:	TQ 2 time on:	TQ 3 time on:	TQ 4 time on:	TXA Dose 1 on:
TQ 1 Converted:	TQ 2 Converted:	TQ 3 Converted:	TQ 4 Converted:	TXA Dose 2 on:

Notes:

Teleconsult Call Script and Patient Handover Info Time:_____

This is _____, an_____ (Job Position)
I have a patient with _____ who I think has_____ and I need _____ Chief Complaint_____ Brief History_____ Vitals
HR_____ RR_____ BP_____ Temp_____ Pulse Ox_____ UOP _____ AVPU _____ Exam Findings_____

Recommendations

Fluids/Meds_____
Interventions_____ Red-Flags_____

Newest version available at prolongedfieldcare.org

Prolonged Field Care Flowsheet v.21.1 (16 Jan 2018)

	Day																									D
	Hour																									H
	Minute																									M
Time Zone:	Other																									Other
	200																									200
	190																									190
	180																									180
	170																									170
	160																									160
	150																									150
BP	140																									140
Systolic v	130																									130
Diastolic ^	120																									120
	110																									110
Temp X	100																									100
	95																									95
SPO2 0	90																									90
	85																									85
	80																									80
Pulse ●	75																									75
	70																									70
MAP Δ	65																									65
	60																									60
	55																									55
	50																									50
	45																									45
ETCO2 ■	40																									40
	35																									35
	30																									30
	25																									25
	20																									20
Respirations O	15																									15
	10																									10
	5																									5
	0																									0
	No Read																									No Read
Output																										
Fluid Input																										
Pain scale/RASS																										
AVPU/Neuro/MACE																										
Eye response	4																									
Oral Response	5																									
Motor Response	6																									
GCS Total	15																									
Drug/Intervention:	Dose:																									
Drug/Intervention:	Dose:																									
Drug/Intervention:	Dose:																									
Drug/Intervention:	Dose:																									
Drug/Intervention:	Dose:																									
Drug/Intervention:	Dose:																									
Drug/Intervention:	Dose:																									
Drug/Intervention:	Dose:																									

Checklist	✓
Reassess Tx	
Expose	
Detailed Exam	
Send MIST Report	
Monitors	
2nd IV/IO	
GCS/Neuro/MACE	
Analgesia	
Sedation	
NG / OG	
Upgrade Airway	
Post Cric Checklist	
Vent w/ PEEP	
Hypothermia Tx	
Recalc TBSA and Fluids	
Ultrasound eFast	
Fluid Challenge	
1st TXA dose (ASAP)	
Blood Type Card	
FWB Transfusion	
Convert TQ <4hrs	
Foley / Bladder Tap	
Adjust Vent Settings	
UA Dipstick	
Clear C-Spine	
Position Pad Patient	
Peripheral Pulses	
Compartment Syndrome	
Escharotomy	
Reduce / Splint Fx	
DVT Prophylaxis	
Antiboitic War Wound Tx	
Tetanus	
Teleconsult	
Labs	
X-Ray / Imaging	
PreOp Eval	
Debridement	
Nursing Care Reminders	✓
Vitals/Assessment q1h	
Flush Saline Locks q8hrs	
Suction ET Tube PRN	
Reposition q2hrs	
Change Blood Tubing q4hrs	
Oral Care q12hrs	
Foley Care q24hrs	
Sponge Bath q24hrs	
Change IV Bag q24hrs	
Check BGL q8hrs	
Change IV Catheter q72hrs	
Change HME q72hrs	
Change Tape q24hrs	
Perform LE Massage q2hrs	
Perform ROM q8hrs	

