Summary of Changes Located at End of Document
INTRODUCTION

The CY 2023 SMOG release marks the last year of the current format. The Aeromedical Evacuation community provided developmental feedback leading to a redesign of current written medical guidance and/or policy. Be assured all future changes are a continued result of collaboration between Emergency Medicine professionals, experienced Flight Medics, Aeromedical Physician Assistants, Critical Care Nurses, and Flight Surgeons across the Army. There is close coordination in the development of these guidelines with the Joint Trauma System, and the Defense Committees on Trauma. Our shared goal is to ensure the highest quality enroute care possible and to standardize care across all evacuation and emergency medical pre-hospital units. It is our vision that all these enhancements and improvements will advance enroute care across the services and the Department of Defense.

Unit Medical Trainers, Medical Standardization Instructors, Medical Flight Instructors and Medical Directors will evaluate Critical Care Flight Paramedics (CCFP) ability to follow and execute the medical instructions herein. These medical guidelines are intended to guide CCFPs and prehospital professionals in the response and management of emergencies and the care and treatment of patients in both garrison and combat theater environments. Unit medical providers are not expected to employ these guidelines blindly. Unit medical providers are expected to manipulate and adjust these guidelines to their unit’s mission and medical air crew training / experience. Medical directors or designated supervising physicians will endorse these guidelines as a baseline, appropriately adjust components as needed, and responsibly manage individual unit medical missions within the scope of practice of their Critical Care Flight Paramedics, Enroute Critical Care Nurses, and advanced practice aeromedical providers.

CCFPs should administer medications as listed in the guidelines unless their medical director and/or supervising physician orders a deviation. Other medications may be added, so long as the unit supervising physician and/or medical director approves them.

This manual also serves as a reference for physicians providing medical direction and clinical oversight to the CCFP. Treatment direction, which is more appropriate to the patient’s condition than the guideline, should be provided by the physician so long as the CCFP scope of practice is not exceeded.

Any medical guideline that is out of date or has been found to cause further harm will be updated or deleted immediately. The Department of Aviation Medicine (DAM) serves as the managing editor of the SMOG and is responsible for content updates, managing the formal review process, and identifying review committee members for the annual review.

The Standard Medical Operating Guidelines are intended to provide medical procedural guidance and is in compliment to other Department of Defense and Department of the Army policies, regulatory and doctrinal guidance. Nothing herein overrides or supersedes laws, rules, regulation or policies of the United States, DoD or DA.
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Standard Medical Operating Guidelines are found at the following website:


Also available, along with all fillable evacuation forms and AARs on the Joint Trauma System website:

https://jts.amedd.army.mil/index.cfm/PI_CPGs/cpgs

https://jts.amedd.army.mil/index.cfm/documents/forms_after_action

All comments and/or recommendations should be sent to:

medcoesaamoperations@army.mil

with the subject line “CCFP-SMOG”
UNIVERSAL PATIENT CARE

**Scene Safety**
( Remain aware and prepared to employ personal weapons in patient and crew self-defense)
Bring all necessary equipment to patient’s side
Demonstrate professionalism and courtesy

Ensure utilizing appropriate PPE
(Including: barrier, aerosol, and IBA - as appropriate)

**Initial assessment**
BLS Guideline as necessary
Consider Spinal immobilization
Length based resuscitation tape for pediatric

**Vital signs q15min (sooner if unstable)**
(BP, Pulse, Resp, SPO₂)
Core temp: assess for hypothermia / heat injury, if appropriate
Blood glucose measurement, if appropriate

**Consider Supplemental O₂**
Airway Guideline as indicated

**Continuous Cardiac Monitoring / SPO₂**
Unless minor / ambulatory patients

**IV / IO Guideline**

**12 Lead EKG as indicated**

**Appropriate Guideline?**

**Limit On-Scene Time**
Transport to appropriate MTF

**Cardiac Arrest**
**Cardiac Arrest Guideline**

**Hypothermia prevention and management** should be provided at all times during movement

**Saline Lock***
If not giving fluids, maintain a slow “to-keep-open” (TKO) drip

**Pearls:**
- *Blood/Fluid boluses given in trauma victims should be done in accordance with hypotensive resuscitation guidelines – see multiple trauma protocol.
- General supportive measures include: Airway / Respiratory support, continuous hemodynamic monitoring with SPO₂ and EtCO₂ as appropriate, Supplemental O₂ PRN, IV Fluid boluses, Pain control PRN.
- All patients should have complete vital signs recorded.
- All patient encounters should be recorded on appropriate care documentation sheets per theater policies, unit SOPs and/or in accordance with JTS Documentation CPG at end of a patient encounter.
- Any mishaps / errors should be brought to attention of the medical control ASAP.
- Contact medical control for any necessary assistance when feasible.
TACTICAL EVACUATION

Ground “Pick-Up” Phase

Attempt to gain info prior to landing:
- Number of Patients
- Time & MOI
- Enemy presence near helicopter landing zone etc.

Wheels Down

Ensure 360 degree scene security
Continuously monitor for threats
Identify yourself to the 1st Responder

Collect Medical Info from 1st responder:
- Time & MOI
- Treatment attempted / Response
- Medications: Doses, Routes, Times
- 1st and Last Vital Signs
- DD Form 1380 TCCC card or Available Documentation
- Name / Unit (Any Available POC INFO)

Triage & Load Casualties
- Quick visual assessment
- Treat ALL preventable causes of death as able (*See Pearls)
- Load and Secure casualties per SOP

Wheels Up

Universal Patient Care Guideline
As Needed:
- O₂
- Monitor / Defibrillator
- IV / IO access (IV Guideline)

“In-Flight” Phase

Triage Casualties as required:
- Assess Responsiveness
- Conduct Rapid Assessment
  - Immediately address ANY IMMEDIATE LIFE THREATS WITH APPROPRIATE LIFE SAVING INTERVENTION(S) (LSI) *See Pearls

Reassess: If unstable move to:
- HEMORRHAGE CONTROL
  - Check / Add Tourniquet
  - Pack and Dress Wound
  - Pressure Dressing
  - Hemostatic Dressing

Reassess: If unstable move to:
- EXTREMITY TRAUMA
- MULTIPLE TRAUMA

Consider converting Limb or Junctional Tourniquets as soon as possible if:
- No presence of shock
- Able to monitor wound closely for bleeding
- Not placed to control hemorrhage on a amputated extremity
See TOURNIQUET CONVERSION

Loss of Circulation at any time:
Start CPR
Move to: TRAUMA ARREST GUIDELINE

Pain Management
Appropriate Care
Consider Antibiotic Therapy
Document Care Contact Receiving Facility
Continuous Monitoring

Pearls:
- *If the tactical situation permits, all known preventable causes of death should be addressed prior to casualty transfer to an air ambulance (e.g., accessible sources of major hemorrhage, tension pneumothorax, and airway obstruction).
- Replace any limb tourniquets placed over the uniform (Hasty Tourniquet) with one applied directly to the skin (Deliberate), 2-3 inches above wound.
- Goal < 5 minutes time on scene prior to wheels up.
HEMORRHAGE

Signs and Symptoms in a Trauma Patient
- Obvious Arterial Bleeding
- Blood Pooling / Soaked Bandages
- Venous Bleeding from Extensive Penetrating Wounds (Multiple fragments)
- Tachycardia
- Distended / Tender Abdomen
- Shortness of Breath / Difficulty Breathing / Tachypnea
- Decreased LOC
- Signs / Symptoms Shock
- Hypotension

Continued From:
Tactical Evacuation Guideline

Apply Direct Pressure and Indirect Pressure as able

Wound Location

Extremity

Trunk
Chest / Abdomen / Pelvis

Head

EXTREMITY GUIDELINE

CHEST TRAUMA GUIDELINE
- Occlusive Dressing
- Hemostatic Dressing/Pack if SC or Axillary vessel hemorrhage
- Pressure Dressing
- NEEDLE Thoracostomy
- FINGER Thoracostomy
- TUBE Thoracostomy

Penetrating Chest?

YES

NO

Penetrating Abdominal / Pelvic?

YES

NO

Hypotension / Shock Guideline

Return to:
Tactical Evacuation Guideline

Consider Possibility of Intra-abdominal Bleeding from Penetrating Abdominal Injury

Hemostatic Dressing / Pack Pelvic Cavities
- Pressure Dressing
- Direct and Indirect Pressure
- Abdominal Dressing
- Pelvic Binder

Needle Thoracostomy Guideline
Finger Thoracostomy Guideline
Tube Thoracostomy Guideline

HEAD INJURY GUIDELINE
**ABDOMINAL INJURY**

### Signs and Symptoms
- Altered mental status
- Tachycardia
- Absence of palpable pulses
- Pale, moist, and mottled skin
- Poor peripheral perfusion
- Hypotension
- Hematuria
- Pain, Tenderness, Distention, Dissymmetry
- Absent/Diminished bowel sounds
- Grey Turner Sign
- Cullen Sign
- Kehr’s Sign

---

**All** Abdominal injuries should also be considered possible chest injuries. Consult CHEST TRAUMA GUIDELINE if S/Sx are indicated.

---

**Blunt Abdominal/Pelvic Injury**
- Serial Physical Exams/Reassessment
- Pelvic Binder
- *Conduct FAST if trained and equipped*
- Focus on resuscitation

---

**Penetrating Abdominal/Pelvic Injury**
- Hemostatic Dressing/Pack Pelvic Cavities
- Pressure Dressing
- Direct and Indirect Pressure
- Abdominal Dressing
- Pelvic Binder
- AAJT-uncontrolled pelvic bleed

---

**Blunt or Penetrating Injury**

**Pregnant Patient?**
- $\uparrow$ aspiration & $\uparrow$ gastric acidity risk. Pregnant pts should receive max $O_2$ for $\uparrow$ $O_2$ consumption and $\downarrow$ reserve. Hypoxia can cause a 30% $\downarrow$ in uterine blood flow. Warm lactated Ringer’s can restore fetal oxygenation better than other crystalloids. Pregnant pts > 20 weeks’ gestation should be tilted at least 15° to left to prevent vena cava syndrome.

---

**Hypotension / Shock Guideline**

---

**Return to: Tactical Evacuation Guideline**

---

**Pearls:**
- *FAST Cannot reliably exclude clinically significant injuries, but may provide reasonable indications of intra-abdominal hemorrhage which requires surgical intervention*
- **Pain management should not be withheld.**
- Lateral contusions (seatbelt sign) associated with a 20% occurrence of internal injury and should alert the CCFP to possible internal injury
- Presence of pregnant uterus should be determined. Traumatic injuries to pregnant patients is further complicated by physiological changes experienced by the patient. Some changes can mimic shock (heart rate can increase by 20 BPM, blood volume increases by 50% during mid-pregnancy, and can experience relative anemia from hemodilution.) Due to the increase in blood flow to the uterus, risk of massive blood loss is greatly increased with trauma to the bony pelvis. At term, the placenta/uterus can perfuse approximately 600-800 mL of blood per minute.
Signs and Symptoms of Chest Trauma

- Difficulty Breathing: Cyanosis / Pursing of lips / Accessory muscle involvement
- Rapid Respirations with SPO₂ <93% (Trauma: In Flight and on O₂)
- Flail Chest
- Unequal Rise and Fall
- Open Wound / Impalement Over Thorax
- Penetrating Abdominal Wound
- Bruising Across Chest or Base of Neck
- Subcutaneous Emphysema or Deviated Trachea

Penetrating vs. Blunt Trauma

OPEN Chest Wound or IMPALEMENT?

- Seal Open Wound (vented occlusive chest seal)
- Stabilize Impalement
  Keep high index of concern for development of Hemo-pneumothorax

Signs of pneumo / hemotherax

Burp Chest Seal and/or Needle Thoracostomy

Consider Controlled Descent

Assess response:
- SPO₂ <93% (On O₂ & Patent Airway)
- Use of Accessory Muscles
- Unequal Rise and Fall
- Cyanosis / Pursed lips
- SOB / Can’t speak in complete sentences
- Wheezing / Rhonchi / Rales / Absent Breath Sounds

REPEAT NEEDLE THORACOSTOMY as needed!

Failing to Improve

Controlled Descent as able

Consider:
- Finger / Tube Thoracostomy
  (Last resort and OUT of options)
- SPINAL IMMOBILIZATION

Respiratory Distress

Flail Chest?

PAIN CONTROL
Consider:
Endotracheal Intubation
Pos P Ventilation

Continued From:
Tactical Evacuation Guideline

Penetrating

Maintain High Index of Suspicion for Intra-Abdominal and retro-peritoneal bleeding in all penetrating Chest Injuries!

Return to:
Tactical Evacuation Guideline

Return to:
Tactical Evacuation Guideline

NO

YES

NO

YES

NO
EXTREMITY TRAUMA

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HEMORRHAGE CONTROL
- Check / Add Tourniquet (Add DELIBERATE tourniquet if HASTY tourniquets only in place)
- Pack and Dress Wound
- Pressure Dressing
- Hemostatic Dressing

Fluid Resuscitation
- Whole Blood (if available)
- pRBCs and plasma (if available)
- Platelets (if authorized)
- Crystalloid (LR/NS)
- PlasmaLyte A

---

Consider converting Limb or Junctional Tourniquets as soon as possible if:
- No presence of shock
- Able to monitor wound closely for bleeding
- Not placed to control hemorrhage on an amputated extremity

See Tourniquet Conversion

Pain Control Guideline

Wound Care / Protection
- Bandage and Cover Injuries
- Immobilize Extremity
- Ice (if available) for Edema

Was it Amputated?
- Clean amputated part
- Wrap in sterile dressing damp with Normal Saline
- Place in plastic bag / air tight container
- Place limb in sealed container in ice bath slurry if available
- Transport with Patient
- Pelvic Binder for Explosive Mechanisms

---

IV / IO Guideline

Hypotension / Shock Guideline

---

Pearls:
- Evaluate and document neurovascular status in all fractures / dislocations.
- Never attempt to reduce an open fracture unless you have a confirmed loss of pulse.
- Blood loss can be severe and concealed in long bone fractures – especially the femur.
- Tourniquets should be used without hesitation to control major bleeding. Use only CoTCCC Approved Tourniquets!
- Limb and junctional tourniquets should be converted to hemostatic or pressure dressings as soon as possible if three criteria are met: the casualty is not in shock; it is possible to monitor the wound closely for bleeding; and the tourniquet is not being used to control bleeding from an amputated extremity. Every effort should be made to convert tourniquets in less than 2 hours if bleeding can be controlled with other means.
MULTIPLE TRAUMA

**Signs and Symptoms:**
- Pain, Swelling, Bleeding, Ecchymosis
- Deformity
- Altered Mental Status
- Respiratory Distress / Failure
- Vomiting
- Hypotension / Shock
- Cardiac Arrest

**Possible Injuries / Diagnoses:**
- Tension Pneumothorax
- Flail Chest
- Pericardial Tamponade
- Open Chest Wound
- Hemorthorax
- Intra-abdominal Injury / Bleeding
- Head Injury, HEENT injuries
- Extremity Fracture / Dislocation
- Hypothermia
- Burns
- Pelvis / Long-bone Fracture
- Spine / Spinal Cord Injury

---

**Continued from:**

**Tactical Evacuation Guideline**

- Rapid Assessment with GCS Concentration on C, A, B
- Minimize On-Scene Time

**HEMORRHAGE CONTROL**

- Check / Add Tourniquet
- Pack and Dress Wound
- Pressure Dressing
- Hemostatic Dressing
- Treatment Order by Severity of Hemorrhage

**HYPOTENSION / SHOCK GUIDELINE**

- Blood (if available) (Blood Guideline)

**TXA: 2g IV/IO**

- If Hemorrhage with HR >100 or SBP <100

**ENSURE Fractures are Stable:**

- Reduction / Compression of pelvic fractures
- Reduction of long bone (Femur) fractures
- Re-assess Control of External Hemorrhage

**Restart Guideline**

- Check and Readdress:
  - Hemorrhage control (MOST IMPORTANT)
  - Airway: Respiration rate, O₂, SPO₂
  - Breathing: Equal Rise / Fall, Bruising, Tracheal shift, Sub-Q Emphysema
  - IV / IO lines open and running
  - Pelvic / Femur FXs reduced and stable
  - Head and/or Spinal Injury

**Consider early airway management per Airway and Chest Trauma Guidelines**

**Spinal Immobilization PRN**

**IV / IO GUIDELINE**

- Vital signs / perfusion?

**Abnormal**

**Normal**

**Altered Mental Status or MOI c/w Head or Spinal Injury**

**Loss of Circulation at any time:**

- Start CPR
- Move to:
- TRAUMA ARREST Guideline

**PAIN MANAGEMENT GUIDELINE**

(Hemodynamic & Mental Status Stable)

- Return to: Tactical Evacuation Guideline

---

**Pearls:**

- **Optimize Hemostasis:**
  - **Hemorrhagic trauma with NO significant head injury:** Should target maintaining SBP >100. Casualties able to maintain SBP >100 do not need immediate fluid resuscitation.
  - **Hemorrhagic trauma WITH significant head injury:** should target maintaining SBP >110
  - If SBP falls <100 (with TBI <110), transition to Enroute Damage Control Resuscitation guideline.
  - Narrowed pulse pressure should prompt resuscitation - do not wait for decompensation to ensue.
  - Stabilize pelvic fractures with pelvic splint or sheet / binder and tie feet together. Up to 4-6L of blood can be hidden in the pelvis.
Pediatric MULTIPLE TRAUMA

**Signs and Symptoms:**
- Pain, Swelling, Bleeding
- Ecchymosis
- Deformity
- Altered Mental Status
- Respiratory Distress / Failure
- Vomiting
- Hypotension / Shock
- Cardiac Arrest

**Possible Injuries / Diagnoses:**
- Tension Pneumothorax
- Flail Chest
- Pericardial Tamponade
- Open Chest Wound
- Hemorthorax
- Intra-abdominal Injury / Bleeding
- Pelvis / Long-bone Fracture
- Spine / Spinal Cord Injury
- Head Injury
- Extremity Fracture / Dislocation
- HEENT Injuries
- Hypothermia
- Burns

---

**PPEAHL:**

- **Hypotension / Shock Guideline**
  - Rapid Assessment with GCS Concentration on C, A, B
  - Minimize On-Scene Time
  - TXA if: Hemorrhage with ↑HR or ↓SBP Average
  - **Pediatric HYPOTENSION / SHOCK GUIDELINE**
    - WB, 1:1:1, or pRBC's (if available) (Blood Guideline)
    - Bolus ALL FLUIDS
      - 10mL/kg Blood Bolus in <20 min.
      - 20mL/kg IVF if blood not available
    - **ENSURE Fractures are Stable:**
      - Reduction / Compression of pelvic fractures
      - Reduction of long bone (Femur) fractures
      - Reassess Control of External Hemorrhage
  - (Continued Decompensation) Abnormal

- **Loss of Circulation at any time:** Start CPR
  - 100-120 Comp/Min
  - 1 Rescuer: 30 Compressions to 2 Breaths
  - 2 Rescuer: 15 Compressions to 2 Breaths

- **Respirations Abnormal**
  - Chest Injury (Impacts Breathing)
    - CHEST TRAUMA GUIDELINE
      - Needle Thoracostomy
      - Tube Thoracostomy
      - Positive Pressure Ventilation

- **Head Injury Guideline**
  - Head Injury
  - Altered Mental Status or MOI c/w Head or Spinal Injury

- **Pediatric PAIN MANAGEMENT GUIDELINE**
  - Hemodynamic & Mental Status Stable
  - Return to: Tactical Evacuation Guideline

**Pearls:**
- Resuscitation: Maintain, SBP to at least [70 + 2 x age (yr)] or to mental status change.
- Normotension: [90 + 2 x age (yr)]
  - Narrowed pulse pressure should prompt resuscitation – do not wait for decompensation to ensue.
  - Stabilize pelvic fractures with Pelvic Splint or sheet / binder and tie feet together. Up to 80% of blood volume can be hidden in the pelvis.
  - Follow Length Based Resuscitation Tape for Pediatric ALS Equipment.
HEAD INJURY/TBI

**Signs and Symptoms:**
- Pain, Swelling, Bleeding
- Ecchymosis
- Deformity
- Altered Mental Status
- Respiratory Distress / Failure
- Vomiting

**Differential Diagnosis:**
- Skull Fracture
- Brain Injury
- Epidural Hematoma
- Subdural Hematoma
- Subarachnoid Hemorrhage
- Spinal Injury
- Abuse

---

**AIRWAY GUIDELINE**
- Return once Stable Airway established

**IV/IO Guideline**
- LR/NS Bolus PRN – SBP >110mmHg

**Return to:**
- Tactical Evacuation Guideline
(When appropriate)

---

**Spinal Immobilization Guideline**
- Assess GCS / Responsiveness
- Altered Mental Status?
  (GCS <8 or Unequal / Blown Pupils)

**GCS <8**
- Airway Compromise?
  NO
- Maintain:
  - SPO2 >90% (goal 95%)
  - SBP >110
  - ETCO2 goal 35-40mmHg
  (Herniation: ETCO2 30-35mmHg)
  - Elevate head of bed to 30° as able

**GCS >8**
- Continuous Monitoring
  Reassess q5-10min
  Seizure develops
  Go to:
  - SEIZURE GUIDELINE

---

**Continued from:**
- Tactical Evacuation Guideline

**Isolated head Trauma?**
- YES
- Spinal Immobilization Guideline

---

**Multiple Trauma Guidelines**
- NO
- Isolated head Trauma?
- YES
- Spinal Immobilization Guideline

---

**Pearls:**
**Evidence of Elevated ICP and Herniation:** Unilateral or Bilateral Fixed / Sluggish and blown pupils, persistent/repetitive vomiting, decorticate or decerebrate posture, motor abnormalities, Cushing’s Reflex: (Hypertension & Bradycardia +/- Respiratory depression)
- Prevention of hypoxic insult is key! Maintain PO2 and maintain cerebral perfusion pressure by preventing hypotension.
  - Target Vital Functions: SBP >110mm Hg, SPO2 >95%, ETCO2 at 35-40mmHg, MAP 80-110.
  - It is CRITICALLY IMPORTANT to avoid both hypo-capnea and hyper-capnea. Dedicated and closely managed ventilation is key to optimal patient outcome.
- With clear signs of herniation, may consider temporizing hyperventilation with 100% O2 and capnography: titrate CO2 to 30-35mm Hg.
- Mannitol should be given as boluses – not a constant infusion. Do not use in hypotensive, dehydration, or under-resuscitated patients
- KETAMINE Not an absolute contraindicated in ICP with hypertension and/or spontaneous cerebral hemorrhage.
**BURNS**

**Signs and Symptoms:**
- Burns, Pain, Swelling
- Dizziness
- Loss of Consciousness
- Airway Involvement (e.g., singed nasal hair, carbonaceous sputum)
- Hoarseness / Wheezing
- Loss of Consciousness

**Differential Diagnosis:**
- Superficial Burns (1st degree)
- Partial Thickness (2nd degree)
- Full Thickness (3rd degree)
- Chemical Burns
- Thermal Burns
- Electrical Burns
- Radiation
- Secondary Trauma

---

**Universal Patient Care Guideline**

1. Remove rings, bracelets, or other constricting items
2. Rapid exam for additional Injuries
3. Position patient supine
4. Immobilize area

**AIRWAY INVOLVEMENT?**

- **YES**
  - THERMAL / ELECTRIC (See Pearl)
  - Remove burning / charred clothing
  - Cool with sterile saline / gel pad
  - Cover with Dry sheet / dry sterile dressings

- **NO**
  - CHEMICAL (See Pearl)
  - Brush off any dry chemical contamination
  - Cut off contaminated clothing
  - Flush area with saline 10-15min
  - If Eye is involved: Flush with saline x 30min

**AIRWAY INVOLVEMENT?**

- **YES**
  - Burn Depth:
    - Superficial / Partial Thickness Burns:
      - 1st Degree: limited to epidermis
      - Red, Hypersensitive, and Painful: Not medically significant and not calculated in Fluid Therapy
    - 2nd Degree: epidermis and part of dermis
      - Very Painful, Red and Blistered, Wet, Weepy or Whiter and Edematous
    - Full Thickness Burns
      - 3rd Degree: destruction throughout dermis
      - Non Painful, Whitish / Charred skin often with coagulate vessels (does not blanch to touch)
    - 4th Degree: destruction through fat, fascia, muscle, and bone

- **NO**
  - All TC3 interventions can be done through burnt or charred skin e.g. IV, TQ, surgical cricothyroidotomy, needle decompression. Consider escharotomy if circumferential burn to chest compromising ventilation.

**Pearl:** Hydrofluoric Acid- Arterial infusion over 4 hr (40mL of D5W with 10mL of 10% calcium gluconate).

**Urinary Output is the MOST Reliable Guide Predicting Adequate Resuscitation**

- Adult: 0.5ml per kg per hour (100mL/hr Electrical Burn)
- Children <40kg: 1ml/kg/hr

---

**HYPOTHERMIA PREVENTION**

**PAIN CONTROL**

**Tactical Evacuation Guideline**
### ELECTRICAL INJURY

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<td>Shock / Hypotension</td>
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<tr>
<td>Cardiac Arrest</td>
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**Pearls:**

- Ventricular fibrillation (in AC) and asystole (in DC) are the most common dysrhythmias seen with electrical shock.
- Damage is often hidden deep as current follows conductive structures (e.g., blood vessels, nerves, muscle).
- In mass casualty situations where lightning is involved – reverse triage should be performed. Those victims in full arrest should be resuscitated first. The reason for this is the respiratory center of the brain takes longer to recover from the shock than the heart and respiratory support during this period can lead to survival.
  - Specifically, if there are no spontaneous respirations after airway maneuver, but no other signs of non-survivable injury, administer ventilatory support aggressively as personnel resources allow.
- Do not overlook secondary trauma.
- Electrical shock victims do not “store” electricity and are safe to handle if current is off.
- Many electrical injury patients will also have significant burn injuries – do not overlook fluid resuscitation.
TRAUMATIC ARREST

Signs and Symptoms:
- Evidence of Trauma with No Pulse
- Lack of Response to External Stimuli

Differential Diagnosis:
- Medical Cause of Arrest Preceding Trauma*
- Tension Pneumothorax
- Hypovolemia
- Cardiac Tamponade

In MASCAL situations / multiple victims:
Once passive airway maneuvers have been attempted with no restoration of spontaneous breathing, do not attempt further resuscitation until other patients have been assessed and triaged. (Triage using the SALT algorithm) https://chemm.nlm.nih.gov/salttriage.htm

Pearls:
- Injuries obviously incompatible with life include decapitation, massively deforming head / chest injury, traumatic hemi-corpectomy or total body disruption, incineration, lividity/rigor mortis.
- If unsure if arrest due to trauma or medical cause, initiate ALS guideline for any arrhythmias following optimization of hemostasis (in trauma patients, volume loss must be corrected 1st, consider blood admin above all else)
- CPR without addressing massive hemorrhage, blood volume resuscitation, tension pneumothorax, and pericardial tamponade will be ineffective.
- *Consider severe hypocalcemia if blood products have recently been transfused due to calcium chelation and evidence of poor cardiac activity/contractility.
# HYPOTENSION / SHOCK

**Signs and Symptoms:**
- Restlessness / Confusion
- Weakness / Dizziness
- Tachycardia
- Pale, Cool, Clammy Skin
- Delayed Capillary Refill
- Hypotension
- Bleeding
- Nausea / Vomiting

**Differential Diagnosis:**
- Shock: Hypovolemic, Cardiogenic, Septic, Neurogenic, Anaphylactic
- Cardiac Arrhythmia
- Pulmonary Embolus
- Tension Pneumothorax
- Medication Effect / OD
- Vasovagal Episode

---

### Hemorrhage / Trauma

**Maximize Mechanical Hemorrhage Control**

**Optimize Hemostasis:** (See Pearls!)

**Optimize Hypothermia Management**

**TXA- 2 Gram IV/IO**

If unable to maintain SBP >100 (110 TBI), move to Enroute Damage Control Resuscitation Guideline

### Non-trauma & Non-cardiac

**2L or 30mL/kg IVF Bolus PRN Additional crystalloid based on reassessment of clinical condition**

**Inadequate Response to therapy?**

**Consider NOREPINEPHRINE 2-20 mcg/min IV/IO**

**Maintain SBP >90, MAP >65**

**At Any Point, Once BP Controlled:**
- Continuous Monitoring
- Reassess q5min

Return to: Tactical Evacuation Guideline

### Cardiac

**Treat per appropriate Cardiac Guideline:**
- BRADYCARDIA w/ Pulse
- CARDIAC ARREST
- TACHYCARDIA w/ Pulse

**Non-Invasive PPV (BVM) vs. Advanced Airway**

**500mL IVF Bolus**

**Inadequate Response to therapy?**

**NOREPINEPHRINE 2-20 mcg/min IV/IO**

---

**Pearls:**
- **Hemorrhagic trauma with NO significant head injury:** Should target maintaining SBP >100. Casualties able to maintain SBP >100 do not need immediate fluid resuscitation.
- **Hemorrhagic trauma WITH significant head injury:** should target maintaining SBP >110
- **If SBP falls <100 (with TBI <110),** transition to Enroute Damage Control Resuscitation guideline.
Pediatric HYPOTENSION / SHOCK

**Signs and Symptoms:**
- Restlessness / Confusion
- Weakness / Dizziness
- Tachycardia
- Pale, Cool, Clammy Skin
- Delayed Capillary Refill
- Hypotension
- Nausea / Vomiting
- Responsiveness / Lethargy

**Differential Diagnosis:**
- Shock: Hypovolemic, Cardiogenic, Septic, Neurogenic, Anaphylactic
- Cardiac Arrhythmia
- Pulmonary Embolus
- Tension Pneumothorax
- Medication Effect / OD
- Vasovagal Episode
- Dehydration
- Congenital Heart Disease

---

**Non-trauma & Non-cardiac**

**IV / IO GUIDELINE**
- Supplemental O₂

**20mL/kg IVF Bolus**

**No Response / Losing BP Control?**

- Consider EPINEPHrine
  - 1mcg/kg/min IV / IO
- OR
  - NOREPINHREINE
    - 0.05-0.1mcg/kg/min IV / IO
    - (Max 2mcg/kg/min)

**At Any Point, Once BP Controlled:**
- Continuous Monitoring
- Reassess q 5min
- Return to: Tactical Evacuation Protocol

---

**Trauma Fluid Preferences**
- Whole Blood (if available)
- pRBCs and plasma (if available)
- (LR/NS) 20mL/kg IVF Bolus

**No Response / Losing BP Control?**

- Consider (as LAST Resort):
  - EPINEPHRINE 1mcg/kg/min IV / IO
  - Norepinephrine 0.05-0.1mcg/kg/min
    - SLOW IV / IO Push q10-15min

---

**Tactical Evacuation Guideline**

**Trauma**

**Non-trauma & Non-cardiac**

**Cardiac**

**Treat per appropriate Cardiac Guideline:**
- Pediatric BRADYCARDIA w Pulse and Poor Perfusion
- Pediatric TACHYCARDIA w Pulse and Poor Perfusion
- Pediatric CARDIAC ARREST

---

**Rales heard on Lung Exam?**

- YES
- 5-10mL/kg IVF over 5-10 min
- NO
- Consider EPINEPHRINE
  - 1mcg/kg/min IV / IO

---

**Pears:**
- Hypotension in pediatric patients is defined as a SBP less than 70 + [2 x age (yr)].
- Decreasing heart rate with worsening neuro or clinical exam may be a sign of impending collapse in pediatric patients
- Consider all the causes of shock and treat per appropriate protocol.
- Avoid Pressors as able (unless distributive or cardiogenic shock) Continue IVFs for trauma: Optimize hemostasis and correct volume loss.
CRUSH SYNDROME

Signs and Symptoms:
- Entrapped extremity (as little as 1hr)
- Erythema, ecchymosis, abrasion
- Swelling, tense muscle compartment

Complications:
- Hyperkalemia
- Hypocalcemia
- Compartment Syndrome
- Rhabdomyolysis
- Arrhythmia
- Hypotension

Pearls:
- Crush syndrome can occur in as little as 1 hour of entrapment
- Tourniquets may delay life-threatening complications if fluid resuscitation and treatment cannot be immediately initiated
- Aggressive fluid resuscitation for Crush injury in the setting of noncompressible hemorrhage may increase hemorrhage. Balance the risk of uncontrolled hemorrhage against cardiotoxic effects of hyperkalemia.

Consider Tourniquet placement for crush injury before extrication if the length of entrapment exceeds 1 hours and crush injury protocol cannot be initiated immediately.

Apply two tourniquets side by side and proximal to the injury immediately before extrication.

Initiate crush injury protocol before extrication if possible and before loosening tourniquets (if tourniquet conversion indicated)

Initiate Aggressive Fluid Administration of IV/IO crystalloids
2L Initial bolus; followed by an initial rate: 1L/h
Adjust to urine output (UOP) goal of >100–200mL/h (Via Foley or improvised graduated cylinder)

Monitor for life-threatening hyperkalemia (PVCs, bradycardia, peaked T-waves, decreased peripheral pulse strength, hypotension)

If no signs of hyperkalemia develop, continue fluid administration and continuously monitor

If PVCs become more frequent, the patient develops bradycardia, peripheral pulse strength decreases, or potassium levels are >5.5mEq/L or rising, treat urgently for hyperkalemia.

Treatment for Hyperkalemia
- Calcium: 30 mL of 10% Calcium Gluconate IV over 5 minutes or 10 mL of 10% Calcium chloride IV over 2 minutes
- Insulin and Glucose: Regular Insulin 5 units IV followed by D50 50mL IV. Titrate PRN
- 10mg Nebulized Albuterol

PRIOR TO EXTRICATION!

Monitor for life-threatening hyperkalemia (PVCs, bradycardia, peaked T-waves, decreased peripheral pulse strength, hypotension)

If no signs of hyperkalemia develop, continue fluid administration and continuously monitor

If PVCs become more frequent, the patient develops bradycardia, peripheral pulse strength decreases, or potassium levels are >5.5mEq/L or rising, treat urgently for hyperkalemia.

Continued From: Tactical Evacuation Guideline
PEARLS:

- Antiemetics are essential to prevent increased IOP. Consider Benzo for anxiety.
- Use rigid eye shields, not pads, for traumatic injuries. Can use a soft pad on unaffected eye.
- Patching both eyes to decrease sympathetic eye movements has not been shown to improve visual outcome but may increase anxiety and will render patient unable to move independently.
- If globe is out of socket – do not attempt to replace. Cover with saline soaked gauze.
- Copious irrigation is the cornerstone of treatment for chemical eye injuries. 30 min is the minimum amount of time to irrigate. Utilize Morgan lens if available.
  - The use of a nasal cannula across the bridge of the nose attached to 1L of NS will also work.
ABDOMINAL PAIN

Signs and Symptoms:
- Pain (RUQ, RLQ, LUQ, LLQ) (Location / Migration / Radiation)
- Tenderness
- Nausea / Vomiting
- Diarrhea (Bloody?)
- Dysuria
- Constipation
- Vaginal Bleeding / Discharge
- Distention
- Guarding / Rigidity

Associated symptoms:
- Fever, Headache, Weakness, Malaise / Fatigue, Myalgia, Cough, Mental Status Changes, Rash

Pearls:
- Maintain a high index of suspicion for ectopic pregnancy as a cause of abdominal pain in females of childbearing age.
- Antacids should be avoided in patients with renal disease.
- Patients older than 50 are at increased risk for life-threatening diagnoses (e.g., AAA).
- Appendicitis presents with vague, periumbilical pain that migrates to the RLQ. This classic presentation may not be present in some patients.
- Repeat VS after each intervention. In non-traumatized patients, may repeat fluid bolus PRN depending on patient condition and VS. In trauma patients, fluid boluses should be used in accordance with hypotensive resuscitation guidelines (see Multiple Trauma Guideline).
- Choose the lower promethazone dosage for patients likely to experience sedative effects (e.g., elderly).

Consider use of BLOOD PRODUCT for:
- Persistent or Worsening Signs of Hypovolemic Shock (Tachycardia, Hypotension, ↓ Pulse Pressure)
- Rigid Distended Abdomen and/or Known: AAA, GI Bleed, or Ruptured Ectopic / Abruptio

Pain Management Guideline
- Consider Chest Pain Guideline
- Promethazone 12.5-25mg IV
  OR
- Ondansetron 4-8mg IV

Universal Patient Care Guideline
- O2 (if Hypoxemic)
- IV / IO Guideline
- Cardiac Monitor
- 12 Lead ECG (>40yo)

500mL IVF Bolus (Repeat as Needed)
- Tachycardia / Hypotension / Orthostatic BP?
  - NO
  - Significant or Disabling Pain?
    - NO
    - Nausea and/or Vomiting?
      - NO
      - Reassess every 5 minutes
    - YES
      - 500mL IVF Bolus
      - OR
        - Ondansetron 4-8mg IV

500mL IVF Bolus (Repeat as Needed)

Continued from:
Tactical Evacuation Guideline

Universal Patient Care Guideline
O2 (if Hypoxemic)
IV / IO Guideline
Cardiac Monitor
12 Lead ECG (>40yo)
ALLERGICREACTION

**Signs and Symptoms:**
- Itching or Hives
- Cough / Wheeze / Resp. Distress
- Chest / Throat Tightness
- Difficulty Swallowing
- Hypotension or Shock
- Edema
- Nausea / Vomiting

**Differential Diagnosis:**
- Urticaria (rash only)
- Shock (other than anaphylactic)
- Angioedema
- Aspiration / Airway Obstruction
- Asthma or COPD
- Pulmonary Edema / CHF

---

**Universal Patient Care Guideline**

O₂ (if Hypoxemic)

IV / IO Guideline

Cardiac Monitor (ASAP)

---

1) Shock or ↓BP

2) Any 2 of the following:
   - Skin changes, resp sx’s, angioedema, or GI sx’s.

**Epinephrine-Pen**

Or

Epinephrine 1:1000

0.3-0.5mg IM

500mL IVF if not previously started

---

**Pearls:**

- Use caution prior to giving epinephrine IV to patients >50yo, pregnant, have a history of cardiac disease, or have HR >150. Epinephrine can precipitate dysrhythmias / ischemia – all patients should be on monitors and have 12-lead ECG.

- **Epinephrine:**
  - IM: 0.3-0.5mg (0.3-0.5 mL 1:1000) or EpiPen®
  - IV Bolus: 100 mcg over 5-10 min; mix 0.1mg (0.1 mL of 1:1000 in 10mL NS, and infuse over 5-10 min)
  - IV Infusion: Start at 1 mcg/min; mix 1mg (1 mL of 1:1000 in 500 mL NS, and infuse at 0.5 mL/min; titrate as needed

- The shorter the interval from contact to symptoms, the more severe the reaction.
Pediatric ALLERGIC REACTION

**Signs and Symptoms:**
- Itching or Hives
- Cough / Wheeze / Resp. Distress
- Chest/Throat tightness
- Difficulty Swallowing
- Hypotension or Shock
- Edema
- Nausea / Vomiting

**Differential Diagnosis:**
- Urticaria ( rash only)
- Anaphylaxis (2 or more systems)
- Shock ( other than anaphylactic)
- Angioedema
- Aspiration / Airway Obstruction
- Asthma or COPD
- Pulmonary Edema / CHF

---

**Pearls:**
- Epinephrine can precipitate dysrhythmias / ischemia – all patients should be on monitors and have 12-lead ECG.
- The shorter the interval from contact to symptoms, the more severe the reaction.
ALTERED MENTAL STATUS

Signs and Symptoms:
- Decreased Mental Status / Coma
- Bizarre Behavior
- Somnolence
- Diaphoresis / Dry, Red Skin
- Polyuria / Polydipsia
- Sweet / Fruity Breath
- Altered Respirations
- Signs of Trauma
- Fever

Differential Diagnosis:
- Head Trauma
- Stroke
- CNS Tumor / Mass / Bleed / Infection
- Thyroid Dysfunction
- Hyperglycemia / Hypoglycemia
- Diabetic Ketoacidosis
- Toxic Exposure
- Environment (Hyperthermia / Hypothermia)
- Hypoxia
- Psychiatric Disorders
- Seizure Disorder
- Sepsis

Pearls:
- Be aware of AMS as a presentation of environmental exposure / toxins / hazmat – use personal protection accordingly / decontamination.
- Recheck blood glucose after each intervention.
- *Oral glucose okay if patient alert, protecting airway, and solution available. Proteins + complex carbs (e.g., sandwich, granola) are better, longer lasting glucose source than simple sugars.
- EKG should be obtained in all suspected toxin or diabetic ketoacidosis cases – evaluate for tall, peaked T-waves (hyperkalemia) or QRS widening >100ms (toxins).
- Restrain patient as necessary for their safety and crewmembers safety during flight.
- Glucagon may cause nausea / vomiting – should have anti-emetic prepared.
Pediatric AMS

**Signs and Symptoms:**
- Decreased Mental Status / Coma
- Bizarre Behavior
- Somnolence
- Diaphoresis / Dry, Red Skin
- Polyuria / Polydipsia
- Sweet / Fruity Breath
- Altered Respiration
- Signs of Trauma
- Fever

**Differential Diagnosis:**
- Head Trauma
- Stroke
- CNS Tumor / Mass / Bleed / Infection
- Thyroid Dysfunction
- Hyperglycemia / Hypoglycemia
- Diabetic Ketoacidosis
- Toxic Ingestion
- Environment (Hyperthermia / Hypothermia)
- Hypoxia
- Psychiatric Disorders
- Seizure Disorder
- Sepsis

---

**Pearls:**
- Be aware of Altered Mental Status (AMS) as a presentation of environmental exposure / toxins / hazmat – use personal protection accordingly / decontamination.
- **Recheck blood glucose after each intervention.**
- Oral glucose okay if patient alert, protecting airway, and solution available. Proteins + complex carbs (e.g., sandwich, granola) are better, longer lasting glucose source than simple sugars.
- EKG should be obtained in all suspected toxin or diabetic ketoacidosis cases – evaluate for tall, peaked T-waves (hyperkalemia) or QRS widening >100ms (toxins).
- Glucagon may cause nausea / vomiting – should have anti-emetic prepared.
BACK and NECK PAIN

**Signs and Symptoms:**
- Pain
- Swelling
- Pain with Motion
- Weakness / Numbness
- Bowel / Bladder Dysfunction

**Differential Diagnosis:**
- Muscle Spasm / Strain
- Degenerative Disc Disease
- Fracture
- Kidney Stone / Infection
- Abdominal Aortic Aneurysm
- Pneumonia / PE
- Cauda Equina Syndrome
- Tumor / Mass / Infection
- *Thoracic Pain: Thoracic or abdominal aortic aneurysm*

---

**Universal Patient Care Guideline**

- **O₂ (if Hypoxemic)**
- **IV / IO Guideline** (Optionally)
- **Cardiac Monitor** (Optionally)

**Injury / Trauma?**

- **NO**

**Extremity BP difference? / Suspcion of AAA?**

- **NO**

**1000mL IVF IV**

- **YES**

**Consider:**

- Blood Product for AAA

**Arrhythmia?**

- **NO**

**Suspicion of ACS? / Chest Pain?**

- **NO**

**PAIN MANAGEMENT Guideline**

When appropriate, return to:

**Tactical Evacuation Guideline**

---

**Spinal Immobilization Guideline**

**Head Injury Guideline**

**Multiple Trauma Guideline**

**Chest Pain Guideline**

---

**Back or Neck Pain Associated with a Neurologic or Vascular Deficit is an Emergency!**

**Mechanisms that increase suspicion of possible Spinal Cord Injury:**
- Blunt trauma to head or neck
- Injury associated with high energy transfer (e.g., blast, motor vehicle)
- Fall from >3 feet
- Fall directly onto head / neck
- History of back / neck arthritis plus any trauma

---

**Pearls:**

- Examine: mental status, HEENT, neck, chest, lungs, abdomen, back, extremities, neurologic.
- Abdominal aortic aneurysm is a concern in hypertensive / diabetic / >50yo populations – feel for pulsatile abdominal mass. Symptoms may mimic kidney stones.
- Patients with trauma / midline tenderness should be immobilized.
- Any bowel / bladder incontinence is significant and may represent a true surgical emergency (*Cauda Equina Syndrome*).
**EPISTAXIS**

**Signs and Symptoms:**
- Bleeding From One or Both Nares
- Pain
- Nausea / Vomiting
- Nasal Deformity

**Differential Diagnosis:**
- Trauma
- Infection
- Allergic / Chemical Rhinitis
- Nose Picking
- Lesions (Polyp, Ulcer)
- Hypertension
- Anticoagulant Therapy
- Thrombocytopenia (ITP)

---

**Pearls:**
- *Avoid Afrin in patients who have a diastolic blood pressure >110 or known coronary artery disease.*
- It is better to overestimate the amount of blood lost with epistaxis.
- Anticoagulants including aspirin, ibuprofen, and even herbals (ginseng) can lead to increased bleeding.
- Firm pressure should be applied for compression. Pressure should not be applied over the bridge of the nose, but instead under the bony portion to effectively compress vessels. Do not release pressure prior to the 10 minutes mark to check bleeding.
- Hypertensive patients will often not stop bleeding until BP is controlled.
- Re-bleeding is common with epistaxis.