TBI RETURN TO DUTY PROGRESSION

Stage	Vestibular/Ocular-Motor/Cervical	Physical Activities	Cognitive/Mood/Migraine Activities	Education
1	Daily activity that does not provide symptoms – (No exercise) Low light, low noise environment – (stay at home) 24–48 hours of symptom-limited cognitive and physical rest followed by a gradual increase in activity, staying below symptom-exacerbation thresholds	Light leisure activity, including walking on level surface	Rest with minimal, limited cognitive activity Light reading TV limited to 1–2 hours/day	• Rest, limited activity to promote recovery and eliminate symptoms • DSM-5 Measure – Adult • Sleep hygiene education & handout • 3000mg molecularly distilled pharmaceutical grade European pharmacopeia DHA/EPA Omega-3 fatty acids • 4x900mg Turmeric/Curcumin daily • Exogenous Ketones • No alcohol or tobacco • No video games/phones • Driving appropriateness
2	• Progression: (progress in sub symptomatic effort levels) begin following 24–48 hr rest Double leg stance Eyes Open (EO)/Eyes Closed (EC) Single leg stance (EO/EC) Single leg stance foam (EO/EC) Double leg bend and reach to floor Single leg bend and reach to floor Single leg alternating step up toe taps Alternating step ups/stair climber	Light physical activities to include walking, treadmill, stationary bike, elliptical at low pace and resistance Monitor HR and keep in Zone 0, 1, 2 – Daily exercises is at 80–90% of HR that brings on symptoms (May use Bruce Protocol or Buffalo Concussion Treadmill Test (BCTT))	Count from 0 to 100 by 3s (all of this out loud) Count from 100 to 0 by 3s Basic Pixy Cubes – 4-block. 2, 3, 4 color progression (Record # Solved) Jigsaw Puzzle: ~200 pieces	• Nutrition consult/anti-inflammatory diet handout • No alcohol • No video games/phones • No driving until vision & vestibular symptoms resolve **Activity / Rest** Physical: 30 min / 4 hr Cognitive: 30 min / 60 min

TBI RETURN TO DUTY PROGRESSION (CONT.)

<table>
<tr><th>Stage</th><th>Vestibular/Ocular-Motor/Cervical</th><th>Physical Activities</th><th>Cognitive/Mood/Migraine Activities</th><th>Education</th></tr>
<tr><td>3</td><td>Light Occupation-Oriented Activity (progress in sub symptomatic effort levels)

Same as Phase 2: adding helmet, kit, ruck
Walking Uneven surfaces
Walking farmers carry ≤ 20lb
Walking alternating Shoulder Press ≥ 20lb
Walking with alternating heat rotation
Walking with alternating head flex/extension
Turkish Get ups ≤ 20lb
SL RDL ≤ 20lb</td><td>Monitor HR may go up to high Zone 2 – Daily exercise is at 80–90% of HR that brings on symptoms (May use Bruce Protocol or (BCTT))</td><td>Weapon assemble/ disassembly
Count from 0 to 200 by 3s
Count from 200 to 0 by 3s

Pixy Cubes – 16-block WITH grid lines 2, 3, 4 color progression (Record # Solved)</td><td>• No video games, limit phone use/ screen time
• Alcohol may worsen symptoms; avoid or minimize to speed full recovery.
• No activities with excessive head movements

<table><tr><th></th><th>Activity</th><th>Rest</th></tr><tr><td>Physical</td><td>60 min</td><td>4 hr</td></tr><tr><td>Cognitive</td><td>30 min</td><td>60 min</td></tr></table></td></tr>
<tr><td>4</td><td>Moderate Activity – (progress in sub symptomatic effort levels)

Same as above add NVG to walking activity
Double leg jump rope/hopping
Single leg jump rope/hopping
SL Balance Ball throws (rebounder)
OLY Lifts (technique only)
Agility Ladder Training (Sub symptom effort)</td><td>Monitor HR should be into zone 3
• Daily Exercises is at 80–90% of HR that brings on symptoms (May use Bruce Protocol or (BCTT))
• Resistance Training with no vestibular load