---

**Universal Patient Care Guideline**

- O2 (if hypoxemic)
- IV / IO Guideline (prn)
- Cardiac Monitor (prn)

---

**Continued from: Tactical Evacuation Guideline**

- Have Patient Blow Nose to Evacuate Clots
- Afrin Nasal Spray (*see Pearls)
- Compression (Pinch) and Tilt Head Forward x 10min

---

- Hypotension? Tachycardia?
- Blood Product (as available) OR 500mL IVF IV prn
- Assess BP and Pulse
- Normotensive
  - Consider: Ondansetron 4-8mg IV (nausea from swallowed blood)
  - Hypertension?
- HYPERTENSION Guideline

---

When appropriate, return to: Tactical Evacuation Guideline
FEVER

Signs and Symptoms:
- Warm
- Flushed
- Diaphoretic
- Chills

Associated Symptoms:
- Myalgias, Cough, Chest Pain, Headache, Dysuria, Abdominal Pain, Mental Status Change, Rash, Stiff Neck

Differential Diagnosis:
- Infection / Sepsis
- Cancer / Tumor / Lymphoma
- Medication / Drug Reaction
- Connective Tissue Diseases
- Hyperthyroidism
- Heat Stroke
- Meningitis

Pearls:
- Fever may not be present in immunocompromised, elderly, or those on immunosuppressive drugs.
- All fever is not due to infection – evaluate for environmental / thyroid / toxic etiology.
- *Appropriate precautions should be used for personal protection when transporting patients with contagious disease:
  - Airborne: standard PPE plus N-95 mask and NRB or surgical mask on patient. Used for tuberculosis, measles, varicella, or other infections spread by droplets.
  - Contact: standard PPE with strict hand-washing. (MRSA, scabies, varicella-zoster)
- It is better to use more PPE than is necessary.
- Acetaminophen may also be given PR if suppository form available and patient not tolerant of PO medications.
HYPERGLYCEMIA

**Signs and Symptoms:**
- Polyuria
- Polydipsia
- Weakness, fatigue
- Nausea, vomiting
- Change in LOC
- Hypotension
- Tachycardia
- Seizures, coma
- Fruity Breath Odor

**Differential Diagnosis:**
- DKA (Ketoacidosis)
- Hyperosmolar Hyperglycemic Syndrome (HHS)
- Head Trauma
- Stroke
- Hypo/Hyperthermia
- Toxic Exposure

---

**Pearls:**
- If insulin is available, treat with low dose infusion, 0.1 units/kg/h
- Too rapid drop in blood glucose can cause hypoglycemia.
- Rapid drop in blood glucose levels can lead to shifts extracellular osmolality which can lead to cerebral edema
- The most common electrolyte imbalance is hypokalemia.
- Identify and treat underlying cause (infection, trauma)
Hyponglycemia

Signs and Symptoms:
- Diaphoresis and pallor
- Neuroglycopenic manifestations/AMS
- Tremor
- Palpitations
- Anxiety

Differential Diagnosis:
- Environmental Exposure
- Postprandial syndrome
- CNS Dysfunction
- Toxic Ingestion
- Metabolic disorders

Pearls:
- There are no statistically significant differences in the median recovery time to a GCS score of 15 following administration of D10% versus D50%. D10% may benefit patients by decreasing the likelihood of post-treatment hyperglycemia and reducing the likelihood of extravasation injury.
- Sulfonylureas (e.g., glyburide, glipizide) have long half-lives ranging from 12 – 60 hours. Patients with corrected hypoglycemia who are taking these agents are at particular risk for recurrent symptoms and frequently require hospital admission.
- Hypoglycemia may be detrimental to patients at risk for cerebral ischemia, such as victims of stroke, cardiac arrest, and head trauma.
- Oral glucose equivalents include 3 - 4 glucose tablets, 4 oz. fruit juice (e.g., orange juice), non-diet soda, 1 tablespoon of pure maple syrup, sugar, or honey. Oral glucose okay if patient alert, protecting airway, and solution available. Proteins + complex carbs (e.g., sandwich, granola) are better, longer lasting glucose source than simple sugars.
RESPIRATORY DISTRESS

Signs and Symptoms:
- Shortness of Breath
- Pursed Lip Breathing
- Decreased Ability to Speak
- Tachypnea / Hyperpnea
- Wheezing / Rhonchi / Rales
- Use Accessory Muscles
- Fever / Cough
- Tachycardia
- Absent Breath Sounds (Emergent)

Differential Diagnosis:
- Asthma
- Anaphylaxis / Allergy
- Aspiration
- COPD
- Pleural Effusion
- Pneumonia
- Congestive Heart Failure / Cardiac
- Pulmonary Embolus
- Pneumothorax
- Pericardial Tamponade
- Hyperventilation
- Toxic Inhalation (e.g., Cyanide, CO)

Universal Patient Care Guideline

Indications of: Respiratory Insufficiency ("See Pearls")

NO

Position to Patient Comfort

Monitor O₂ Sat

YES

Rales / Signs of CHF

Wheezes

Stridor

AIRWAY Guideline
Consider:
Early establishment of Advanced Airway!

Consider:
Furosemide 60-80mg IV (Place Foley if possible)

PPV/NIPPV (CPAP/BiPAP)
100% O₂ via NRB

NTG SL 0.4mg q5min if SBP > 90

100% O₂ via NRB

Albuterol 90mcg MDI
2 puffs or 5mg neb

Consider Epinephrine 1:1,000
0.3mg IM (EPI PEN)

IV / IO Guideline

If Failing to Improve, Consider
IV / IO Guideline

Consider:
ALLERGIC REACTION

Methylprednisolone 125mg IV
Consider:
- Magnesium Sulfate 2gram IV over 20min

Last resort:
Ketamine 1mg/kg IV Bolus (SLOW PUSH)

View for Obstruction:
(jaw-thrust for c-spine injury)
- Sweep & Suction prn

O₂ Sat <90% or respiratory status continues to deteriorate:

AIRWAY Guideline

Consider:
Epinephrine 1:1,000
0.3mg IM (EPI PEN)

IV / IO Guideline

Methylprednisolone 125mg IV

Pearls:
- Signs of respiratory insufficiency: Cyanosis, altered mental status / loss of consciousness, fatiguing, inability to speak, or inability to maintain O₂ sat >90% with supplemental O₂.
- Albuterol can be administered with spacer or short (6") section of ventilator tubing to increase delivery if patient unable to perform action appropriately. No max dose of albuterol, repeat as needed for continued wheezing.
- Lack of abnormal breath sounds does not always signify improvement. As respiratory status worsens, there may be inadequate air movement to produce these sounds.
**PEARLS:**

- **Signs of respiratory insufficiency:** Cyanosis, altered mental status / loss of consciousness, fatiguing, inability to speak, or inability to maintain O₂ sat >94% with supplemental O₂.
- **Albuterol can be administered with spacer or short (6”) section of ventilator tubing to increase delivery if patient unable to perform action appropriately.** No max dose of albuterol, repeat as needed for continued wheezing.
- **Lack of abnormal breath sounds does not always signify improvement.** As respiratory status worsens, there may be inadequate air movement to produce these sounds. In pediatric patients (especially infants), respiratory insufficiency may be the result of cardiac anatomical anomalies, in addition to standard causes. Peripheral cyanosis is a clue to this condition, and suspicion should be reported to accepting providers upon arrival.
MEDICAL X

[ADULT MEDICINE GUIDELINES]

SEIZURE

Continued from:
Tactical Evacuation Guideline

Universal Patient Care Guideline

O₂ (if Hypoxemic) IV / IO Guideline
Cardiac Monitor
Patient Safety (ensure secured to litter)

LORAZEPAM 2-4mg IV / IM
OR

MIDAZOLAM 5mg IV/IO/IN or 10mg IM/IN
May Repeat Anticonvulsants 2x q3-5min (Must Have Definitive Airway Control)
AIRWAY Guideline for RSI

Spinal Immobilization Guideline

Consider:
HEAD INJURY Guideline

Monitor and Reassess every 15min
When appropriate, return to:
Tactical Evacuation Guideline

 Pearls:
• Status epilepticus defined as seizure >15min or two or more continuous seizures without a period of consciousness / recovery. This is a real emergency requiring rapid airway control, treatment, and transport to the nearest suitable medical treatment facility.
• Paralysis for airway control does not stop seizure activity – only hides it. A seizure is a CNS electrical phenomenon and damage is still being done even when no muscular activity seen due to paralysis.
• Anticipate further seizure activity / recurrence and monitor continually.
• Assess probability of toxin, occult trauma, abuse, or substance use.
• Be prepared to assist with ventilations with the use of midazolam. If airway controlled and ventilating well – may give total of 4 doses of Midazolam.
• In pregnant patients, Magnesium should be first line to abort non-epileptic seizures. Midazolam should only be used if this fails (pregnancy class D).
• Adult Alcohol Withdrawal or Malnutrition (Thiamine 100mg IV).

Signs and Symptoms:
• Decreased Mental Status
• Seizure Activity
• Somnolence
• Incontinence
• Evidence of Trauma
• Loss of Consciousness
• Oral Injuries (e.g., Tongue, Buccal)

Differential Diagnosis:
• CNS Trauma
• Tumor / Mass / Infection
• Metabolic
• Hypoxia
• Electrolyte Abnormality
• Drugs / Toxins
• Alcohol / Benzodiazepine Withdrawal
• Stroke
• Eclampsia
• Hyperthermia
• Hypoglycemia

Blood Glucose <60?

YES

NO, Postictal

Having Active Seizure?

Evidence of Significant Trauma?

YES

NO

Recurrence of Seizure?

YES

NO

Restart Guideline at:
Having Active Seizure?

50% Dextrose 25g IV

OR

Glucagon 1mg IV / IM

Glucose 60-250?

YES

NO

5% Dextrose 25g IV

Glucagon 1mg IV / IM

Glucose 60-250?
Pediatric SEIZURE

Signs and Symptoms:
- Decreased Mental Status
- Seizure Activity
- Somnolence
- Incontinence
- Evidence of Trauma
- Loss of Consciousness
- Oral Injuries (e.g., Tongue, Buccal)

Differential Diagnosis by Age:
- Less Than 3 Years Old:
  - Trauma
  - Fever
  - Infection
  - Birth Injury
  - Drug / Toxin
  - Metabolic: Hypoglycemia / Electrolyte Abnormality
- More Than 3 Years Old:
  - Trauma, Infection, Brain Degenerative Disease

Pearls:
- Status epilepticus defined as seizure >5min or two or more successive seizures without a period of consciousness / recovery. This is a true emergency requiring rapid treatment and transport to nearest suitable medical treatment facility. Ensure adequate airway control is established if medication is administered.
- Paralysis for airway control does not stop seizure activity – only hides it. Seizure is a CNS electrical phenomenon and damage is still being done even when no muscular activity seen due to paralysis.
- Be prepared to assist with ventilations with the use of Lorazepam / Midazolam. If airway controlled and ventilating well – may give total of 4 doses of Lorazepam.
- MAX DOSES:
  - LORAZEPAM = 4mg/dose, D25 = 25mL/dose, GLUCAGON = 1mg/dose
SEPSIS

History
- Fever
- Previous infection
- Recent surgery
- Immunocompromised (transplant, HIV, diabetes, cancer, etc.)
- Wound

Signs and Symptoms
- Altered Mental Status
- Hyper or hypothermia
- Chills
- Myalgia
- Rigors
- Rash
- Hyperglycemia
- Decreased urine output

Differential Diagnosis:
- Cardiogenic shock
- Hypovolemic shock
- CVA
- MI
- Acute renal failure
- Hypoglycemia
- Infection not meeting sepsis criteria

Pearls:
- Early recognition of sepsis allows for attentive care, appropriate fluid resuscitation, vasoactive medications, and early administration of antibiotics.
- Utilize 6-8 mL/kg tidal volumes if artificially ventilated.
- Record urine output if Foley in place. Decreased urine output is an indicator of patient deterioration.
- Use vasopressin despite less than maximal norepinephrine. Consider adding it when titrating above 8-10 mcg/min IV norepinephrine. Continue it once started and decrease norepinephrine to MAP goal.
**SUSPECTED STROKE / TIA**

**Prehospital Stroke Scale:** any 1 abnormal finding = 72% chance of stroke

- **Facial Droop** (show teeth and smile)
  - Abnormal when one side of face does not move equally with opposite side.

- **Arm Drift** (close eyes and extend both arms)
  - Abnormal when one arm drifts down compared to opposite arm (arms move separately).

- **Abnormal Speech** (say, “you can’t teach an old dog new tricks”)
  - Abnormal with slurred words, using wrong words, or unable to speak.

**Universal Patient Care Guideline**

- **O2** (if hypoxemic)
  - IV / IO Guideline
  - Cardiac Monitor
  - Blood Glucose <60? → **YES**
  - **NO**

- **Quick Neurologic Status:**
  - GCS >8?
  - Can protect airway?
  - Can move all extremities?
  - NO → Intubated?
    - **YES**
    - Tachycardia with Pulse (A-Fib)
    - Cardiac Arrest (VF / Pulseless VT, Asystole / PEA)
  - **NO** → 12-lead ECG
  - Arrhythmia? → **YES**
  - **NO** → Consider Alternate Guidelines

**Pearls:**

- Duration of symptoms should be determined as accurately as possible. Family members / colleagues can be helpful. If pt awaken with symptoms – onset time est. from last time patient was seen “normal.”
- Be alert for airway problem / risk of aspiration. If concerned, request intubation before departure.
- Hypoglycemia can mimic stroke / TIA. May present with focal neurologic deficit, especially in the elderly.
- EKG should be obtained in all patients to evaluate for arrhythmia – especially atrial fibrillation.
- All TIA’s should be transferred for evaluation, even if symptoms abated – these patients have a 10% risk of stroke within 30 days.
- **Aspirin should not be given to patients for suspected stroke.** Aspirin use is a contraindication to the use of thrombolytics for stroke.
- All strokes/TIA’s are not associated with motor findings. Although uncommon, pure sensory strokes can occur. More frequently, very subtle motor abnormalities are present that the patient may not note.
- **Systolic greater than 185 or Diastolic greater than 110:** give Labetalol 10-20 mg IV for 1-2 minutes. May repeat 1 time.
- **Aim for no more than a 20% reduction in MAP.** MAP = [(2 x Diastolic) + Systolic] / 3 For additional info see: ALS Acute Coronary Syndromes and Stroke.
**SYNCOPE**

**Signs and Symptoms:**
- Loss of Consciousness with Recovery
- Lightheadedness / Dizziness
- Nausea / Vomiting
- Palpitations / Chest Pain
- Shortness of Breath
- Decreased Pulse Pressure

**Differential Diagnosis:**
- Vasovagal Episode
- Orthostatic Hypotension
- Cardiac Etiology
- Psychiatric
- Stroke
- Hypoglycemia
- Seizure
- Shock
- Toxicologic / Medication

---

**Universal Patient Care Guideline**

- **O₂ (if Hypoxemic)**
- **IV / IO Guideline**
- **Cardiac Monitor**

**Consider Spinal Immobilization Guideline**

- **O₂ Sat <94%?**
- **GCS <8?**
- **Unable to protect Airway?**

**Airway Guideline** (maintain stable airway)

- **Tachycardia / Hypotension?**

**Blood Glucose <60?**

- **Glucose 60-250?**

**12-lead ECG**

**Continuous Monitoring**

- **Move to Appropriate Protocol as needed**

**Evidence of Alcohol Abuse?**

- **YES**
  - Thiamine 100mg IV / IM
  - 50% Dextrose 25g IV or D10 drip
  - Glucagon 1mg IV / IM

- **NO**
  - Glucose 60-250?

**If patient unresponsive or mental status is altered upon arrival of MEDEVAC to patient pick-up site.**

**GO To:**

**AMS Guideline**

True Syncope is a brief self-resolving event. If the patient is still altered upon your arrival it’s NOT Syncope!

---

**Altered Mental Status Guideline**

- **Stroke / TIA Guideline**
- **Seizure Guideline**
- **Hypotension Guideline**

**Pearls:**
- Assess every patient for signs of trauma if suspected with syncopal event.
- Consider occult bleeding in all cases of syncope: GI bleeding, ruptured ectopic pregnancy, and seizure.
- Prodromal symptoms (e.g., flushing, lightheadedness, diaphoresis, tunnel vision) are often associated with more innocent etiologies, especially if temporally related to standing / rising. Absence of prodrome should raise concern for cardiac / CNS (emergent) etiologies.
- It is uncommon for stroke to cause syncopal episode.
- Patients who sustain trauma to the temporal region of the skull and are now lucid may experience a precipitous loss of consciousness / degeneration due to epidural hematoma.
TOXIC INGESTIONS

**Signs and Symptoms:**
- Mental Status Changes
- Hypo / Hypertension
- Respiratory Depression
- Tachycardia / Arrhythmias
- Seizure

**Differential Diagnosis:**
- Cyclic Antidepressants
- Acetaminophen
- Depressants
- Stimulants
- Anticholinergic
- Cardiac Medications
- Solvents / Cleaners
- Organophosphate / Carbamate
- Medical Cause (hyperthyroidism)

**Continued from:**
Tactical Evacuation Guideline

### Universal Patient Care Guideline

**O2** (if Hypoxemic)
**IV / IO Guideline**
Cardiac Monitor (ASAP)

If possible, Contact Poison Control Center or Medical Control if toxin known or for treatment advice
In US: 1-800-222-1222

**Supportive care is keystone in management of toxic ingestions:**
- Continuous monitoring, supplemental O2 / airway support, IVF resuscitation

**Activated Charcoal 1gram/kg PO**
(If alert / protecting airway and time of ingestion <1hr)

**IV Bolus PRN**

**Blood Sugar <60?**

**YES**

**NO**

**Sodium Bicarbonate 1mEq/kg**
May repeat to maintain QRS <100

**Start Maintenance Infusion:**
100-150mEq (2-3 amps) in 1 L D5 / NS @ 100-200 mL/hr IV

**Atropine 2mg IV / IO q5min**
(No max dose: give until improving with ↓ secretions)

**2-PAM 600mg IV / IM**
(Atropine + 2-PAM = Mark 1 Kit)

**If in Seizure give:**
Midazolam 2.5-5mg IV/IM x 2

**Seizure Guideline**

**Opiates**
(Respiratory Depression)

**Naloxone 0.4-2mg IV / IO**

### Airway Guideline

**12 Lead EKG**

**QRS >100ms or Hypotensive?**

**Sodium Bicarbonate 1mEq/kg**
May repeat to maintain QRS <100

**Start Maintenance Infusion:**
100-150mEq (2-3 amps) in 1 L D5 / NS @ 100-200 mL/hr IV

**Atropine 2mg IV / IO q5min**
(No max dose: give until improving with ↓ secretions)

**2-PAM 600mg IV / IM**
(Atropine + 2-PAM = Mark 1 Kit)

**If in Seizure give:**
Midazolam 2.5-5mg IV/IM x 2

**Seizure Guideline**

**TriCyclic Overdose:**
QRS >100 = Predictive of seizures
QRS >160 = Predictive of VT

**Activated Charcoal 1gram/kg PO**
(If alert / protecting airway and time of ingestion <1hr)

**IV Bolus PRN**

**Blood Sugar <60?**

**YES**

**NO**

**Sodium Bicarbonate 1mEq/kg**
May repeat to maintain QRS <100

**Start Maintenance Infusion:**
100-150mEq (2-3 amps) in 1 L D5 / NS @ 100-200 mL/hr IV

**Atropine 2mg IV / IO q5min**
(No max dose: give until improving with ↓ secretions)

**2-PAM 600mg IV / IM**
(Atropine + 2-PAM = Mark 1 Kit)

**If in Seizure give:**
Midazolam 2.5-5mg IV/IM x 2

**Seizure Guideline**

**TriCyclic Antidepressant**

**12 Lead EKG**

**QRS >100ms or Hypotensive?**

**Sodium Bicarbonate 1mEq/kg**
May repeat to maintain QRS <100

**Start Maintenance Infusion:**
100-150mEq (2-3 amps) in 1 L D5 / NS @ 100-200 mL/hr IV

**Atropine 2mg IV / IO q5min**
(No max dose: give until improving with ↓ secretions)

**2-PAM 600mg IV / IM**
(Atropine + 2-PAM = Mark 1 Kit)

**If in Seizure give:**
Midazolam 2.5-5mg IV/IM x 2

**Seizure Guideline**

**Organophosphate / Carbamate**

**Atropine 2mg IV / IO q5min**
(No max dose: give until improving with ↓ secretions)

**2-PAM 600mg IV / IM**
(Atropine + 2-PAM = Mark 1 Kit)

**If in Seizure give:**
Midazolam 2.5-5mg IV/IM x 2

**Seizure Guideline**

**Beta Blocker Overdose:**
AV Block (especially, 1st Degree), Bradycardia, and Hypotension:
Consider giving: Glucagon 3-10mg IV / IM Bolus followed by 3-5mg/hr infusion

**Other**

**Hypotension, Seizures, Ventricular Dysrhythmias, Altered Mental Status, Chest Pain**

**Appropriate Guideline**

### Pearls:
- **Anticholinergic:** Altered mental status (mad as a hatter), Hyperthermia (hot as a hare), mydriasis (blind as a bat), Flushing (red as a beet), anhidrosis (dry as a bone), Full Bladder (full as a flask).
  - Treat as with Tricyclic overdose pathway (including EKG and Sodium Bicarb for prolonged QRS and/or arrhythmias)
  - LORAZEPAM for agitation and seizures and Hyperthermia Guideline if hyperthermic
- **Beta Blocker:** Hypoglycemia.
- **Calcium Channel Blocker:** HypERglycemia.
- **Cyclic Antidepressant:** Hypotension, depressed mental status, respiratory depression, cardiac arrhythmias.
- **Opioid:** Depressed mental status, pinpoint pupils, N/V, respiratory depression, hypotension possible.
- **Organophosphate / Carbamate (Cholinergic):** Salivation, lacrimation, urination, diarrhea, emesis, altered mental status.
- **Sympathomimetic / Stimulant (Methamphetamine / Cocaine):** Altered mental status, tachycardia, diaphoresis, mydriasis, and hyperthermia. Treat with Benzodiazepine (LORAZEPAM) and PRN cooling or Hyperthermia Guideline.
Pediatric TOXIC INGESTIONS

Signs and Symptoms:
- Mental Status Changes
- Hypo / Hypertension
- Respiratory Depression
- Tachycardia / Arrhythmias
- Seizure

Differential Diagnosis:
- Cyclic Antidepressants
- Acetaminophen
- Depressants
- Stimulants
- Anticholinergic
- Cardiac Medications
- Solvents / Cleaners
- Organophosphates / Carbamate
- Medical Cause (hyperthyroidism)

Continued from:
Tactical Evacuation Guideline

Beta Blocker Overdose:
AV Block (especially, 1st Degree), Bradycardia, and Hypotension:
Consider giving: Glucagon 1mg IV / IM

Tricyclic Overdose:
QRS > 100 = Predictive of seizures
QRS > 160 = Predictive of VT

Opiates
(Respiratory Depression)
- Naloxone 0.1mg/kg IV
  (every 2-3 mins as needed)

Pediatric Airway Guideline

Tricyclic Antidepressant
- QRS >100ms or Hypotensive?
- Sodium Bicarbonate 1mEq/kg
  May repeat to maintain QRS <100
  Start Maintenance Infusion:
  100-150mEq (2-3 amps) in 1 L D5/NS
  @ 100-200 mL/hr IV

Organophosphate / Carbamate
- Atropine 0.02mg IV / IO q5min
  (No max dose: give until improving with ↓ secretions)
- 2-PAM 25mg/kg IV/IM
  (Atropine + 2-PAM = Mark 1 Kit)
- If in Seizure give:
  Lorazepam 0.1mg/kg IV

Pediatric Seizure Guideline

Blood Glucose: <65?

YES

NO

Universal Patient Care Guideline
- O₂ (if Hypoxemic)
- IV / IO Guideline
- Cardiac Monitor (ASAP)

NS 20mL/kg IV Bolus PRN

Activated Charcoal 1gram/kg PO
(if alert / protecting airway and
time of ingestion <1hr)
(via NG OK if airway protected)

12-lead EKG

Pediatric Airway Guideline

Continuous Monitoring, reassess q5 min

Altered Mental Status Guideline
(25% Dextrose 2mL/kg IV OR
Glucagon 0.05mg/kg IM if NO IV,
Max 1mg)

Other

Hypotension, Seizures,
Ventricular Dysrhythmias,
Altered Mental Status, Chest
Pain.

Appropriate Guideline

Pearls:
- Anticholinergic: Altered mental status (mad as a hatter), hyperthermia (hot as a hare), mydriasis (blind as a bat), Flushing (red as a beet), anhidrosis (dry as a bone), Full Bladder (full as a flask).
  o Treat as with Tricyclic overdose pathway (including EKG and Sodium Bicarb for prolonged QRS and/or arrhythmias)
  o LORAZEPAM for agitation and seizures and Hyperthermia Guideline if hyperthermic.
- Beta Blocker: HypOglycemia.
- Calcium Channel Blocker: HypERglycemia.
- Cyclic Antidepressant: Hypotension, depressed mental status, respiratory depression, cardiac arrhythmias.
- Opioid: Depressed mental status, pinpoint pupils, N/V, respiratory depression, hypotension possible.
- Organophosphate / Carbamate (cholinergic): Salivation, lacrimation, urination, diarrhea, emesis, altered mental status.
- Sympathomimetic / Stimulant (Methamphetamine / Cocaine): Altered mental status, tachycardia, diaphoresis, mydriasis, and hyperthermia. Treat with Benzodiazepine (LORAZEPAM) and PRN cooling or Hyperthermia Guideline.
VOMITING & DIARRHEA

**Signs and Symptoms:**
- Pain
- Abdominal Distention
- Constipation
- Diarrhea
- Anorexia

**Associated Symptoms:**
Fever, Headache, Weakness, Malaise, Myalgia, Cough, Dysuria, Mental Status Changes, Rash

**Differential Diagnosis:**
- CNS Injury / Mass / Infection
- Myocardial Infarction
- Drugs / Toxins
- Bowel Obstruction
- Diabetic Ketoacidosis
- Pregnancy
- Infections
- Gastroenteritis
- Food Borne / Toxic
- Psychologic
- Appendicitis

---

**Continued from: Tactical Evacuation Guideline**

**Universal Patient Care Guideline**

- **O2 (if Hypoxemic)**
- **IV / IO Guideline**
- **Cardiac Monitor**

**Evidence of Alcohol Abuse?**
- **NO**
  - **Glucose 60-250?**
  - **NO**
    - **Abdominal Pain?**
      - **NO**
        - **Reassess q5 minutes**
      - **YES**
        - **Abdominal Pain Guideline**

- **YES**
  - **Thiamine 100mg IV / IM**
  - **50% Dextrose 25g IV or D10 drip**
  - **Glucagon 1mg IV / IM**

**Blood Glucose <60?**
- **NO**
  - **Tachycardia / Hypotension?**
    - **YES**
      - **1000mL IVF IV**
    - **NO**
      - **Nausea and/or Vomiting?**
        - **YES**
          - **Promethazine 12.5mg IV**
        - **NO**
          - **Abdominal Pain?**
            - **NO**
              - **Reassess q5 minutes**
            - **YES**
              - **Abdominal Pain Guideline**

**When appropriate, return to: Tactical Evacuation Guideline**

---

**Pearls:**
- Suspicion of other underlying condition should prompt immediate referral to appropriate protocol.
- In pregnant patients with nausea / vomiting – can substitute D5 1/2NS or D5NS in place of NS.
- Fluid of choice for vomiting is NS. Fluid of choice for diarrhea is LR.
- Continually monitor for any decompensation.
Pediatric VOMITING & DIARRHEA

**Signs and Symptoms:**
- Pain
- Abdominal Distention
- Constipation
- Diarrhea
- Anorexia

**Associated Symptoms:**
- Fever, Headache, Weakness, Malaise, Myalgia, Cough, Dysuria, Mental Status Changes, Rash

**Differential Diagnosis:**
- CNS Injury / Mass / Infection
- Myocardial Infarction
- Drugs / Toxins
- Bowel Obstruction
- Diabetic Ketoacidosis
- Pregnancy
- Infections
- Gastroenteritis
- Food Borne / Toxic
- Psychologic
- Appendicitis

---

**Universal Patient Care Guideline**

O₂ (if Hypoxic)

IV / IO Guideline

Cardiac Monitor

---

**Continued from:**

Tactical Evacuation Guideline

---

**Evidence of Malnourishment?**

- YES: Thiamine 100mg IV / IM
  - OR: 25% Dextrose 2mL/kg IV
  - OR: Glucagon 0.5mg IM (if NO IV access)
  - YES: Glucose: >65?

- NO: Evidence of Malnourishment?

---

**Blood Glucose: <65?**

- NO: Tachycardia / Hypotension?
  - YES: Promethazine (if >2 years old)
    - 0.25mg/kg/dose IV
    - (up to 12.5 mg/dose)
  - NO: Nausea and/or Vomiting?
    - YES: Ondansetron
      - <40kg: 0.1mg/kg IV
      - >40kg: 4mg IV
    - NO: Abdominal Pain?
      - YES: Consider Pediatric Pain Management
      - NO: Reassess every 5 minutes

---

**Pearls:**
- Suspicion of other underlying condition should prompt immediate referral to appropriate guideline.
- Continually monitor for any decompensation.
CHEST PAIN

Signs and Symptoms:
- Chest Pain
- Radiation of Pain
- Location of Pain
- Pale / Diaphoretic / Lightheaded
- Nausea / Vomiting
- Shortness of Breath

Differential Diagnosis:
- Angina
- Acute MI
- Pericarditis
- Pulmonary Embolism
- Asthma / COPD
- Pneumothorax

Differential Diagnosis:
- Aortic Dissection / Aneurysm
- GERD
- Esophageal Spasm
- Esophageal perforation
- Chest Wall Injury / Pain

Pearls:
- **Aspirin** should be held only for patients with known significant allergy.
- Patients with suspected AMI should be transferred to the nearest MTF for further treatment / thrombolitics.
- **With right sided MI (ST Elevations in leads II, III, AvF), NTG may cause hypotension so use with caution. Add small fluid boluses for low BP.**
- Ensure that you have IV access before giving SL NTG.
- **Hold Morphine or Fentanyl for SBP <90.**
- Max dose Morphine 20mg, Fentanyl 200mcg for non-traumatic chest pain (higher doses may be required for trauma, see Pain Control algorithm).
START CPR
(100-120 b/min, Breath 30:2)
Universal Patient Care Guideline
O2/Monitor / Defibrillator

VF / pulselessVT
Asystole / PEA
Confirm in two leads

Rhythm shockable?
YES
NO

CPR 2 min
Treat Reversible Causes
IV / IO access (IV Guideline)

Rhythm shockable?
YES
NO

CPR 2 min
Epinephrine (every 3-5 min)
IV / IO: 1:10,000 1mg (amp)
Consider advanced airway, capnography: 8-10 breaths/min
(Airway Guideline)

Shock
200J biphasic, 360 monophasic

CPR 2 min
Amiodarone IV / IO
1st Dose: 300mg bolus
2nd Dose: 150mg –or–
Lidocaine IV.IO
1st Dose 1-1.5 mg/kg
2nd Dose 0.5-0.75 mg/kg

Rhythm shockable?
YES
NO

Reversible Causes:
- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-hyperkalemia
- Hypothermia
- Hypo-Hyperglycemia
- Tension pneumothorax
- Tablets/toxin
- Tamponade, cardiac
- Thrombus – cardiac
- Thrombus – pulmonary

CPR 2 min
Treat Reversible Causes
IV / IO access (IV Guideline)

Rhythm shockable?
YES
NO

Rhythm shockable?
YES
NO

Rhythm shockable?
YES
NO

Return of Spontaneous Circulation (ROSC)?
YES
NO

ROSC at any time:
go to:
Post-Cardiac Arrest Care Guideline

YES
NO

NO
NO

YES
NO

NO
NO

NO
NO

Pearls:
- Reversible causes should be addressed as soon as possible.
- Consider discontinuation of efforts if:
  o Asystole following trauma – especially blunt.
  o Prolonged downtimes - > 15min.
  o Prolonged code with no response - >3 rounds of medications, 30min of resuscitation.
  o All patients should get a glucose check, at least 1L fluid bolus, and ultimately bilateral needle decompression (especially in Trauma) before discontinuation of efforts.
  o Should take at least 1min to check for pulse in hypothermic patients.
CARDIAC II-P

PEDIATRIC CARDIAC ARREST

**Signs and Symptoms:**
- Unresponsive, apneic, pulseless
- Ventricular fibrillation or ventricular tachycardia on EKG

**START CPR Universal Patient Care Guideline**

**O2 Monitor / Defibrillator**

**VF / pulseless VT**

**Asystole / PEA**

**Rhythm shockable? Confirm in two leads**

**CPR 2 min**
- IV / IO access (IV Guideline)

**Rhythm Shockable?**

**Yes**
- **Shock**
- **1st Shock 2 J/kg,**
  **2nd Shock 4 J/kg,**
  Then ≥ 4 J/kg up to 10 J/kg

**CPR 2 min**
- **Epinephrine (q3-5 min)**
- **0.01mg/kg (0.1mL/kg of 1:10,000) IV / IO**

**Consider advanced airway, capnography: 12-20 breaths/min** (Airway Guideline)

**Return of Spontaneous Circulation (ROSC)?**

**Yes**
- **Rhythm Shockable?**
  - **Yes**
  - **Amiodarone IV / IO**
  - **5mg/kg bolus**
  - **May Repeat X 2**
  - **Lidocaine IV / IO**
  - **1mg/kg loading dose**
  - **Then 20-50mcg/kg/min**
- **CPR Rate of 100-120 Compressions/Min**
  - **One Rescuer = 30 to 2 Breaths**
  - **Two Rescuer = 15 to 2 Breaths**

**NO**
- **CPR 2 min**

**Treat Reversible Causes**

**Pearls:**
- CPR Rate of 100-120 / Min 2 inches depth for children and 1 1/2 inches depth for infants of chest with complete chest recoil
- Reversible causes should be addressed as soon as possible.
- Epinephrine Endotracheal Dose: 0.1 mg/kg (0.1mL/kg of 1:1,000) IV / IO
- Consider discontinuation of efforts if:
  - Asystole following trauma – especially blunt
  - Prolonged downtimes - > 15min
  - Prolonged code with no response - >3 rounds of medications, 30min of resuscitation
  - **All patients should get a glucose check, at least 20ml/kg fluid bolus of NS, and ultimately bilateral needle decompression (Trauma) before discontinuation of efforts**

**Reversible Causes:**
- **Hypovolemia**
- **Hypoxia**
- **Hypothermia**
- **Hypoglycemia**
- **Tension pneumothorax**
- **Tablets / toxin**
- **Tamponade, cardiac**
- **Hydrogen ion (acidosis)**
- **Hypo-/hyperkalemia**
- **Thrombus – cardiac**
- **Thrombus – pulmonary**

**CPR 2 min**
- **IV / IO access (IV Guideline)**

**Epinephrine (q3-5 min)**
- **0.01mg/kg (0.1mL/kg of 1:10,000) IV / IO**

**Consider advanced airway, capnography, 12-20 breaths/min** (Airway Guideline)

**Rhythm Shockable?**

**Yes**
- **CPR 2 min**

**Treat Reversible Causes**

**NO**
- **Rhythm Shockable?**
  - **Yes**
  - **Move to VF / pulseless VT side of guideline**

**NO**
- **CPR 2 min**

**Treat Reversible Causes**

**END**
### PEDIATRIC ALS and BLS INDICATORS

**Indicators of Potential Need for Cardiopulmonary Support**

- **Breathing**
  - Irregular Respirations or >60 breaths/min
  - Labored Breathing (Retractions, Nasal Flaring, Grunting, Pursing of Lips, Tripod Positioning, ↓ Ability to Speak)
- **Heart Rate Ranges** (especially if associated with poor perfusion)
  - <2 Years Old: <80/min or >180/min
  - >2 Years Old: <60/min or >160/min
- **Poor Perfusion with Weak or Absent Distal Pulses**
  - Cyanosis
  - ↓ O₂ Sat
- **Altered Mental Status**
  - GCS <8, Weak Cry, Unusual Irritability, Altered Responsiveness, Lethargy, or Failure to Respond to Painful Stimulus
- **Seizures, Fever with Petechiae, Trauma, and/or Burns >10% Body Surface Area**

---

**IOT Prevent Cardiac Arrest You Must Detect and Treat:**
Respiratory Failure / Respiratory Arrest / Shock

Pediatric Cardiac Arrest Results from Deterioration in Respiratory or Cardiac Function!

---

**Universal Patient Care**

- O₂ Monitor / Defibrillator
- IV / IO access (IV Protocol)

- Unresponsive, Not Breathing or ALS Indicators

---

**Heart Rate/Min**

<table>
<thead>
<tr>
<th>Age</th>
<th>Awake Rate</th>
<th>Mean</th>
<th>Sleeping Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn to 3mo</td>
<td>85-205</td>
<td>140</td>
<td>80-160</td>
</tr>
<tr>
<td>3mo - 2y</td>
<td>100-190</td>
<td>130</td>
<td>75-160</td>
</tr>
<tr>
<td>2 - 10 y</td>
<td>60-140</td>
<td>80</td>
<td>60-90</td>
</tr>
<tr>
<td>&gt;10 y</td>
<td>60-100</td>
<td>75</td>
<td>50-90</td>
</tr>
</tbody>
</table>

**Respiratory Rate/Min**

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>30-60</td>
</tr>
<tr>
<td>Toddler</td>
<td>24-40</td>
</tr>
<tr>
<td>Preschool</td>
<td>22-34</td>
</tr>
<tr>
<td>School</td>
<td>18-30</td>
</tr>
<tr>
<td>Adolescent</td>
<td>12-16</td>
</tr>
</tbody>
</table>

**Blood Pressure**

<table>
<thead>
<tr>
<th>Average</th>
<th>Lower Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>90+(years old x 2)mmHg</td>
<td>70+(years old x 2)mmHg</td>
</tr>
<tr>
<td>90mmHg</td>
<td>55+(years old x 1.5)mmHg</td>
</tr>
</tbody>
</table>

---

**CPR Rate of 100 Compressions / Min at:**

- One Rescuer = 30 Compressions and 2 Breaths
- Two Rescuer = 15 Compressions and 2 Breaths

---

**Check Pulse** (up to 10 sec)

- DEFINITE Pulse
- Rapid Pulse with good perfusion?
  - GIVE: 1 Breath every 3-5 seconds
  - Ensure adequate oxygenation & ventilations
  - Recheck Pulse every 2 minutes
    - Add compressions if pulse <60/min despite O₂ and Ventilation
    - Move to appropriate Guideline
- Rapid Pulse with poor perfusion despite O₂ and ventilation?
- Pulse <60/min with poor perfusion despite O₂ and ventilation?
- No Pulse?

---

**Pediatric Cardiac Arrest**
BRADYCARDIA with PULSE

Signs and Symptoms:
- HR <50bpm
- Chest Pain
- Respiratory Distress
- Hypotension / Shock
- Altered Mentation
- Syncope

Differential Diagnosis:
- Acute MI
- Hypoxia
- Hypothermia
- Sinus Bradycardia
- Physiologic Bradycardia (Athletes)
- Stroke
- Spinal Cord Lesion
- Toxin / Medications (B-blockers)
- AV Block / Sick Sinus Syndrome

Pearls:
- Decompensation at any time (e.g., altered MS, hypotension) should prompt treatment as unstable patient.
- All bradycardic patients should have pacer pads in place after initial evaluation.
- Epinephrine infusion for refractory bradycardia: 2-10 mcg/min or 0.1-0.5 mcg/kg/minute (7 to 35 mcg/min in a 70 kg patient)
  - 1mg 1:10,000 in 250mL D5W / NS = 4 mcg/mL concentration
- Evaluate for treatable causes of bradycardia (B-blockade, Ca Channel blockade).

“OVERDOSE” treatable causes:
- B-blocker (atenolol, metoprolol, labetalol):
  - Glucagon 0.05mg/kg (3-10mg) IV – pretreat with ondansetron for nausea if possible
- Calcium channel blocker (diltiazem, verapamil, nifedipine):
  - Calcium gluconate 10% 1000mg (1amp) slow IV push (1-1.5 mL per minute; not exceeding 200mg/min)
PEDIATRIC BRADYCARDIA with Pulse and Poor Perfusion

Typical HR/min
- Newborn: 85 - 205
- 3mth - 2y/o: 100 - 190
- 2y/o - 10y/o: 60 - 140
- >10 y/o: 60 - 100

Typical Sinus Tachycardia Rates
- Infants <220/min
- Children <180/min

Identify and Treat Underlying Cause!

Universal Patient Care Guideline
- Maintain Airway / Assisted Breathing
- O₂ (Titrated to 94-99% SpO₂)
- IV / IO access (IV Guideline)
- Monitor and 12-Lead ECG (ASAP)
- Check Glucose

CPR Rate of 100 Compressions / Min at:
- One Rescuer: 30 Compressions and 2 Breaths
- Two Rescuers: 15 Compressions and 2 Breaths

Cardiopulmonary Compromise Continues?

YES
- Support ABCs
- Continue O₂
- Continuous Monitoring
- Consider Consultation

NO
- CPR if HR <60/min with Poor Perfusion despite O₂ and Ventilation

Bradydardia Persists?

YES
- Epinephrine 1:10,000 0.01mg/kg IV/IO q3-5min
- Atropine 0.02mg/kg IV / IO (Increased Vagal Tone or Primary AV Block) May Repeat Once (Minimum dose 0.1mg Max Single dose 0.5mg)

NO
- Check Pulse every 2 minutes during CPR

Consider:
- Transcutaneous Pacing (Consider sedation: Midazolam 0.05-0.1mg/kg IV / IO)

If Pulse is lost, GO TO: PEDIATRIC CARDIAC ARREST

Treat Underlying Causes
- Support ABCs
- Continue O₂
- Continuous Monitoring
- Consider Consultation

Indicators of CARDIOPULMONARY COMPROMISE
- Hypotension
  - 1-10 y/o lower limit = 70+(years old x 2)mmHg
  - >10 y/o lower limit = 90mmHg
- Acutely Altered Mental Status
  - GCS <8, Weak Cry, Unusual Irritability, Altered Responsiveness, Lethargy, or Failure to Respond to Painful Stimulus
- Signs of Shock

Pearls:
- Decompensation at any time (e.g., altered MS, hypotension) should prompt treatment as unstable patient.
- All bradycardic patients should have pacer pads in place after initial evaluation.
- Evaluate for treatable causes of bradycardia (B-blockade, Ca channel blockade).
- The majority of pediatric cardiac problems are actually airway problems.
- In young, breast fed patients – evaluate for mother’s medications as they can cause toxicity in the infant.
- Pediatric pacer pads should be used if available. If only adult pads are obtainable – they should be placed in the anterior-posterior position.
**TACHYCARDIA w/PULSE**

**Signs and Symptoms:**
- Ventricular Tachycardia on EKG (rate typically ≥150/min)
- Conscious, Rapid Pulse
- Chest Pain / Shortness of Breath
- Palpitations
- Dizziness
- Anxiety

**Differential Diagnosis (Wide Complex QRS > 12sec):**
- Artifact / Device Failure
- Cardiac
- Endocrine / Metabolic
- Hyperkalemia
- Drugs
- Pulmonary

**Differential Diagnosis (Narrow QRS):**
- Wolf-Parkinson-White Syndrome
- Valvular Heart Disease
- Sick Sinus Syndrome
- Myocardial Infarction
- Electrolyte Imbalance
- Sinus Tachycardia / Atrial Flutter
- Hypoxia
- Drug Overdose / Toxin
- Hyperthyroidism

**Pearls:**
- **Torsades de Pointes** may benefit from early use of Magnesium: 1-2 grams IV over 60 min (Mix in 50ml D5W). Start drip of 0.5-1 gram/hr and titrate to effect.
- If hyperkalemia suspected (end-stage renal disease, dialysis) – administer Ca Chloride through central access or Ca Gluconate through peripheral IV.
- All patients should be warned of discomfort / feeling of heart stopping prior to adenosine administration.

---

**Universal Patient Care Guideline**

**O2 (if Hypoxemic)**

**IV / IO Guideline**

Monitor and 12-lead ECG (ASAP)

**Chest Pain / SOB / Dizziness?**

- **YES**
  - “Sinus Tach”
  - **STABLE**
  - **UNSTABLE**: Signs / Symptoms of:
  - BP Low (hypotension)
  - Altered mental status
  - Signs/symptoms of shock
  - Ischemic chest pain
  - Congestive heart failure (acute)

- **NO**
  - **Chest Pain Guideline**

**Observe Reassess q 5 minutes**

- **Regular**
  - Narrow QRS? <0.12 Second
  - Wide QRS? >0.12 Second

- **Irregular**
  - Consider:
  - **AMIODARONE**

**Consider Sedation:**

- Midazolam 2-5mg IV / IO

---

**DILTAZEM**

1st Dose: 6mg rapid IV push: followed by NS Flush

2nd Dose: 12mg

**ADENOSINE**

1st Dose: 6mg rapid IV

**METOPROLOL**

5mg IV q5min X 3

Hold if SBP <100, P <60

**Differential Diagnosis (Narrow QRS):**

**Torsades de Pointes**

**PREFERRED**

**Pearls:**

**All Pathways End with Continuous Monitoring**

**Cardiac Arrest Guideline**

**Narrow Irregular, Atrial Fibrillation:**

- 120-200 J biphasic

**Narrow Regular, Other SVT, Atrial Flutter:**

- 50-100 J, increase in stepwise fashion

**Wide Regular, Stable Monomorphic VT:**

- 100 J, increase in stepwise fashion

**Wide Irregular:**

- Defibrillate (NOT Synchronized)

- Go to: Cardiac Arrest Guideline
**PEDIATRIC TACHYCARDIA with Pulse and Adequate Perfusion**

### Typical HR/min
- **Newborn**: 85 - 205
- **3mth – 2y/o**: 100 - 190
- **2y/o to 10y/o**: 60 - 140
- **>10y/o**: 60 - 100

### Typical Sinus Tachycardia Rates
- **Infants**: <220/min
- **Children**: <180/min

### Identify and Treat Underlying Cause!
- **Continue**: Universal Patient Care Guideline
  - **Maintain Airway / Assisted Breathing**
  - **O2** (Titrated to 94-99% SpO2)
  - **IV / IO access** (IV Guideline)
  - **Monitor and 12-Lead ECG (ASAP)**
  - **Check Glucose**

### Treatable causes:
- **Check & Treat Compromise in ABCs**
- **Hypoglycemia**
  - D52 2mL/kg slow IV (max 25mL)
  - Glucagon 0.025mg/kg IM (max 1mg)
- **Tension Pneumothorax**

### B-blocker (atenolol, metoprolol, labetalol):**
- Glucagon 0.05mg/kg (3-10mg) IV – **pretreat with ondansetron (0.15mg/kg – max 2mg)** for nausea if possible.
- **Calcium Channel Blocker** (diltiazem, verapamil, nifedipine)
  - Calcium gluconate 10% 0.2ml/kg slow IV push.
- **Narcotic**
  - Naloxone 0.1mg/kg IV/IM (max 2mg)

### Pearls:
- **Vagal maneuvers**: blow through 18ga IV catheter, ice pack on forehead, carotid massage (unilateral only – listen for bruits prior to performing), or having patient blow against closed glottis (“bear down”).
- **Adenosine should be as central as possible with the “2 syringe technique”** – one with adenosine and the other with the saline flush. These should be attached to a 2 port IV adapter and flush should immediately follow drug.
- **Adenosine should be utilized in monomorphic and regular R-R interval type presentation.**
- All patients should be warned of discomfort / feeling of heart stopping before adenosine administration.
PEDIATRIC TACHYCARDIA with Pulse and Poor Perfusion

**Typical HR/min**
- Newborn 85 - 205
- 3mth – 2y/o 100 - 190
- 2y/o to 10y/o 60 -140
- >10 y/o 60 - 100

**Typical Sinus Tachycardia Rates**
- Infants < 220/min
- Children <180/min

**Identify and Treat Underlying Cause!**
Continue: Universal Patient Care Guideline
- Maintain Airway / Assisted Breathing
- \(O_2\) (Titrate to 94-99% \(SpO_2\))
- IV / IO access (IV Guideline)
- Monitor and 12-Lead ECG (ASAP)
- Check Glucose

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- **Vagal maneuvers:** blow through 18ga IV catheter, ice pack on forehead, carotid massage (unilateral only – listen for bruits prior to performing), or having patient blow against closed glottis ("bear down").
- **Adenosine should be given with the “2 syringe technique”** – one with adenosine and the other with the saline flush. These should be attached to a 2 port IV adapter and flush should immediately follow drug.
  - All patients should be warned of discomfort / feeling of heart stopping before adenosine administration.