20:10 Circuit – 1 Min Rest – 5 Rounds
A. DB Walking Lunges
B. Incline Bench Press
C. Barbell Glute Bridge
D. Band Lat Pull Down
E. Machine Row
F. Goblet Squat
*Weight as tolerated</td><td>Count from 0 to 300 by 7s
Count from 300 to 0 by 7s

Pixy Cubes – 16-block WITHOUT gridlines. 2, 3, 4 color progression (Record # Solved)

500-piece jigsaw puzzle

NeuroTracker SOF Protocol (Self-limiting)</td><td>• No Combatives or collision sports
• No weapons firing

<table><tr><th></th><th>Activity</th><th>Rest</th></tr><tr><td rowspan="3">Physical</td><td>60 min</td><td>2 hr</td></tr><tr><td>60 min</td><td>4 hr</td></tr><tr><td>90 min</td><td>6 hr</td></tr><tr><td rowspan="3">Cognitive</td><td>20 min</td><td>40 min</td></tr><tr><td>30 min</td><td>60 min</td></tr><tr><td>40 min</td><td>80 min</td></tr></table></td></tr>
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TBI RETURN TO DUTY PROGRESSION (CONT.)

Stage	Vestibular/Ocular-Motor/Cervical	Physical Activities	Cognitive/Mood/Migraine Activities	Education
5	Vestibular/Ocular-Motor Screening (VOMS)	RTD Stress Test – Monitor Heart Rate throughout test Treadmill (If treadmill only goes to 15% grade) 3.5 (4.5) mph @ 14% (10%) grade × 3 min 4.5 (5.5) mph @ 16% (12.5%) grade × 3 min 5.0 (6.0) mph @ 18% (15%) grade × 3 min 1–2 min rest and then: (10 sec between activity) Trap Bar Dead lift 185# × 10 reps Burpees x20 Bench Press 135# × 10 reps Assault Bike 2 miles in < 6 minutes or Rower 1400m in < 6 minutes Continuous Step-ups 12 inches, in kit or vest × 3 min Rest 3 min and repeat	NeuroTracker SOF Protocol (Self-limiting)	• No combatives or collision sports • No weapons firing Physical: 30 min / 2 hr; 60 min / 4 hr; 90 min / 6 hr
6	Shooting at range – assess tolerance to small arms blast	Walking in kit with NVG's over uneven terrain	NeuroTracker SOF Protocol (Self-limiting)	• No combatives or collision sports
7	Shooting – stepwise integration of movement and vestibule-ocular systems (CQB crawl-walk-run reintegration)	Running in kit with NVG's over uneven terrain and climb over wall	NeuroTracker SOF Protocol (Self-limiting)	• No crew-served weapons, mortars, breeching
8				
9	Return to Full Duty			***If symptoms are present for 30 days place consult to Neuropsychology and Neurology***

NOTES

NOTES


RANGER
RANGER
75
RGT

THE RANGER CREED

Recognizing that I volunteered as a Ranger, fully knowing the hazards of my chosen profession, I will always endeavor to uphold the prestige, honor, and high esprit de corps of my Ranger Regiment.

Acknowledging the fact that a Ranger is a more elite soldier who arrives at the cutting edge of battle by land, sea, or air, I accept the fact that as a Ranger, my country expects me to move further, faster and fight harder than any other soldier.

Never shall I fail my comrades. I will always keep myself mentally alert, physically strong, and morally straight, and I will shoulder more than my share of the task, whatever it may be, one hundred percent and then some.

Gallantly will I show the world that I am a specially selected and well trained soldier. My courtesy to superior officers, neatness of dress, and care of equipment shall set the example for others to follow.

Energetically will I meet the enemies of my country. I shall defeat them on the field of battle for I am better trained and will fight with all my might. Surrender is not a Ranger word. I will never leave a fallen comrade to fall into the hands of the enemy and under no circumstances will I ever embarrass my country.

Readily will I display the intestinal fortitude required to fight on to the Ranger objective and complete the mission, though I be the lone survivor.

RANGERS LEAD THE WAY

979-8-9902257-5-6