**Indicators of CARDIOPULMONARY COMPROMISE**
- Hypotension
  - 1-10 y/o lower limit = 70+(years old X 2)mmHg
  - > 10 y/o lower limit = 90mmHg
- Acutely Altered Mental Status
  - GCS <8, Weak Cry, Unusual Irritability, Altered Responsiveness, Lethargy, or Failure to respond to painful stimulus
- Signs of Shock

**QRS Width?**
- **Wide QRS?** >0.09 Second
- **Narrow QRS?** <0.09 Second

**Possible Ventricular Tachycardia**

**Cardiopulmonary Compromise?**
- **YES**
  - Amiodarone 5mg/kg over 20-60 minutes IV / IO
  - Procainamide 15mg/kg over 30-60 minutes
- **OR**
  - Adenosine IV / IO Rapid Push
    1\(^{st}\) 0.1mg/kg (max 6mg)
    2\(^{nd}\) 0.2mg/kg (max12mg)

**Ventricular Tachycardia Indicators**
- Infants: Typically >220/min
- Child: Typically >180/min
- Constant Rate w/o variability on 6 second strip
- Abrupt Rate changes between tachy and normal
- P waves absent or abnormal?
- Vague history inconsistent with known cause

**Check & Treat compromise in ABCs**
- Hypoglycemia
  - D25 2mL/kg slow IV (max 25mL)
  - Glucagon 0.025mg/kg IM (max 1mg)
- Tension Pneumothorax

**OVERDOSE** (Breastfeeding Mother):
- B-blocker (atenolol, metoprolol, labetalol):
  - Glucagon 0.05mg/kg (3-10mg) IV – pre-treat with ondansetron (0.15mg/kg – max 2mg) for nausea if possible
- Calcium channel blocker (diltiazem, verapamil, nifedipine)
  - Calcium chloride 10% 0.2ml/kg slow IV push
- Narcotic
  - Naloxone 0.1mg/kg IV/IM (max 2mg)

**Probable Sinus Tachycardia**
- Search for and Treat Underlying Causes

**Probable Supraventricular Tachycardia**
- Consider Vagal Maneuvers with NO delay to next step

**Probable Ventricular Tachycardia**
- Adenosine IV / IO Rapid Push
  1\(^{st}\) 0.1mg/kg (max 6mg)
  2\(^{nd}\) 0.2mg/kg (max12mg)

If no IV / IO access or adenosine fails
- Synchronized Cardioversion
  1\(^{st}\) 0.5-1J/kg, if fails then 2J/kg (Sedation w/o delay to Cardioversion: Midazolam 0.05-0.1mg/kg IV / IO)
**POST-CARDIAC ARREST CARE**

**Signs and Symptoms:**
- Return of Spontaneous Circulation
- Pulse
- Respiration

**Differential Diagnosis:**
- Continually Address Primary Pathology Associated with Arrest

---

**Universal Patient Care Guideline**

Continuous Monitoring and Maintain:
- **Circulation:** Palpable Pulses and BP
- **O₂:** Sat < 90% (may need advanced airway)
- **12 lead ECG / Defibrillator**
- **IV / IO access (IV Guideline)**

**Changes in Pulses or Significant Ectopy**

**Reversible Causes:**
- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-hyperkalemia
- Hypothermia
- Hypo-Hyperglycemia
- Tension pneumothorax
- Tablets/toxin
- Tamponade, cardiac
- Thrombus – cardiac
- Thrombus – pulmonary

**Pearls:**
- Hyperventilation may cause hypotension and/or recurrence of cardiac arrest in the post-resuscitation phase and must be avoided.
- Most patients will require ventilator assistance in the post-resuscitative phase.
- In non-airway controlled patients, it is important to prevent aspiration following resuscitation. For this reason, patients should be rotated onto their side (non-spinal immobilization) or be closely monitored in case vomiting occurs.
- **Reperfusion:** 1-2 L IVF and consider use of a pressor IV / IO Drip – **EPINEPHRINE 2-10mcg/min** or **NOREPIINEPHRINE 0.1-0.5 mcg/kg/min:** 70kg adult: 7-35mcg/min.
  - Dopamine should be started at a low dose (5mcg/kg/min) and titrated up to maintain a SBP >90. The same applies norepinephrine.
- **Trauma patients** post-resuscitation should have fluid resuscitation consistent with hypotensive resuscitation guidelines. Maintain body core temperature 32-36 degrees Celsius for at least 24 hours.

---

**Consider as appropriate:**
- **Post-Resuscitation Induced Hypothermia Guideline**
- **Loss of Pulses, or onset of VF / pulseless VT, asystole / PEA:** Move to **Cardiac Arrest Guideline**
- **Symptomatic Bradycardia move to Bradycardia with Pulse Guideline**
- **Symptomatic Tachycardia, Pulse >150/min move to Tachycardia with Pulse Guideline**

---

**POST-CARDIAC ARREST CARE**

**Signs and Symptoms:**
- Return of Spontaneous Circulation
- Pulse
- Respiration

**Differential Diagnosis:**
- Continually Address Primary Pathology Associated with Arrest

---

**Universal Patient Care Guideline**

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HYPERTENSION

Signs and Symptoms of Hypertensive Crisis w/ end organ damage.

One of These:
- Systolic BP 185+
- Diastolic BP 110+

Plus One of These:
- Altered Mental Status
- Blurred Vision
- Dizziness / Stroke Symptoms
- Chest Pain

Differential Diagnosis:
- Primary CNS Injury (Cushing's Reflex)
- Myocardial Infarction
- Aortic Dissection
- Pre-Eclampsia / Eclampsia
- Toxin / Medication

Pearls:
- Do not treat elevated blood pressure based on one set of vital signs.
- Improper cuff size and equipment malfunction are common reasons for abnormally high readings.
- If patient has none of the above symptoms of hypertensive emergencies – they do not require treatment of their blood pressure.
- In setting of stroke – do not treat blood pressure unless SBP >220 and/or DBP >120 or signs of end-organ involvement.
  - Elevated BP is required to maintain perfusion during a stroke.
- Only lower MAP approximately 20% with slow, titrated doses – hypertensive patients often need elevated BP to maintain organ / CNS perfusion. MAP = [(2 x Diastolic) + Systolic] / 3
- Labetalol is contraindicated in patients with severe asthma / COPD. In these patients, NTG can be given to lower BP if absolutely necessary. Labetalol doses above are for symptomatic hypertension patients, not hypertension alone.
- Metoprolol is contraindicated for CHF, Acute PE, bronchospasms, bradycardia, hypotension, hx of asthma, and thyrotoxicosis.
ALTITUDE ILLNESS

Differential Diagnosis:
- Head Trauma
- Stroke
- CNS Tumor / Mass / Bleed / Infection
- Endocrine Disorder
- Toxic Ingestion
- Pneumonia / PE
- Cephalgia

Acute Mountain Sickness (AMS)
- Headache
- Nausea / Vomiting
- Lethargy
- Dizziness

High Altitude Cerebral Edema (HACE)
- AMS Symptoms
- Unstable Gait
- Drowsiness
- Confusion
- Coma

High Altitude Pulmonary Edema (HAPE)
- Cough
- Dyspnea
- Pink Frothy Sputum
- Cyanosis
- Hyperthermia

Universal Patient Care Guideline
O2 (ASAP)
IV / IO Guideline
Cardiac Monitor (ASAP)

Hypothermia Precautions
Hypothermia Guideline

Immediate / 1st Line Care for any form of Altitude Illness:
- Rapid Descent (as mission able)
- O2
- Gamow Bag (when descent is not possible)

Pulmonary Symptoms (HAPE)
Rapid Descent
Consider:
Gamow Bag (*See Pearls)

O2 (If not previously started)
Dexamethasone: Initial Loading dose 10mg IV / IO (6mg if 4mg already provided)
(then 4mg IV / IO / PO q6hr)
Ondansetron 4-8mg IV / IO

Headache

Altered Mental Status or Ataxia?

NO (AMS)
Prevent Further Ascent
O2 (If not previously started)
Descend 500-1000m if able
Acetazolamide 125-250mg PO
Dexamethasone 4mg IV / IO / PO q6hr

YES (HACE)
Rapid Descent
Consider:
Gamow Bag (*See Pearls)
O2 (If not previously started)

Altered Mental Status

When appropriate, return to: Tactical Evacuation Guideline

Pears:
- The treatment of choice for all altitude-related illnesses is supplemental O2 and descent – at least 500-1000m. If unable to descend, a hyperbaric bag (Gamow bag) can be utilized if available.
  - If unable to descend immediately - as soon as HACE or HAPE are suspected, the crew must begin engaging actively with the PIC or other tactical commander to work the issue of descent ASAP.
- Acetazolamide should not be given to those patients with Sulfal allergies or known Sickle Cell Anemia.
- High-Altitude Pulmonary Edema (HAPE) patients may have crackles / fever / hypoxia.
- High-Altitude Cerebral Edema (HACE) patients have AMS and may have tremors, HACE often occurs along with HAPE.
  - ANY altered mental status / confusion / abnormal gait should be presumed to have cerebral edema and descent should be undertaken immediately.
- *Descent should be done with the least amount of patient exertion possible to prevent worsening of the condition.
Animal and Insect Bites and Stings

**Signs and Symptoms:**
- Rash, Skin Break, Wound, Retained Stinger
- Pain, Swelling, Erythema
- Bleeding / Discharge
- Shortness of Breath / Wheezing / Throat Tightness
- Hypotension or Shock

**Differential Diagnosis:**
- Bite / Envenomation
- Other Allergic Reaction
- Anaphylaxis
- Rabies / Tetanus Risk

---

**Universal Patient Care Guideline**
- O₂ (if Hypoxemic)
- IV / IO Guideline
  - IV/IO in non-effected limb
  - Cardiac Monitor (prn)

**Position patient supine**

**Allergic Reaction Guideline**
- YES
- Allergic Reaction?
- NO

**Pain Management Guideline**
- When appropriate, return to:
  - Tactical Evacuation Guideline

---

**Pearls:**
- Never attempt to capture / transport a live animal / insect.
- **Anaphylactic reactions should be treated as soon as recognized.**
- Review country environmental concerns before deployment or visitation.
- All animals should be considered rabid outside the U.S. until proven otherwise. This excludes rodents, which do not carry rabies.
- Consider IV administration of Calcium Gluconate if Tetany develops.
- Elevate effected limb to reduce swelling
- **DO NOT apply constricting bandages or tourniquets** as these may worsen local tissue injury and increase the risk of permanent disability.
- **DO NOT** cut, suck, electrocute, burn, or use chemicals on the envenomation site

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*For SPIDER / SCORPION see: SPIDER and SCOPRION Envenomation*

*For SNAKEBITE see: Snakebite Envenomation*
HYPERThERMIA

**Signs and Symptoms:**
- Altered Mental Status
- Loss of Consciousness
- Hot / Dry or Sweaty Skin
- Hypotension or Shock
- Seizure
- Nausea / Vomiting

**Differential Diagnosis:**
- Infection
- Dehydration
- Thyroid Storm
- Medications / Toxin
- Delirium Tremens
- Heat Cramps

**Heat Exhaustion**
- Heat Stroke
- CNS Lesions or Tumors

---

**Universal Patient Care Guideline**

**O2 (if Hypoxemic)**

**IV / IO Guideline**

**Cardiac Monitor (ASAP)**

**Assessment:**
- Mental Status
- Rectal Temperature
- Glucose (treat per AMS Guideline)

**Continued from:**

**Tactical Evacuation Guideline**

**Altered Mental Status and Temperature >40ºC / 104ºF**

**Consider Intubation:**

**AIRWAY Guideline**

**Aggressive cooling:**
- Tepid water to skin with fanning
- Ice packs to groin / axillae / neck
- Consider opening windows

**D/C once temp ≤40ºC / 104ºF!!!**
(prevents rebound hypothermia)

**Consider benzodiazepines to block/stop shivering of rebound Hypothermia:**
Midazolam 0.1mg/kg

**Monitor EKG for Arrhythmia**
(treat per appropriate guideline)

**Be prepared for and consider:**

**Seizure Guideline**

**1L IVF Bolus / PO fluids**

**Altered Mental Status and Temperature >40ºC / 104ºF**

**1L IVF Bolus or PO fluids**

**PO fluids as able**
Consider:
- Tepid Water or Room Temp Saline to Skin

**Continuous Monitoring / Reassess**

**When appropriate, return to:**

**Tactical Evacuation Guideline**

**Altered Mental Status with Temperature <40ºC / 104ºF**

**Consider Intubation:**

**AIRWAY Guideline**

**1L IVF Bolus / PO fluids**

**Tepid Water or Room Temp Saline to Skin**

**Altered Mental Status Guideline**

**Be prepared for and consider:**

**Seizure Guideline**

**Monitor EKG for Arrhythmia**
(treat per appropriate guideline)

**Arrhythmia?**

**Bradycardia with Pulse**

**Tachycardia with Pulse**

**Cardiac Arrest**
(VF / Pulseless VT or Asystole / PEA)

---

**Pearls:**
- The single best method to cool patient is sublimation-sprinkling with water and fanning to evaporate off the skin
- Groups at elevated risk for heat emergencies: elderly, very young, highly active.
- Use of alcohol, cyclic antidepressants, phenothiazines, and anticholinergic medications increase risk.
- Cocaine, ecstasy, amphetamines, and aspirin toxicity can all raise body temperature.
- Sweating does not exclude heat stroke / heat illness.
- In conscious patients that can protect their airway, encourage intake of PO fluids and electrolytes.
ENVIRONMENTAL IV

HYPOThERMIA

Signs and Symptoms:
- Cold, Clammy
- Shivering / Lack of Shivering
- Mental Status Changes
- Extremity Pain / Numbness
- Bradycardia / Arrhythmia
- Hypotension or Shock

Differential Diagnosis:
- Sepsis
- Environmental Exposure
- Hypoglycemia
- CNS Dysfunction
- Toxic Ingestion

---

Pearls:
- "No patient is dead until they are warm and dead."
- Hypothermia defined as core temperature <95ºF (35ºC).
- With temperatures <31ºC (88ºF) ventricular fibrillation is common. Cardiac muscle becomes very irritable as temperature drops and rough handling may induce a cardiac dysrhythmia.
- With temperatures below 30ºC (86ºF) shivering ceases – removing an important heat production source.
- The pulse may be very slow in hypothermic patients – should wait at least one minute to feel pulse.
- Arrhythmias at temperature >30ºC (86ºF) treated similar to normo-thermic patients with the addition of active re-warming.
- At temperatures <30ºC (86ºF) one defibrillation can be attempted, but withhold further attempts / meds until temp >30ºC (86ºF).
Snake Envenomation Management: General Principles

If the patient is being medically evacuated from the field or between roles of care, confirm that the receiving facility has an adequate supply of the appropriate regionally specific antivenoms. *Evacuation is not an alternative to antivenom administration.* A patient whose snakebite warrants evacuation will require antivenom. The earlier it is given the greater the chance of full recovery without permanent disability. **DO NOT** delay administration of antivenom in the field if available to a patient with an envenomation.

**Pearls:**
- **Don't try to ID the snake.** Snake identification is unreliable and should not be purposely attempted.
- **DO NOT** attempt to catch or kill the snake; treatment is clinical and the snake species does not need to be identified. Never attempt to capture or transport a live snake.
- Amount of envenomation from snake bites can be variable or dry bites. Snakebite treatment should always be determined by the clinical presentation and evolution of signs and symptoms in the patient.
- **DO NOT** use ice / tourniquets or constricting bandages as these may worsen local tissue injury and increase the risk of permanent disability.
- If a tourniquet is already in place, **do not** remove it until you are ready to treat and resuscitate the patient as a rapid decompensation can occur.
- Anaphylactic reactions or hypovolemic shock should be treated as soon as recognized.
- Snakebites are clinically dynamic emergencies and can change dramatically until control has been achieved.
Snakebite Envenomation Clinical Syndromes

There are 3 major clinical syndromes of snakebite envenomation worldwide and 3 major signs and symptoms of each. All dangerous snakes capable of injuring or killing a human will produce at least one sign or symptom from at least one of the 3 major snakebite syndromes. Specific antivenoms required will vary regionally but the major triads are applicable globally.

HEMOTOXIC SYNDROME:
- Internal and external active bleeding should cease within 30 – 60 minutes of antivenom administration once the appropriate dose has been given.
- Packed red blood cell or whole blood transfusion can be considered if the patient is in hemorrhagic shock
- Platelets, fresh frozen plasma, cryoprecipitate, TXA, and other agents are not effective in these cases due to the mechanism of the venoms.

NEUROTOXIC SYNDROME:
- Evaluate respiratory muscle weakness by single breath count testing
- Dyspnea?
- Signs and symptoms of descending flaccid paralysis: Ptosis, diplopia, neck flexor muscle weakness, bulbar weakness, etc.
- Signs and symptoms of parasympathetic / cholinergic crisis: SLUDGE mnemonic - Salivation, Lacrimation, Urination, Defecation, GI distress, Emesis
- Altered Mental Status?

HYPO-ADRENAL MIGHTY BLADDER SYNDROME:
- Mark leading edge of pain with a dash line (- - -) and annotate time
- Mark leading edge of edema with a solid line and annotate time
- It is important to keep the limb significantly elevated (> 60° is ideal) whenever possible to limit dependent edema and swelling.

Rapid examination for signs of local or systemic bleeding:
- persistent local bleeding > 30 mins from the bite wound (if visible) or other lesions
- Inspect the molar gingiva and other mucosa for signs of systemic bleeding

NUEROTOXIC SYNDROME:
- Anticipate the need for aggressive airway management with intubation and prolonged ventilation in all patients presenting with neurotoxic envenomation.

Consider:
- Atropine 0.5mg IV/IO
  - Titrated by auscultation to dry up bronchial and oral hypersecretions
- Pediatric Dose: 0.01mg/kg up to .25mg

Joint Trauma System Clinical Practice Guideline (JTS CPG) Global Snake Envenomation Management (CPG ID: 81) for 1st and 2nd line ANTIVENOM based on Region and Syndrome. Follow JTS CPG for ANTIVENOM administrations.
SNAKEBITE SUDDEN COLLAPSE SYNDROME

Signs and Symptoms:
- Rapid onset of Shock (<30 min) from bite with any of the following:
  - Angioedema
  - Altered Mental Status
  - Systemic Bleeding
  - Diarrhea

Differential Diagnosis:
- Neurotoxic Syndrome
- Allergic reactions

Patient presents with signs and symptoms of sudden collapse syndrome post snakebite.

Stabilize with Epinephrine:
- **IM:** 0.3-0.5mg (0.3-0.5 mL 1:1000) or EpiPen®
- **IV Bolus:** 100 mcg over 5-10 min; mix 0.1mg (0.1 mL of 1:1000 in 10mL NS, and infuse over 5-10 min)

Initiate infusion if hypotenstion not responsive to IM/IV:
- **IV Infusion:** Start at 1 mcg/min; mix 1mg (1 mL of 1:1000 in 500 mL NS, and infuse at 0.5 mL/min; titrate as needed

Airway edema responsive to Epinephrine:
- **YES**
- Regional Antivenom Available?
  - **NO**
    - Maintain SBP >90-100 with IV/IO Fluid Resuscitation and Epinephrine and transport to location with appropriate regional antivenom
  - **YES**
    - See Snakebite Envenomation Clinical Syndromes Guideline

When appropriate, return to:
- Snakebite Envenomation Management: General Principles and/or Tactical Evacuation Guideline

Establish Advanced Airway per procedure in the following sequence:
(Move to next procedure per individual competencies, contraindications, and/or attempt failures)
- ENDOTRACHEAL INTUBATION
- BIAD
- CRICOTHYROIDOTOMY

Pearls:
- Anaphylactic reactions (or hypovolemic shock) should be treated aggressively while simultaneously treating for severe envenomation with appropriate regional antivenom.
- Priority of care for a patient in snakebite sudden collapse syndrome is the consideration of the shorter of two options: evaporating the patient to a location with antivenom or bringing the antivenom to the patient.
- Most patients presenting with hypotension or angioedema are responsive to epinephrine, but may require IV epinephrine infusions to achieve this effect if they are unresponsive to IM epinephrine.
Global Spider and Scorpion Envenomation

Background:
Spider and scorpion envenomations can occur in many environments in which the military operates. Many arthropods possess a significant venom but lack a sufficient apparatus (fangs or talon) to inject it into humans. Most bites and stings involve more danger from anaphylaxis, but several species of spiders and scorpions have significant neurotoxic, cytotoxic, or hemotoxic venoms. While most spider and scorpion envenomations result in mild symptoms, severe toxicity and death can occur. Anaphylaxis is the most concerning initial effect. Recognize and treat it immediately using standard acute allergic reaction therapies. Anaphylaxis from an arthropod envenomation is not an indication for antivenom.

SPIDERS:
While many spider species produce venom, the vast majority lack sufficiently large or strong enough fangs to penetrate human skin and cause clinically significant effects. However, spiders venomous to humans can be found throughout much of the world. The chart below provides information regarding clinically significant venomous spider species.

<table>
<thead>
<tr>
<th>Clinically Significant Venomous Spider Species</th>
<th>Widow Spiders (Latrodectus spp) a.k.a Black Widow Red Widow Brown Widow</th>
<th>Violin Spiders (Laxosceles reclusa) a.k.a Brown Recluse Fiddleback Spider</th>
<th>Funnel Web Spiders (Atrax) a.k.a Australian Funnel-Web Spider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>X</td>
<td>X</td>
<td>Yes</td>
</tr>
<tr>
<td>Asia</td>
<td>X</td>
<td>X</td>
<td>No</td>
</tr>
<tr>
<td>Australia</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Europe</td>
<td>X</td>
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<tr>
<td>North America</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>South America</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picture</td>
<td><img src="image1.jpg" alt="Spider Images" /> <img src="image2.jpg" alt="Spider Images" /> <img src="image3.jpg" alt="Spider Images" /></td>
<td><img src="image4.jpg" alt="Spider Images" /> <img src="image5.jpg" alt="Spider Images" /> <img src="image6.jpg" alt="Spider Images" /></td>
<td><img src="image7.jpg" alt="Spider Images" /> <img src="image8.jpg" alt="Spider Images" /> <img src="image9.jpg" alt="Spider Images" /></td>
</tr>
<tr>
<td>Antivenom Available</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Global Spider and Scorpion Envenomation (Continued)

Scorpions:
Scorpions envenomate humans by stinging them with the telson on their tail. Around 20 species of medically important (meaning potentially lethal to humans) scorpions are known, and all but one of these (Hemiscorpius lepturus) are members of the Buthidae family. Buthidae family contains the large genera Ananteris, Centruroides, Compsobuthus, and Tityus. Centruroides are the only clinically significant venomous scorpion indigenous to the United States (i.e. Bark Scorpions). The majority of medically significant envenomations occur in the Middle East, tropics (e.g., Southwest Asia, India, Central and South America), and North Africa.

Scorpion venoms are complex and can include phospholipase, acetylcholinesterase, hyaluronidase, serotonin, and neurotoxins. Scorpion venom increases neuronal release by blocking inactivation of the sodium channel, resulting in an increase in the amplitude and duration of neuron action potential. The overall result is excess stimulation of the central nervous system, the neuromuscular system, the sympathetic nervous system, and the parasympathetic nervous system.

The components of scorpion venom are species specific and generally fall into the categories of neurotoxic and cardiotoxic; however, this terminology is misleading since the cardiotoxic effects are secondary to an excess release of catecholamines stimulated by the nervous system. The venom of the unique species, Hemicorpius lepturus, found in Iraq and Iran is predominately cytotoxic, similar to the brown recluse spider.

Antivenom is available for some species; data regarding the benefits and risks of many of these antivenoms are significantly limited. In patients with moderate to severe symptoms refractory to analgesics and benzodiazepines, antivenom, if available, may be indicated. Due to the high risk of immediate or delayed allergic reactions to these antivenoms administration should be done at a controlled clinical location and pre-hospital treatment should be focused on supportive care. Intravenous histamine antagonists (i.e. diphenhydramine), steroids, and epinephrine should be immediately available at the patient’s bedside prior to antivenom administration. The Joint Trauma System Clinical Practice Guideline: Global Spider and Scorpion Envenomation Management (CPG ID: 84) contains a list of antivenoms available by country. (https://jts.amedd.army.mil/assets/docs/cpgs/Global_Spider_and_Scorpion_Envenomation_Management_09_Feb_2021_ID84.pdf)

Prehospital/En Route Care Treatment Goals for Spider and Scorpion Bites and Stings:
Some moderate to severe cases of envenomations will require medical evacuation to a treatment facility with the capability to administer antivenom. En Route Care consists primarily of supportive care and pain management. En route care providers should be prepared to counter cholinergic, adrenergic, sympathetic and parasympathetic effects. Aggressive use of benzodiazepines as indicated for agitation, neuromuscular stimulation, tachycardia, and hypertension. Secure the airway and initiate mechanical ventilation if indicated. Anaphylaxis is the most concerning initial effect. See specific treatment guidelines for Widow Spiders, Funnel-Web Spiders and Scorpions for additional guidance.
Widow Spider Envenomation

Patients may or may not feel a pinprick upon the initial bite. A pair of small red spots at the envenomation site may be visible; however, the bite site is often not located. Some patients do not develop systemic toxicity. In those patients who do, symptoms typically begin 15 to 60 minutes following the envenomation. The primary symptom is painful muscle cramping, starting at the bite site and progressing towards the center of the body. Patients may develop a painful, rigid abdomen secondary to abdominal muscle spasm which may be mistaken for peritonitis. The pain increases over time and may occur in waves. In some cases, the patient develops a temporary diaphoretic, grimaced, and contorted appearance of the face referred to as “facies latrodectismica.” Other symptoms include vomiting, diaphoresis, tachycardia, hypertension (often profound), and restlessness. Symptoms of Latrodectus envenomation last hours to days. Fatalities from Latrodectus envenomation are exceedingly rare and, when they do occur, are secondary to cardiac arrest (presumably from severe hypertension in patients with predisposing medical conditions) and wound infection.

Pearls:
- Review country environmental concerns before deployment or visitation.
- **Anaphylactic reactions should be treated as soon as recognized.**
- Given the low risk of infection, antibiotics are not routinely recommended.
- Depending upon the severity of pain, acetaminophen, nonsteroidal anti-inflammatory agents, and opioids can be used for pain control.
- **Ketamine is not recommended** as patients may develop tachycardia and have profound hypertension due to widow spider toxin.
- Benzodiazepines may improve muscle spasms.
- Pain control and benzodiazepines are often sufficient to manage tachycardia and hypertension.
- Patients with severe pain refractory to pain medications, antivenom (if available) may be indicated, evacuate to MTF where antivenom is available if able.
- Elevate effected limb to reduce swelling.
- **DO NOT apply constricting bandages or tourniquets** as these may worsen local tissue injury and increase the risk of permanent disability.
- **DO NOT** cut, suck, electrocute, burn, or use chemicals on the envenomation site.
Funnel Web Spider Envenomation

The lethal component of funnel web spider venom is robustotoxin. It induces an autonomic storm by causing excessive release of acetylcholine, norepinephrine, and epinephrine. Funnel web spider envenomation causes a biphasic envenomation syndrome. The first phase includes pain at the bite site, perioral tingling, piloerection, and regional fasciculations which may progress to muscle spasm. This muscle spasm may involve the face, tongue, and larynx leading to airway compromise. The increased stimulation of cholinergic and adrenergic systems causes nausea, vomitting, lacrimation, salivation, tachycardia, hypertension, cardiac dysrhythmias, and acute lung injury. Acute lung injury is the predominate cause of death during the first phase. In the second phase the symptoms of the first phase resolve and lead to the gradual onset of refractory hypotension, apnea, and cardiac arrest.

Pearls:
- Immediately transport to an MTF with antivenom. Effective funnel web spider antivenom is available in Australia.
- Anaphylactic reactions should be treated as soon as recognized.
- Local tissue enzymes may inactivate the venom, therefore the use of pressure immobilization bandage may be helpful in delaying the onset of symptoms, but also may allow for a degree of inactivation of the venom.
- Ketamine is not recommended as patients may develop tachycardia and have profound hypertension.
- Benzodiazepines may improve muscle spasms.
- Elevate effected limb to reduce swelling.
- DO NOT cut, suck, electrocute, burn, or use chemicals on the envenomation site.
Scorpion Envenomation

**Pearls:**
- Anaphylactic reactions should be treated as soon as recognized.
- For clinically significant envenomation, management is supportive and focused on the patient’s symptoms and graded 1-4.
- Patients graded 3 & 4 will require antivenom, evacuate to a MTF able to administer antivenom.
- Administer Benzodiazepines aggressively to ensure symptom control.
- For significant neuromuscular spasm, oral secretions, sedation, or other threats to the patent airway, perform endotracheal intubation to prevent aspiration and ensure adequate ventilation.
- Pulmonary edema should be managed with noninvasive or invasive ventilation in combination with optimization of cardiac output.
- Direct acting vaspressors (epinephrine and norepinephrine) are recommended to treat bradycardia and hypotension.
- Elevate effected limb to reduce swelling.
- **DO NOT apply constricting bandages or tourniquets** as these may worsen local tissue injury and increase the risk of permanent disability.
- **DO NOT** cut, suck, electrocute, burn, or use chemicals on the envenomation site.

### Clinical Grade and Treatment of Scorpion Stings

<table>
<thead>
<tr>
<th>Grade</th>
<th>Effects</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Local Effects Only</td>
<td>Analgesia</td>
</tr>
<tr>
<td>2</td>
<td>Mild/Moderate autonomic excitation (i.e. tachycardia, hypertension)</td>
<td>Benzodiazepines</td>
</tr>
<tr>
<td></td>
<td>Agitation and anxiety</td>
<td>Benzodiazepines</td>
</tr>
<tr>
<td></td>
<td>Pain and paresthesias remote from the sting site</td>
<td>Analgesia</td>
</tr>
<tr>
<td>3</td>
<td>Pulmonary edema</td>
<td>Antivenom, noninvasive or mechanical ventilation</td>
</tr>
<tr>
<td></td>
<td>Hypotension and cardiogenic shock</td>
<td>Antivenom, vasopressors (i.e., norepinephrine, epinephrine)</td>
</tr>
<tr>
<td></td>
<td>Neuromuscular excitation, somatic neuromuscular dysfunction or cranial nerve dysfunction (associated with Centruroides species)</td>
<td>Antivenom, benzodiazepines</td>
</tr>
<tr>
<td>4</td>
<td>Multiorgan failure, coma, seizures, end-organ damage secondary to hypotension, somatic neuromuscular dysfunction and cranial nerve dysfunction (associated with Centruroides species)</td>
<td>Antivenom, vasopressors, sedation (benzodiazepine, propofol, phenobarbital), mechanical ventilation</td>
</tr>
</tbody>
</table>

### Analgesia

Consider acetaminophen, NSAIDs, and Opioids:

- **Acetaminophen**
  - 1 gram PO pm every 6-8 hours max 4gm in 24 hour period

- **Ketorolac**
  - 15mg IV every 6hr or 15-30mg IM every 6hr, max daily dose 120mg

- **Fentanyl**
  - 0.5 – 1.0 mcg/kg IV/IO
  - May repeat every 30 min or
  - PO 800mcg OTFC

### Benzodiazepines

- **Midazolam** 2.5-5mg IV / IO every 15-30 pm
- **Diazepam** 5-10 mg IV/IO; then 5-10 mg in 3-4 hours, if necessary

### Hypotension / Cardiogenic Shock: Vasopressors

- **Norepinephrine**
  - 2-20mcg/min IV/IO, titrate to effect (See Norepinephrine Infusion Chart)
  - Epinephrine 1mg/10ml
  - 5-20 mcg IV/IO Push; may repeat ONCE in 2-5 minutes. If patient remains hypotensive, proceed to continuous infusion.
  - **2-10 mcg/minute:** titrate to desired effect (See Epinephrine 1mg/10ml Infusion Chart)

### Increased Secretions / Salivation/ Lacrimation

- **Atropine**
  - 0.5 mg every 3-5 minutes, until atropinization achieved, not to exceed a total of 3 mg or 0.04 mg/kg

**Allergic Reaction / Anaphylaxis**

- Consider acetaminophen, NSAIDs, and Opioids.
- Administer Benzodiazepines aggressively to ensure symptom control.
- Elevate effected limb to reduce swelling.
- DO NOT apply constricting bandages or tourniquets as these may worsen local tissue injury and increase the risk of permanent disability.
- DO NOT cut, suck, electrocute, burn, or use chemicals on the envenomation site.

**Airway Compromise**

- Establish Advanced Airway per procedure in the following sequence:
  - (Move to next procedure per individual competencies, contraindications, and/or attempt failures)
  - ENDOTRACHEAL INTUBATION
  - BIA D
  - CRICOTHYROIDOTOMY
- Pulmonary Edema: Use ARDS for Ventilator Management

**Airway Guideline**

**Rapid Sequence Intubation**

**Pulmonary Edema:**
Use ARDS for Ventilator Management

**HYPOTENSION / SHOCK GUIDELINE**

- **Increased Secretions / Salivation / Lacrimation**
SUBMERSION INJURY

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Differential Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unresponsive</td>
<td>• Trauma (esp. C-spine)</td>
</tr>
<tr>
<td>• Mental Status Changes</td>
<td>• Dysbarism</td>
</tr>
<tr>
<td>• Hypoxia</td>
<td>• Pressure Injury as in Self-contained under water breathing apparatus (SCUBA)</td>
</tr>
<tr>
<td>• Cyanosis</td>
<td>• Hypothermia</td>
</tr>
<tr>
<td>• Hypothermia</td>
<td>• Vomiting</td>
</tr>
<tr>
<td>• Vomiting</td>
<td>• Coughing</td>
</tr>
</tbody>
</table>

Continued from: Tactical Evacuation Guidelines

Universal Patient Care Guideline

O2 (100% FiO2 for all injuries)

Cardiac Monitor (ASAP)

Spinal Immobilization Protocol

Hypothermic?

YES

Hypothermia Guideline

NO

Multiple Trauma Guideline

YES

Trauma?

NO

Reassess Airway, Check for Arrhythmias

Address per appropriate protocol

When appropriate, Return To: Tactical Evacuation Guideline

Continuous Monitoring

Consider as appropriate: Post-Resuscitation Induced Hypothermia Guideline

Always Record

• Dive Depth
• Duration of decent
• Fresh or salt water

Patients with SCUBA or decompression injuries involving the CNS or respiratory system (stroke symptoms, pulmonary embolism symptoms) should be treated with 100% O2 and delivered EXPEDITIOUSLY to a facility with a hyperbaric chamber.

Pain Management Guideline

Airway Guideline

Cardiac Arrest Guideline

Tachycardia with Pulse

Bradycardia with Pulse

Dive Depth

Duration of decent

Fresh or salt water

Pearls:

- If Decompression Illness or arterial gas embolism is suspected and neurological deficits (including altered mental status) are present, consider high-flow oxygen, lidocaine 1.5 mg/kg IV / IO, and aspirin 325mg. While these interventions remain unproven, the risk / benefit ratio makes them acceptable options, particularly if time to hyperbaric chamber is anticipated to be prolonged.
- Rapid hypothermia from cold water immersion in children has resulted in survival despite prolonged downtime – resuscitate per appropriate protocols and rapidly transport. This has not been seen in adults.
- All near-drowning victims should be transported for evaluation due to potential for worsening respiratory status over next several hours.
- Drowning is the leading cause of death among would-be rescuers.
- Head-first diving injuries often associated with unstable Jefferson fracture (burst fracture of C1) due to axial load. Patients found with suspicion of this type of injury should have early and careful C-spine immobilization.
- Altitude should be restricted in patients suffering from decompression illnesses to prevent worsening. Should remain <1000 ft. AGL / 10,000 ft. MSL whenever possible.
  - Aggressive pre-planning for access to hyperbaric treatment facilities is encouraged if mission requirements warrant it.
CBRN CASUALTY MANAGEMENT

BASIC PRINCIPLES:
Initial care of the CBRN casualty should be approached in the same manner as other casualties. Life threats require prompt recognition and intervention, and non-life-threatening sequelae can be addressed when clinically appropriate. Early recognition and categorization of CBRN-exposed patients is the foundation for further management, and is key not only for initiating patient treatment but also for preventing contamination of medical personnel, equipment, and facilities. Thorough and appropriate decontamination is a core skill that requires planning and practice. Attention to details such as preventing hypothermia in patients undergoing decontamination and clinical reassessment at each stage of the process will reduce unnecessary morbidity. Basic life saving measures such as airway management and resuscitation are fundamental concepts that must be mastered at the appropriate level for each practitioner in the CBRN care chain.

CBRN CRITICAL TASK LIST:
1. Recognize CBRN exposure that requires action to protect self and others.
2. Don personal protective equipment (PPE) to prevent exposure in self and assist others with PPE.
3. Egress from the threat:
   a. Move upwind, uphill, upstream from threat.
   b. Utilize time/distance/shielding for protection.
4. Recognize signs/symptoms of CBRN exposure that prompt immediate self-treatment or treatment of others utilizing CRESS assessment. (RAPID IDENTIFICATION OF CHEMICAL WARFARE AGENTS).
5. Apply TCCC integrated with CBRN response [TCCC + CBRN = (MARCHE)²]. (MARCHE²)
6. Apply airway management skills in a CBRN setting (positioning, suction, ventilation to include manual.
7. Perform Rapid Spot Decontamination.
8. Identify and establish Hot/Warm/Cold Zones.
9. Establish a dirty casualty collection point (CCP).
10. Understand decontamination principles and casualty procedures for partial or complete removal of PPE, clothing, and equipment (casualty cut out).
11. Understand cross contamination and take appropriate measures to prevent it.
12. Understand available technology that can aid in agent identification.

CBRN MEDICAL REGULATING CONSIDERATIONS:
1. Military Treatment Facility (MTF).
   a. DECON/Treatment Coordination. Ensure MTF is prepared to receive dirty casualties and determine the most appropriate location for DECON.
   b. Treatment Capabilities (Toxicology, Critical Care, Trauma Surgery). Determine whether the MTF has the services necessary to care for and sustain the CBRN casualty on site and/or establish telemedicine support.
   c. Capacity. The CBRN casualty is far more resource intensive than a typical trauma or critically ill casualty. Assess the MTF’s capacity and capability to treat CBRN casualties and identify potential alternate locations.
2. Integrate the medical regulating system into CBRN casualty evacuation.
EVACUATION PLATFORM CONSIDERATIONS:
1. Evacuation of patients must continue even in a contaminated environment.
2. Clean and Dirty. It is necessary to plan for both clean and dirty platforms for evacuation.
   a. Optimize the use of resources, medical or nonmedical, which are already contaminated before employing uncontaminated resources.
   b. Once a vehicle or aircraft has entered a contaminated area, it is highly unlikely that it will be able to be spared long enough to undergo a complete decontamination. Factors include - contaminant, the tempo of the battle, and the resources available.
   c. Contaminated vehicles (air and ground) will have restricted use and are confined to a contaminated environment until decontamination can occur.
3. Refuel.
   a. Consider the time it takes for refueling in a MASCAL situation, as well as the distance from the objective to the DECON site and MTF.
   b. Factor in any platform decontamination that may be necessary prior to arrival at the refueling site.
   c. WARM ZONE Forward Arming and Refuel Points may be necessary.
4. Preparation time (hasty vs. deliberate). Factor the time it takes to prepare the platform for a hasty or deliberate CBRN mission.
5. Radiological Exposure Limitations:
   a. Operational exposure guidance: MEDEVAC operations will establish operational exposure guidelines by the appropriate Surgeon and Command limiting radiation exposure to crews by absorbed dosage.
   b. Radiation exposure records are maintained by the unit CBRN noncommissioned officer and are made available to the commander, staff, and surgeon.
6. Flying Hour Limitations:
   a. Environmental Relative Factors (ERF) under Mission Oriented Protective Posture (MOPP) 3 and 4 limits flying hours to 3 hours day, night or combined modes of flight.
   b. ERF extensions are limited to a case by case basis.

CBRN LANDING ZONES / AMBULANCE (CASUALTY) EXCHANGE POINTS:
1. Route coordination. Consider alternate routes, primary routes may be jammed or unavailable.
2. Consider appropriate distance to accommodate for aircraft rotor wash and direction of landing for Dirty LZs and Clean LZs at the DECON/CCP locations.
3. Environmental Considerations:
   a. Wind
   b. Terrain / Slope
   c. Drainage (for DECON Sites)
   d. Water Sources
CBRN MILITARY WORKING DOG CASUALTY MANAGEMENT

Chemical protective doctrine for animals is incomplete, and there is no chemical protective equipment in the current inventory for MWDs. Equipment and doctrine for animals are under development but pending its availability, any degree of protection of the MWD in a CBRN agent environment will, at best, be extremely difficult. The MWD’s Handler should be in possession of additional ATNAA and CANA kits to use on their MWD. Attempt to obtain and use those resources first when treating a MWD.

MILITARY WORKING DOG DECONTAMINATION PROCEDURES

While not generally a MEDEVAC mission, ensuring proper MWD Decon prior to transport is vital to ensuring the platform and crew are not contaminated by the agent involved.

- Rinse the MWD thoroughly with plain water beginning at the head along the back and to the tail; then rinse down the MWD’s sides, chest, stomach, legs, and paws.
- Work the soap into the hair starting the head, along the back and to the tip of the tail, then work down the MWD’s sides, chest, and abdomen, legs, and paws. Ensure the soap reaches the MWD’s skin. If the MWD has erect ears, flush the ears with otic solution or water.

Note. Special attention should be paid to the MWD’s stomach, face, ears, eyes, under tail, paws and in between legs to ensure all contamination is removed.

- Flushed the eyes with copious amounts of water, ophthalmic solution, or saline.
- Rinse with plain water using the same pattern as the initial rinse (head to back to tail, then down sides, chest, stomach, legs, and paws).
- Allow the MWD to shake off excess water. A tarp or other impervious materiel may be placed around the MWD while it shakes off excess water to prevent contaminating of other people, MWDs, or equipment.

TREATMENT OF MILITARY WORKING DOG CASUALTIES OF NERVE AGENTS

- For mildly exposed MWDs, administer a total of two ATNAA injections (atropine and 2-PAM Cl in a single autoinjector) (carried by the MWD handler) into the back of the thigh of the dog. The initial dosage of atropine is 4 mg and the dosage for 2-PAM Cl is 1200 mg

- For severely exposed MWDs, administer three ATNAA and one CANA. This is similar to the buddy aid a Service member provides another Service member suffering from severe nerve agent exposure. In general, MWDs should not need additional 2-PAM Cl injections.

- Single atropine injections may be given every 10 to 20 minutes until the nerve agent effects have subsided or signs of atropinization appear. The MWD must be monitored for heat stress. Atropine dries the mucous membranes thus preventing the MWD from expelling body heat.

- The initial dosage of 2-PAM Cl in the dog is 20 mg/kilogram. Three ATNAA injectors should provide sufficient amount of 2-PAM Cl. If a MWD is still showing signs of seizure after initial
treatment, the handler may give up to 3 additional CANA autoinjections at 5 to 10 minute intervals until the seizures are gone.

- Maintain a clear airway by removing respiratory secretions and saliva obstructing the airway. Loosen or remove the muzzle. In severe nerve agent exposure, the animal’s respiration is markedly depressed and extreme muscular weakness or paralysis is present. In such cases, assisted ventilation is required to effectively resuscitate the animal.

Adequate atropine and 2-PAM Cl should bring about an improvement or restoration of spontaneous respiration and also improve blood circulation. However, the effectiveness of 2-PAM Cl is lost after a short period of time. The 2-PAM Cl varies in its effectiveness against nerve agents. It is least effective against GD nerve agent. In some cases, severe nerve agent symptoms may persist or recur and require veterinary personnel to administer additional 2-PAM Cl autoinjectors every 8 to 12 hours for up to 3 days.
MARCHE²

After initial assessment of casualty in CBRN-threat environment for the presence or absence of CBRN symptoms using the CRESS algorithm, the integrated assessment and management of TCCC and CBRN injuries can proceed. MARCHE² integrates the TCCC MARCH algorithm with the priorities of CBRN treatment. MARCHE² is further broken down into phases similar to TCCC. The “Hot Zone” should be considered as care under fire, addressing only immediate life threats, “Warm Zone” is tactical field care and “Cold Zone” as tactical evacuation care.

TCCC MARCH

- MASSIVE HEMORRHAGE
  - HASTY tourniquets in the HOT ZONE
  - Transition to DELIBERATE tourniquets during DECON in WARM ZONE

- AIRWAY
  - Assess – excessive secretions indicate NERVE AGENT
  - Defer most interventions - consider risks in active HOT ZONE of remove mask to access airway

- Respirations
  - Increased respirations consider ATNAA/CANA NERVE AGENT GUIDELINE
  - Depressed respirations consider NAXOLONE INCAPACITATING AGENT GUIDELINE
  - Other than antidotes – respiratory interventions is best deferred to WARM ZONE

- Circulation
  - Circulation intervention should be deferred to WARM ZONE
  - Assess for shock
  - IV/IO GUIDELINE
  - HYPOTENSION/SHOCK GUIDELINE

CRESS Assessment

- Consciousness:
  - Conscious, Unconscious, depressed consciousness, AMS, seizures, agitation, normal

- Respirations:
  - Normal, increased, decreased, distress, delayed onset, apneic, tachypnea, wheezing, immediate irritation

- Eyes:
  - Normal, constricted (Miosis), dilated (Mydriasis), irritated, painful

- Secretions:
  - None, Increased, Decreased
  - Copious Secretions (salivation, lacrimation, rhinorrhea, bronchorrhea)

- Skin:
  - Normal, Dry and Hot, Flushed, Erythema, Diaphoresis, Cyanotic, Blisters, Pain

- CRESS must be reassessed regularly, during zone transitions and at each transfer, to monitor for delayed onset of life threatening symptoms, and analyze antidote or countermeasure effectiveness

CBRN MARCHE²

- Mask
  - MASK or CHECK MASK SEAL as immediate HOT ZONE treatment

- Antidote
  - Utilize CRESS to differentiate chemical agent exposure
  - RAPID IDENTIFICATION OF CHEMICAL WARFARE AGENT
  - ATNAA (x3)/CANA (x1) for NERVE AGENT
  - NAXOLONE (2mg IM) for OPIOID INCAPACITATING AGENT
  - Cyanokit® in HOT ZONE for BLOOD AGENT

- Rapid Spot Decontamination
  - Indicated for gross contamination on skin and/or wounds or if protective gear is breached
  - Rapid exposure and decontamination of contaminated wounds is necessary lifesaving procedure in the HOT ZONE
  - Apply RSDL, M100, M295, Sorbent, tech wipe, etc.

- Countermeasures
  - Appropriate therapy based on type of agent exposure, post initial antidote administration
  - Deferred to WARM ZONE

Hypothermia Prevention & Head Injury

- Protect from lethal triad: HYPOTHERMIA, acidosis and coagulopathy through HOT/WARM/COLD ZONES
- Active warming or HPMK post decontamination and packaging for further evacuation
- Determine if altered mental status is due to chemical agent or trauma, if trauma HEAD INJURY/TBI GUIDELINE

Extricate and Evacuate

- EXTRICATE: egress patient from threat, agent contact, HOT ZONE
- Evacuate: to WARM ZONE – Dirty CCP for decontamination
- COUNTERMEASURES and appropriate supportive care starts in WARM ZONE and continues during Evacuation/COLD ZONE

Pearls:

- Treatment goals of CBRN is give antidote, extricate from exposure area, conduct spot decontamination, provide airway support.
Rapid Identification of Chemical-Warfare Agents

Assess:
- C: Consciousness
- R: Respirations
- E: Eyes
- S: Secretions
- S: Skin

Observations:
- unconscious, seizures, depressed consciousness, agitation
- present, absent, labored, increased, decreased, normal, abnormal
- constricted, dilated, normal
- dry, normal, increased
- diaphoretic, dry, hot, cyanosis

Can conventional mechanisms of injury alone account for observed effects, signs and symptoms?

YES: Treat as conventional Mass-Casualty incident:
- Remain vigilant for CBRN signs and symptoms (CRESS)

NO: Consider CBRN.

Don personnel PPE
Assess casualty CRESS

Confusion?

YES: Consider botulinum toxin

NO: Bradypnea or apnea?

YES: Gasiing, collapse, and seizures with or without cyanosis?

YES: Miosis?

YES: Consider Nerve Agent
- Atropine and Pralidoxime

NO: Any increase in:
- SECRETIONS (lacrimation, rhinorrhea, salivations, bronchial secretions)
- Muscle Effects (fasciculation, weakness, paralysis)
- With or without constricted pupils (miosis)

NO: Bradypnea or apnea?

YES: Consider Asphyxiant
- BLOOD AGENT
- Administer Cyanide Antidote

NO: Confusion?

YES: Consider Opioid Agent
- INCAPACITATING AGENTS
- Administer Naloxone

NO: Respiratory noise?

YES: Consider Anticholinergic Agent
- INCAPACITATING AGENTS
- Manage airway as needed

NO: Delayed onset shortness of breath or chest tightness?

YES: Consider Pulmonary Agent
- CENTRAL COMPARTMENT, LARGE AIRWAY
- PULMONARY AGENTS

NO: Diplopia, descending paralysis, dysphagia, and mydriasis?

YES: Consider Pulmonary Agent
- PERIPHERAL COMPARTMENT, SMALL AIRWAY
- PULMONARY AGENTS

NO: Gasping, collapse, and seizures with or without cyanosis?

NO: Miosis?

YES: Consider Asphyxiant
- BLOOD AGENT
- Administer Cyanide Antidote

NO: Sedation?

YES: Consider Nerve Agent
- Atropine and Pralidoxime

NO: Mydriasis, dry skin, elevated temperature?

YES: Consider Pulmonary Agent
- CENTRAL COMPARTMENT, LARGE AIRWAY
- PULMONARY AGENTS

NO: Unlikely to be CBRN

- Reassess for conventional injuries
- Monitor for delayed CBRN effects

Consider Nerve Agent
- Atropine and Pralidoxime

Consider Asphyxiant
- BLOOD AGENT
- Administer Cyanide Antidote

Consider Opioid Agent
- INCAPACITATING AGENTS
- Administer Naloxone

Consider Anticholinergic Agent
- INCAPACITATING AGENTS
- Manage airway as needed

Consider Pulmonary Agent
- CENTRAL COMPARTMENT, LARGE AIRWAY
- PULMONARY AGENTS

Consider Pulmonary Agent
- PERIPHERAL COMPARTMENT, SMALL AIRWAY
- PULMONARY AGENTS

Pearls:
- Treatment goals of CBRN is give anti-dote, provide airway support, conduct spot decontamination.
NERVE AGENT

**Nerve Agent**
- Liquid or Vapor
- Non-Persistent (GA, GB, GF)
- Persistent (VX)
- Organophosphate Treatment

**PPE and Detection**
- Mask
- AP-PPE
- JLIST or UIPE
- M8 Detection Paper
  - G – Yellow
  - V – Green

**CBRN IV**

**CRESS Symptomatic Presentation**
- C: altered, unconscious, seizures
- R: tachypnea, wheezing, respiratory distress
- E: miosis (may or may not be present with organophosphate)
- S: copious secretions (salivation, lacrimation bronchorrhea)
- S: diaphoresis

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**NERVE AGENT ANTIDOTE**
Antidote Treatment, Nerve Agent, Auto-Injector (ATNAA)
- ATNAA contains 2.1mg Atropine and 600mg Pralidoxime Cholride (2PAM) in each Auto Injector
- Initial administration is 3x ATNAA in rapid sequence for severe signs of nerve agent poisoning (6.3mg Atropine, 1800mg 2PAM)
- Convulsant Antidote Nerve Agent (CANA)
  - CANA contains 10mg Diazepam
  - Administer 1x CANA following 3x ATNAA

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**NERVE AGENT COUNTERMEASURES**
ATROPINE IV/IIO
- 20mg in 250mL NS IV/IIO, titrate 1mg every 3 mins to dry secretions
- Once clinical improvement achieved, adjust to rate of 2-4mg/hr

PRALIDOXIME IV/IIO
- 1-2gm in 250mL NS IV/IIO over 15-30min.

BENZODIAZEPINES IV/IIO
- MIDAZOLAM (preferred)1-2mg IV/IIO, titrate to effect
- DIAZEPAM 10-20mg IV/IIO, titrate to effect

SCOPOLAMINE IV/IIM (adjunct if available)
- 0.6mg IV/IM

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**M2, A2, R2, E.**
- address MASSIVE HEMORRHAGE / Mask check
- assess AIRWAY / administer ANTIDOTE
- assess RESPIRATIONS / conduct RAPID SPOT DECON
- Extract (move upwind, uphill, upstream – away from threat)

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**M2, A2, R2, Reassessment** (clear airway, O2 as needed, filtered air)
- Decontaminate and Cutout
- CIRCULATION (asses vitals, resuscitate) administer COUNTERMEASURES as necessary if ATNAA/CANA administered and symptoms persist
- Prevent HYPOTHERMIA / assess mental status (altered due to agent or trauma?) HEAD INJURY
- EVACUATE to next role of care/zone

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**MARCHÉ2 Reassessment**
- Continue to address any immediate life threats
- provide AIRWAY and RESPIRATORY support as necessary
- continue CIRCULATION support / COUNTERMEASURES as symptoms dictate
- prevent HYPOTHERMIA with HPMK, warm fluids / HEAD INJURY treat elevated ICP, conduct neuro exam, MACE

Reassess regularly, follow protocols for respiratory or cardiac compromise.
BLOOD AGENT - CYANIDE

Blood Agent – Cyanide
- Hydrogen Cyanide, Cyanogen Chloride
- volatile water-soluble liquid
- vapor
- Odor: Bitter Almonds

PPE and Detection
- Mask
- AP-PPE
- JLIST or UIPE

M8 Detection Paper
- Does not detect

CRESS Symptomatic Presentation
C: altered or unconscious
R: normal to apneic
E: normal unless vapor irritant
S: none
S: may appear flushed (50% occurrence)

Immediate Action + M², A², R², E.
- address MASSIVE HEMORRHAGE / Mask check
- assess AIRWAY / administer ANTIDOTE
- assess RESPIRATIONS / conduct RAPID SPOT DECON
- Extract (move upwind, uphill, upstream – away from threat)

HOT ZONE POI

Decontaminate and Cutout
- Remove and bag equipment, PPE, and clothing
- Evacuation from exposure + clothing removal is adequate decon
- Can further decontaminate skin with irritation solution, but priority is antidote

M², A², R², Reassess (clear airway, O² as needed, filtered air)

WARM ZONE DIRTY CCP

C², H², E
- CIRCULATION (asses vitals, resuscitate) administer COUNTERMEASURES (initial or second Cyanokit®)
- Prevent HYPOTHERMIA / assess mental status (altered due to agent or trauma?) HEAD INJURY
- EVACUATE to next role of care/zone

COLD ZONE

MARCHE² Reassessment
- Continue to address any immediate life threats
- provide AIRWAY and RESPIRATORY support as necessary, provide supplemental O² even with normal SPO²
- continue CIRCULATION (monitor) / COUNTERMEASURES 2nd dose as appropriate
- prevent HYPOTHERMIA with HPMK, warm fluids / HEAD INJURY treat elevated ICP, conduct neuro exam, MACE

Anticipate hemodynamic compromise, seizures, cardiac arrhythmiasReassess regularly, follow protocols for respiratory or cardiac compromise.

CYANIDE ANTIDOTE
HYDROXOCOBALAMIN (Cyanokit®) IV/IO
- 5gm IV/IO over 5min with 200ml NS or LR or D5W
- Do not shake vial (gently mix)
- Do not use if solution is not dark red
- Reapeat second 5gm dose based on severity and clinical response
- Maximum cumalitive dose 10gm

Antidote Considerations:
Decision to give in hot or warm zone is based on clinical presentation. Unlike to have diagnostic adjuncts (lactate, arterial/venous samples) prior to cold zone. High concentrations of cyanide can result in death within seconds to minutes. Early symptoms may include dizziness, headache, weakness, diaphoresis, and dyspnea / hyperpnea. CNS and cardiotoxicity occur due to intracellular hypoxia.
- Consider amyl nitrite (0.3mL ampule)
- If Cyanokit® (hydroxocobalamin) antidote is not available, aggressive supportive care may be sufficient treatment.
PULMONARY AGENTS

**Pulmonary Agents: Phosgene, Chlorine**
- Phosgene, Chlorine
- Gas (COCl₂) above 47°F/8.3°C
- Gas (Cl) above 29°F/-1.6°C
- Odor Phosgene: freshly mowed hay
- Phosgene toxic below odor threshold

**PPE and Detection**
- Mask (C2-A1 Filter)
- AP-PPE
- JLIST or UIPE
- M8 Detection Paper
- Not effective

**CRESS Symptomatic Presentation**
- C: conscious (unconscious if asphyxia)
- R: normal to respiratory distress, delayed onset up to 24 hours (phosgene)
- E: irritated, injected (chlorine)
- S: Mucous membrane irritation (rhinorrhea, salivation)
- S: Chlorine: immediate irritation (tearing and rhinorrhea) Phosgene: delayed fluid buildup

**There is no antidote for Chlorine or Phosgene exposure. Treatment focus is remove from exposure, aggressive management of airway and respirations, supportive care.**

**Phosgene:** Onset of symptoms can be delayed up to 24 hours, generally 2-6 hours after exposure. Exertion is associated with worse outcomes, so keep patients exposed to phosgene at rest. The major effects of phosgene are on peripheral airways, therefore dyspnea, chest tightness or pain, and cough are common symptoms. Development of hypoxia and pulmonary edema. Fluid shifts secondary to pulmonary edema may result in hypovolemia.

**Chlorine:** Onset of symptoms are immediate. Chlorine causes more immediate symptoms in the moist areas of the eyes, mouth, and upper airways. Eye pain, blepharospasm, and lacrimation are common. Other symptoms may include headache, salivation, dyspnea, cough, hemoptysis, chest burning, and vomiting. Irrigate eyes if irritated or burning.

Laryngospasm may occur with both Phosgene and Chlorine. Anticipate airway edema and manage airway early. If advanced airway required, place largest endotracheal tube possible to facilitate suctioning. Intravenous fluids may be necessary in the setting of volume depletion, but should not be given empirically. Fluid overload can contribute to pulmonary edema and should be avoided.

**Consider following for wheezing /bronchospasms:**
- **ALBUTEROL** (2.5mg in 3ml NS)
- **METHYPREDNISOLONE** (125mg IV)
- See RESPIRATORY DISTRESS

**Mechanical Ventilations**
- Use ARDS VENTILATOR MANAGEMENT techniques

**M², A², R², Reassessment (C³, H², E³)**
- Clear airway (copious secretions)
- Anticipate laryngospasm
- Place advanced airway (largest bore ET as able), be prepared to conduct cricothyroidotomy for failed airway
- Advanced Ventilatory support (SAVe or simple vent may not be sufficient, ARDS technique, need to manipulate peep, volume, FIO2)
- O₂ as needed, maintain air filter
- Decontaminate and Cutout
- Remove and bag equipment, PPE, and clothing
- Soap and water sufficient for skin decon
- Remove and replace contaminated treatments (chest seals, tourniquets, etc.)

**CIRCULATION (asses vitals)**
- Prevent HYPOTHERMIA / assess mental status (altered due to agent or trauma?) HEAD INJURY
- EVACUATE to next role of care/zone

**MARCHE² Reassessment**
- Continue to address any immediate life threats
- provide AIRWAY and RESPIRATORY support as necessary, provide supplemental O₂ even with normal SPO₂
- continue CIRCULATION support (monitor vitals), resuscitate as necessary / COUNTERMEASURES 2nd dose as appropriate)
- prevent HYPOTHERMIA with HPMK, warm fluids / HEAD INJURY treat elevated ICP, conduct neuro exam, MACE
CBRN VII

[ADULT CBRN GUIDELINES]

VESICANT BLISTER AGENTS

Vesicant Agents: Anticholinergics, Opioids, Riot Control
- Lewisite (L), Mustard-Lewisite Mixture (HL)
- Immediate Acting Agent
- Oily liquid
- Persistent, Freezing 0.4°F/-17°C
- Odors: Geraniums

PPE and Detection
- Mask
- AP-PPE
- JLIST or UIPE
- Red to Pink
- LCD Detection

CBRN GUIDELINES

Immediate Action + M², A², R², E.
- address MASSIVE HEMORRHAGE / Mask check
- assess AIRWAY / administer ANTIDOTE (none in HOT ZONE)
- assess RESPIRATIONS / conduct RAPID SPOT DECON
- Extract (move upwind, uphill, upstream – away from threat) Extraction to the Dirty CCP [For Small Spills (<2 kg) move away 100m day/300m night] [Large Spills (<25kg) = 500m day/1000m night]

HOT ZONE POI

M², A², R², Reassessment
- Clear airway, O₂ as needed, maintain filtered air
- ALBUTEROL (2.5mg in 3ml NS)
- Invasive airway if unresponsive to albuterol

Decontaminate and Cutout
- Remove and bag equipment, PPE, and clothing
- Wipe away gross contamination, RSDL cut line, cut out
- RSDL residual contamination on skin (>2min contact time, then wipe away)
- Remove and replace contaminated treatments (chest seals, tourniquets, etc.)

C², H², E
- CIRCULATION (assess vitals, resuscitate)
- COUNTERMEASURES (rapid decon, irrigate eyes and wounds with water)
- Prevent HYPOTHERMIA / assess mental status (altered due to agent or trauma?) HEAD INJURY
- EVACUATE to next role of care/zone

WARM ZONE DIRTY CCP

(MARCHÉ)² Reassessment
M²: Convert tourniquets & bandage wounds
A²: In case of severe inhalation symptoms upgrade airway adjunct & RSI
R²: Vesicant Inhalation Tx SOP, Ventilator, O₂, PEEP, Suction, Bronchoscopy
C²: Trend Vitals, TXA, FDP, FWB, Fluid Challenge if Req’d / severe exposures will present with distributive shock requiring chelation therapy with Dimercaprol aka British Anti-Lewisite (BAL) in order to resolve

COLD ZONE

H²: Hypothermia (HPMK, fluid warmer) / Head wounds (treat elevated ICP, Neuro exam, MACE) HEAD INJURY treat elevated ICP, conduct neuro exam, MACE

Lewiste binds to tissues and absorbs systemically within two minutes of contact. Symptoms begin to manifest immediately upon exposure and worsen over time. Control of massive hemorrhage and rapid spot decon are top priorities.

Casualties with palm-size exposure without rapid decon, >5% BSA burn, pulmonary edema, or shock symptoms with rapid onset require chelation. Early pain control may be required to ensure casualty cooperation. Administration of BAL within 5 minutes of exposure to skin and eyes can neutralize agent.

COUNTERMEASURE / TREATMENT

Dimercaprol (BAL) Administration
- Initial Dose: 3 mg/kg deep IM repeat every 4 hours for two days
- Then: Every 12 hours for 7-10 days
- Severe & Life Threatening Exposure: consider 5 mg/kg
- Side Effects: Increased BP, Tachycardia, Nausea/vomiting, Headache, Anxiety, Injection Necrosis
- Contraindications: Nut Allergy.

Supportive Care
- PAIN MANAGEMENT
- Expect SIRS and ARDS in severe cases

Mechanical Ventilations
- Use ARDS VENTILATOR MANAGEMENT techniques

Skin
- Burns-apply Silvadene & bandage QID (burn fluid resuscitation not necessary
- Blister fluid may contain Arsenic, unroof >2cm, irrigate, calamine or steroidal cream

Eyes
- Petroleum based ophthalmic ointment,
CBRN VII

[ADULT CBRN GUIDELINES]

INCAPACITATING AGENTS

Incapacitating Agents:
Anticholinergics, Opioids, Riot Control
- Variable; aerosol, smoke/gas, or liquid
- Fentanyl derivatives extremely potent lethality

PPE and Detection
- Mask (C2-A1 Filter)
- AP-PPE
- JLIST or UIPE
- M8 Detection Paper
- Not effective

CRESS Symptomatic Presentation
C: Varies with agents
R:
E:
S:
S:

Immediate Action + M2, A2, R2, E.
- address MASSIVE HEMORRHAGE / Mask check
- assess AIRWAY / administer ANTIDOTE
- assess RESPIRATIONS / conduct RAPID SPOT DECON
- Extract (move upwind, uphill, upstream – away from threat)

M2, A2, R1, Reassessment
- Clear airway (copious secretions)
- Anticipate laryngospasm
- Place advanced airway (largest bore ET as able), be prepared to conduct tracheotomy for failed airway
- Advanced Ventilatory support (SAVe or simple vent may not be sufficient, ARDS techniques need to manipulate peak, volume, FIO2)
- O2 as needed, maintain air filter

Decontaminate and Cutout
- Remove and bag equipment, PPE, and clothing
- Soap and water sufficient for skin decon
- Remove and replace contaminated treatments (chest seals, tourniquets, etc.)

C2, H2, E
- CIRCULATION (asses vitals) COUNTERMEASURES
- Prevent HYPOTHERMIA / assess mental status (altered due to agent or trauma?) HEAD INJURY
- EVACUATE to next role of care/zone

MARCHÉ2 Reassessment
- Continue to reassess any immediate life threats
- provide AIRWAY and RESPIRATORY support as necessary, provide supplemental O2 even with normal SPO2
- continue CIRCULATION support (monitor vitals), resuscitate as necessary / COUNTERMEASURES 2nd dose as appropriate
- prevent HYPOTHERMIA with HPMK, warm fluids / HEAD INJURY; treat elevated ICP, conduct neuro exam, MACE

HOT ZONE
POI

WARM ZONE
DIRTY CCP

COLD ZONE

OP cloids

C – Sedation
R – Decreased respirations
E - miosis
S – normal
S- normal

OPIOID ANTIDOTE:
- NAXOLONE (2-4mg) additional escalating doses up to 10mg dose as needed
- May require NAXOLONE drip at 2/3 of response dose/hr
- Support respirations as needed see RESPIRATORY DISTRESS

ANTICHOLINERGICS
C – Delirium, agitation
R – normal, tachypnea, tachycardia
E - red
S – mydriasis
S- red, hot dry

ANTICHOLINERGICS ANTIDOTE:
- Titrate Benzodiazepines (2-4mg IV/IO/IM) to control severe agitation
- Support respirations as needed see RESPIRATORY DISTRESS

Laryngospasm may occur with both Phosgene and Chlorine. Anticipate airway edema and manage airway early. If advanced airway required, place largest endotracheal tube possible to facilitate suctioning. Intravenous fluids may be necessary in the setting of volume depletion, but should not be given empirically. Fluid overload can contribute to pulmonary edema and should be avoided.

Consider following for wheezing /bronchospasms:
- ALBUTEROL (2.5mg in 3ml NS)
- METHYPREDNISOLONE (125mg IV)
- See RESPIRATORY DISTRESS

Mechanical Ventilations
- Use ARDS VENTILATOR MANAGEMENT techniques
CHILD BIRTH

Signs and Symptoms:
- Spasmodic Pain
- Vaginal Fluid / Bleeding
- Crowning / Urge to Push
- Meconium

Possible Complications:
- Preterm Labor
- Spontaneous Vaginal Delivery
- Placenta Previa
- Prolapsed Cord
- Abnormal Presentation (e.g., breech)

### Pearls:
- Document all times – delivery, contraction frequency / length.
- Assist with birth:
  - Position mother as necessary.
  - Prepare 2 sets of hemostats and scissors / scalpel, umbilical cord clamp if available, bulb suction.
  - If umbilical cord palpable around neck – attempt to reduce manually prior to delivery of head (should feel rope-like structure around neck). As last resort, and if unable to keep pressure off of the cord, clamp and cut cord when unable to manually reduce.
  - If umbilical cord seen, elevation of presenting part with vaginal hand and maintain elevation until delivery via C-section AKA “ride the bed” ***Do not place pressure on the cord or monitor pulse via the cord.
  - Suctioning of nose and mouth with bulb aspirate recommended if obvious obstruction from secretions.
  - Use slight downward pressure to deliver superior shoulder, then slight upward pressure to deliver lower shoulder.
  - Clamp cord after 1-3 minutes with 2 hemostats and cut between clamps.
  - Immediately wrap infant and give to mother – assistant to aid in monitoring child.
  - Deliver placenta – should feel lengthening / giving way of cord and gush of blood – keep placenta for pathology evaluation. (This process may take up to 30min. Never pull on the umbilical cord in attempts to speed delivery.)
  - “Externally” massage uterus to encourage contraction and limit bleeding.
  - If neonate appears to be stuck in the birth canal (i.e., turtling of the head), flex the mother’s hips (both knees to chest) in order to widen the birth canal.
  - Provide the neonate with safe and adequate hearing protection and hypothermia prevention as possible.
NEWBORN CARE & DISTRESS

Post Resuscitation Care
- Clear Airway (bulb syringe mouth / nose)
- Dry Infant
- Keep Warm (wrap in dry blanket)
- Determine APGAR Score
- Treat Hypoglycemia (Glucose <40)
- Continuous Monitoring (with SpO2)

Meconium Staining of Amniotic Fluid?
- Suction Mouth then Nose until clear with bulb syringe. Deep suction is no longer advised.

Airway Open? (Breathing or Crying)
Good Tone?
Full Term Delivery?

Clear Airway
BVM (PPV): Titrate to 94-99% SpO2 at 30-60 breaths/min
SpO2 Monitoring

HR <100?

Apnea or Gasping?
Labored Breathing?
Persistent Cyanosis?

Post Resuscitation Care

Continued from:
- TACTICAL EVACUATION Guideline,
- CHILDBIRTH Guideline, or
- Pediatric RESPIRATORY DISTRESS Guideline

Maintain:
Universal Patient Care Guideline
(Mother and Newborn)

Clear Airway (Bulb syringe Mouth / Nose)
Dry Infant
Stimulate (Foot Tap, Back Rub)
Keep Warm (wrap in dry blanket)
SpO2 Monitor (if not already placed)
Determine APGAR Score

Clear Airway
BVM (PPV): Titrate to 94-99% SpO2 at 30-60 breaths/min
SpO2 Monitoring

HR <100?

Signs of:
Dehydration
- Tachycardia, ↓BP
- Sunken Fontanelles
- No tears
- Dry mouth, tongue, skin
- ↓UOP
Fluid Overload
- Shortness of Breath
- Ankle / Sacral Edema
- ↑Jugular venous pressure
- Crackles in Lungs

Targeted Preductal SpO2 After Birth
1 min: 60-65%
2 min: 65-70%
3 min: 70-75%
4 min: 75-80%
5 min: 80-85%
10 min: 85-95%
Do NOT titrate O2 for SpO2 >95%

Signs of:
Dehydration
- Tachycardia, ↓BP
- Sunken Fontanelles
- No tears
- Dry mouth, tongue, skin
- ↓UOP
Fluid Overload
- Shortness of Breath
- Ankle / Sacral Edema
- ↑Jugular venous pressure
- Crackles in Lungs

APGAR SCORE
- Determine by end of 1st 60 seconds of care and repeat every 5 min.
- Score of 6 or less? Start Immediate Resuscitation.
(CPR: 90 compressions per 30 ventilations / min – provide supplemental O2 to titrate to 94-99%SpO2)

APGAR SCORING

Activity
(Muscle Tone)
Absent
Arms and Legs Flex
Active Movement
Pulse
Absent
Below 100 bpm
Over 100 bpm
Grimace
(Reflex irritability)
Flaccid
Some Extremity Flexion
Active motion (pull away, cough)
Appearance
(Skin color)
Blue, Pale
Body Pink, Extremities blue
Completely Pink
Respirations
Absent
Slow, irregular
Vigorous cry

Epinephrine 1:10,000
0.01-0.03mg/kg push q3-5min
(0.1-0.3mL of 1:10,000 10cc Cardiac Epi vial)

Consider:
1. Hypoglycemia (Treat Glucose <40)
2. Shock
3. Pneumothorax (Intubate)

1. D12.5 1.0mL/kg IV (Dilute D50 to ¼ strength (1mL D50 in 3mL NS)
2. IVF or Blood 10mL/kg IV
3. Intubation

Severely Depressed 0-3
Moderately Depressed 4-6
Excellent Condition 7-10
### OBSTETRIC EMERGENCY

**Signs and Symptoms:**
- Vaginal Bleeding
- Abdominal Pain
- Seizure
- Hypertension
- Headache
- Visual Disturbance

**Differential Diagnosis:**
- Pre-Eclampsia / Eclampsia
- Placenta Previa
- Abruptio Placentae
- Spontaneous Abortion

---

**Universal Patient Care Guideline**
- O₂ (if Hypoxemic)
- IV / IO Guideline
- Cardiac Monitor

**ABDOMINAL PAIN Guideline**
- Place in Left Lateral Decubitus or with Pad Under Right Hip

**Vaginal Bleeding?**
- **Yes**
  - Tachycardia / Orthostatic?
  - 1000mL IVF IV bolus
  - Blood Product (as available) OR 2G TXA IV
  - Monitor, Reassess, Address:
    - BP?
    - Seizure?
    - Glucose
    - Vision
    - Changes / Headache
  - Continuous Monitoring Throughout transport to MTF, any Complaint of Labor, move to:

**Seizure**
- If in Status Epileptics, Move to: SEIZURE Guideline

**Hypertension >160/110 or Hypertension (140-159/90-109) with severe headache, blurred vision, photophobia, hyperreflexia, epigastric pain?**
- **Yes**
  - Magnesium Sulfate 4g IV Over 15min (or 5mg IM each buttocks)

**Blood Product**
- **Yes**
  - 1000mL IVF IV bolus
- **No**
  - S/Sx, Complaint of Labor?
  - **Yes**
    - CHILDBIRTH Guideline
  - **No**
    - Monitor, Reassess, Address:
      - BP?
      - Seizure?
      - Glucose
      - Vision
      - Changes / Headache
    - Continuous Monitoring Throughout transport to MTF, any Complaint of Labor, move to:

**ALTERNED MENTAL STATUS Guideline**
- MIDAZOLAM 5mg IV / IO or 10mg IM
- LORAZEPAM 2-4mg IV / IM

**Seizure Stopped?**
- **Yes**
- **No**
  - Failed to resolve after 2nd dose
  - Seizure? Move to: SEIZURE Guideline

**Magnesium Sulfate 4g IV Over 15min (or 5mg IM each buttocks)**
- Glucose <60 or >250?
  - **Yes**
    - Magnesium Sulfate 4g IV Over 15min (or 5mg IM each buttocks)
  - **No**
    - Monitor, Reassess, Address:
      - BP?
      - Seizure?
      - Glucose
      - Vision
      - Changes / Headache
    - Continuous Monitoring Throughout transport to MTF, any Complaint of Labor, move to:

---

**TACTICAL EVACUATION GUIDELINE**

**PEARLS:**
- Seizure / headache / vision complaints: can give Midazolam 0.1mg/kg IV every 15-30 or 1mg IV every 2-3min up to 5mg while waiting for magnesium to take effect.
- Seizure activity in an OB patient signifies eclampsia.
- The best life support for the fetus is to resuscitate the mother.
- All pregnant / suspected pregnant patients should be kept in the left lateral decubitus position or have padding placed below the right hip to keep pressure off of the inferior vena cava.
- Use caution when using magnesium – it can lead to cardiorespiratory collapse with hypotension and decreased respiratory drive.
- Treat all hypertensive patients as if they are pre-eclamptic despite any prior history of hypertension.
- The leading cause of Postpartum Hemorrhage is Uterine Atony (lack of contracting), which can be treated with uterine massage.
TREATMENT OF MINORS

INDICATIONS:
Responding to treat a minor patient without a parent or legal guardian representative available. For the purpose of these guidelines, all patients under age 18 years will be considered minors. Medical aircrew and medical directors should consult unit rules of engagement and applicable laws and adjust accordingly.

PATIENT MANAGEMENT PROCEDURE:
1. Treatment and transport of any minor requiring immediate care to save a life or prevent severe injury will be performed following the principle of implied consent for emergency care. (Assume any minor who needs treatment to save life, limb, eyesight, or to prevent severe injury has provided consent to treatment.)

2. ALWAYS act in the patient’s best interest. ALWAYS maintain complete and careful documentation.

3. If the parent or guardian is present, follow these guidelines:
   a. Allow one (1) parent to accompany the child during transport after approval of the pilot in command (PC) and if it does not interfere with patient care or flight safety.
   b. In event of major trauma and/or cardiac arrest, judgment should be exercised in allowing parents to accompany the child. Recent evidence supports this practice in emergency departments and some EMS settings, but care should be exercised to maintain crew safety and mission accomplishment.
   c. Allow the parent to hold or touch the child, if possible, while assuring optimal transport restraints to assure safety.
   d. Remember to be open and honest to both parent and child about the child’s condition and any treatment given. DO NOT diagnose, DO NOT deceive, and DO try to comfort the child and parent.

4. In many jurisdictions, parent or legal guardians CANNOT refuse consent for treatment/transport of a minor with a life-threatening condition. Contact your medical director in the event of the parent/guardian refusing treatment/transport of a minor with a life-threatening condition.
SEXUAL ASSAULT

INDICATIONS:
1. Reported and/or suspected assault on any person regardless of age or gender.
2. Trauma and/or bleeding to the vagina, rectum or buttocks that cannot be identified as being the result of any other cause.

REMARKS:
1. Focus shall be placed on the victim and on doing what is necessary and appropriate to support victim recovery and also, if a Service Member, to support that Service Member to be fully mission capable and engaged.
2. Medical personnel should be gender-responsive, culturally competent, and recovery-oriented.
   a. Medical providers giving care to sexual assault victims shall recognize the high prevalence of pre-existing trauma (prior to present sexual assault incident) and the concept of trauma-informed care.
   b. If the attending flight medic is not appropriately trained to utilize a Sexual Assault Forensic Evidence (SAFE) Kit, information will be forwarded to the Medical Treatment Facility in order to make the necessary arrangements to complete the SAFE Kit administration as soon as possible.
3. Flight Paramedics shall abide by the Sexual Assault Prevention and Response (SAPR) Program and coordinate with the Sexual Assault Response Coordinator (SARC) and Sexual Assault Prevention and Response Victim Advocate (SAPR VA). The SARC's shall serve as the single point of contact for coordinating care to ensure that sexual assault victims receive appropriate and responsive care.
4. Sexual assault victims shall be given priority and treated as emergency cases. Emergency care shall consist of emergency medical care and the offer of a SAFE Kit.

PATIENT MANAGEMENT PROCEDURE:
1. In the management of sexual assault patients, the DoD’s first priority for victims is to protect, treat with dignity and respect, and to provide the medical treatment, care, and counseling that patients deserve. Under the DoD Confidentiality Policy, sexual assault victims have two reporting options: Restricted and Unrestricted. It is mandatory that all DoD health care providers (including 68Ws) adhere to the parameters of confidentiality and notification pursuant to each form of reporting.

   a. Restricted Reporting: Reporting option that allows assault victims to confidentially disclose the assault to specified individuals (e.g., SARC, SAPR VA, healthcare personnel) and receives medical treatment (including emergency care), counseling, and assignment of a SARC and SAPR VA; without triggering an investigation. The victim’s report provided to healthcare personnel (including the information acquired from a SAFE Kit), SARCs, or SAPR VAs will NOT be reported to law enforcement or to the command to initiate the official investigative process unless the victim consents or an established EXCEPTION applies. Restricted reporting applies to Service Members and their military dependents 18 years of age and older. Additional persons who may be entitled to Restricted Reporting are NG and Reserve Component members. Only a SARC, SAPR VA, or healthcare personnel may receive a Restricted Report.

   b. Unrestricted Reporting: A process that an individual covered by this policy uses to disclose, without requesting confidentiality or Restricted Reporting, that he or she is the victim of a
sexual assault. Under these circumstances, the victim’s report provided to healthcare personnel, the SARC, a SAPR VA, command authorities, or other persons is reported to law enforcement and may be used to initiate the official investigative process.

5. Priority treatment as emergency cases includes activities relating to access to healthcare, coding, and medical transfer of evacuation and complete physical assessment, examination, and treatment of injuries including immediate emergency interventions.

6. **DO NOT** attempt to examine the patient without informed consent except to treat immediate life, limb, or eyesight threats. SARC notification must not delay emergency medical care treatment of a victim.
   a. Limit cleaning of wounds to only determine severity.
   b. Check for associated or additional injury and/or other illness. Refer to appropriate medical treatment guidelines as appropriate.

7. In situations where installations do not have SAFE kit capability, the installation commander will require that the eligible victim, who wishes to have a SAFE, be transported to a MTF or local off-base, non-military facility that has a SAFE capability. A local sexual assault nurse examiner or other healthcare providers who are trained and credentialed to perform a SAFE may also be contacted to report to the MTF to conduct the examination.

8. Preserve all evidence:
   a. Bag all personal items (e.g., blood stained items, clothes). Paper bags are recommended if available, in order to prevent excess moisture accumulation and subsequent evidence degradation.
   b. Ensure all items are signed for before handing off.
   c. Ensure all interactions, statements made by the patient, and all treatment given is medically documented in patient care record while maintaining patient confidentiality.
PATIENT REFUSAL

INDICATIONS:
If a patient (or person[s] responsible for a minor) refuses treatment or transport, after prehospital providers have arrived on the scene, the following procedures should be carried out:

PATIENT MANAGEMENT PROCEDURE:
1. A Primary Assessment (to include vital signs) should be completed, if possible. Pay particular attention to the patient's mental status.

2. Any injuries or illnesses found to immediately threaten life, limb, or eyesight (or can be assumed will deteriorate enroute) should be addressed and treated immediately while enroute, to the greatest extent possible while assuring safety. With Patients that prevent treatment of these injuries, all should be done to encourage the patient seek treatment and any doubt of capacity should prompt treatment/transport under implied consent. Patient with decision-making capacity refusing treatment of life-threatening injury or illness require further clinical judgement and consultation with medical director prior to informed refusal.

3. Injuries or illnesses that do not represent imminent threats to life, limb, or eyesight (or considered unlikely to deteriorate enroute) may be addressed in accordance with the following:

   a. Determine the patient's (or parent's) decision-making capacity to make sound/valid judgments concerning the patient's condition. If there are any doubts from the provider’s aspect, consider treating in accordance with the ALTERED MENTAL STATUS GUIDELINE or COMBATIVE PATIENT GUIDELINE. Decision-making capacity means that:
      - The patient is awake, alert, and oriented to person, place, time and event.
      AND
      - The patient is able to understand his/her medical problem(s), and recite back an understanding of the medical problem(s) and risks of possible resulting problems or worsening of his/her medical condition if patient is not evaluated and treated.

   b. Ensure that you clearly and repeatedly explain to the patient or responsible parties of the concerns and possible risks involved in refusing medical care.

   c. Clearly document all findings during the patient assessment and any discussions with the patient regarding his/her condition as well as all persons involved with the patient. Document all statements made pertaining to the risks associated with refusing treatment and transportation and obtain a signature from a witness (crewmember) and the patient or parties responsible for the patient as to refusal of care.

   d. Clearly explain to Military Personnel why the treatment is needed. Notify them that refusal of treatment may bring judicial or administrative adverse action upon them under UCMJ.
SAMPLE PATIENT REFUSAL

PATIENT REFUSAL FORM

DATE: ________________

PATIENT INFORMATION:

LAST NAME ___________ FIRST NAME ___________ M.I. ___________

ADDRESS

D.O.B / AGE ___________ SSN / DOD ID ___________ UNIT ___________

GUARDIAN / CARE GIVER

WAIVER OF LIABILITY:
I REFUSE TREATMENT AND/OR TRANSPORTATION BY THE PROVIDING MEDICAL SERVICE. I ASSUME RESPONSIBILITY FOR MY OWN, MY CHILD’S OWN, OR FAMILY MEMBER’S MEDICAL TREATMENT. I RELEASE THIS MEDICAL SERVICE FROM ANY LIABILITY OR MEDICAL CLAIMS RESULTING FROM MY REFUSAL OF EMERGENCY MEDICAL CARE AND/OR TRANSPORTATION.

I HAVE BEEN ADVISED:
☐ TO SEEK MEDICAL CARE OF A PHYSICIAN. (INITIALS ___________)
☐ REFUSING MEDICAL CARE AND/OR TRANSPORTATION AGAINST MEDICAL ADVISEMENT CAN LEAD TO WORSENING OF MY CONDITION AND/OR A FATAL OUTCOME. (INITIALS ___________)

☐ DIFFERENTIAL DIAGNOSIS: ____________________________________________

☐ VITALS: BP: _________ HR: _________ RR: _________ SPO2: _________ GCS: _________

☐ I AM MAKING THIS REFUSAL IN GOOD MENTAL CAPACITY AND JUDGEMENT. (INITIALS ___________)

PATIENT / GUARDIAN SIGNATURE ___________________________ WITNESS SIGNATURE ___________________________

FLIGHT MEDIC SIGNATURE ___________________________ ADDITIONAL WITNESS SIGNATURE ___________________________
COMBATIVE PATIENT

**Signs and Symptoms:**
- Bizarre Behavior
- Violent Activities
- Head Injuries / AMS
- Anxiety
- Tachycardia / Elevated BP

**Differential Diagnosis:**
- Head Trauma / Psychiatric Disorders
- Thyroid Dysfunction
- Hyper/Hypoglycemia
- Diabetic Ketoacidosis / Toxic Ingestion
- Environment (Hyper / Hypothermia)
- Hypoxia

---

**Perls:**
- *Physical restraints* such as tying down patient hands to prevent pulling lines, etc., should be limited to the least amount necessary to accomplish treatments / prevent injuries. *(Kerlex gauze can be a useful restraint)*
  - Do not jeopardize the patient's airway! — Avoid hog tying, lying prone in restraints, sandwiching between spine boards, etc.
  - Check Vitals, SpO2, Pulse and Cap Refill every 5 minutes.
- Combative patients present a very real threat to the safety of themselves, the medic, and the aircrew during flight. For this reason, any patient with altered mental status and the potential for combativeeness that would threaten aircrew safety or themselves should be prophylactically sedated / paralyzed and intubated for the flight.
- Use of sedative medications adds risk of decreasing respiratory drive and should be used with caution. However, meds should be titrated to adequate dosage to control patient. Be prepared for airway interventions/vomiting if used. Cardiac arrest in patients with excited delirium/extreme agitation following restraint is well documented. Capnography in addition to cardiac monitoring is essential.
# MWD Normal Clinical Parameters

for further reference see
Clinical Practice Guidelines for Military Working Dogs, 12 Dec 2018

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**Vital Signs**
- Temperature (rectal) - 99.5° to 103° F
- Heart Rate/Pulse - 60 to 80 (at rest) bpm
- Respiratory Rate - 16 to 32 bpm
  (Controlled panting is normal)
- Blood Pressure - Systolic 120 mmHg, Diastolic 80 mmHg, Mean 90 to 100 mmHg

---

### Clinical Pearls for MWDs-
- Average MWD weighs 30-35 kg (German shepherd dogs, Belgian Malinois, Labrador retrievers).
  
  *All drug dosages should be calculated based on measured or estimated body weight.*
  
  **DOG HANDLER CARRIES DRUG CARD FOR THE DOG**

- IV catheterization access points are:
  - Cephalic vein on the cranial (superior) aspect of the forearm (figures 1 & 2)
  - Lateral saphenous vein on the lateral aspect of the hind limb at the distal tibial area (figure 3)
  - External jugular vein in the jugular furrow of the neck. Standard human central venous catheter kits can be used; the Seldinger technique is most reliable.

- IO catheterization access points are:
  - Greater trochanter of the humerus (figure 4 & 5)
  - Medial tibia just distal to tuberosity (figure 6 & 7)

- Arterial Pulse is palpated at the femoral artery on the medial aspect of the proximal thigh in the inguinal area (figure 8) or at the dorsal metatarsal artery on the dorsal aspect of the proximal hind paw.

- Heart sounds are best auscultated over the lower left lateral thoracic wall between the 4th and 5th intercostal space. (figure 9)

- 3-lead electrocardiograms are sufficient for MWDs. Adhesive electrodes should be taped to the pads of the paws of the left forelimb (black lead), right forelimb (white lead), and left hind limb (red lead). (figure 10)

- Pulse oximetry probes can be utilized on conscious dogs using the ear pinna, lip fold, or flank skin; while not optimal for oximetry, these alternative sites are generally acceptable. For optimal reliability place probe on tongue (only in unconscious dogs)

---

**Figure 1** - Vein best punctured toward the elbow.

**Figure 2** - Vein occlusion superior to elbow joint while elbow is in extension.
Figure 3 - Lateral saphenous vein on the hind limb of a MWD

Figure 4 - Musculoskeletal view of greater trochanter of the humerus for IO catheter

Figure 5 - Shoulder IO catheter location

Figure 6 - Musculoskeletal view of medial tibia location for IO catheter just distal to tuberosity

Figure 7 - Medial tibia IO catheter location just distal to tuberosity
Figure 8 - location for palpation of the femoral arterial pulse

Figure 9 - optimal location for auscultation of the heart sounds and palpation of the heart beat

Figure 10 - placement of adhesive ECG electrode pads on the footpads

Figure 11 - placement of pulse oximetry on tongue
MWD Airway Management

RESPIRATORY ARREST PRESENT or AIRWAY OBSTRUCTION PRESENT
(dyspnea, labored inspiration, stridor and stertor)

- Inspect, wipe and suction mouth and pharynx
- Is the airway clear?
- Is the animal breathing spontaneously?

NO

- Endotracheal Intubation (Size 9-11)
  - Able to intubate?
  - Is airway clear?

NO

- Suction Airway
  - Is airway clear?

NO

Disruption of mouth, pharynx, larynx, or trachea?

YES

- Perform Tracheostomy
  - Is airway clear?

NO

Ventilate with 100% oxygen
- Is airway clear?
- Lung sounds clear and bilateral

YES

Continue evaluation of other body systems

NO

Reposition and suction ET Tube
- Lung sounds clear and bilateral?

YES

Evaluate for pleural space and parenchymal problems

NO
Clinical Pearls:
- Unconscious MWDs: Use tracheal insufflation, orotracheal intubation, or tracheostomy. If there is an obstruction then bypass the obstruction until the patient is more stable. Do not use tracheal insufflation for >30 min.
- NOTE: intubation of the MWD is most easily performed with the dog in sternal or prone position, head and neck extended, and tongue pulled forward. Verify placement by palpating neck for 1 tube. If 2 tubes are felt, the tube is in the esophagus. Capnometer reading > 10mmHg also ensures correct placement.
MWD Heat Injury Treatment

**Clinical Pearls:**

- **PANTING** is the only significant cooling mechanism for dogs.
- **NO** specific body temperature defines heat stroke in MWD’s. Normal rectal temperature is 101° to 103° F in the MWD. Temperatures as high as 105.8°F have been associated with pathology. Most commonly, heat stroke is seen in MWDs with rectal temperatures greater than 107°F.
- **DO NOT** use of cold intravenous fluids, ice packs, or ice-water baths for cooling.
- Once the MWD’s body temperature is =103°F **CEASE** all cooling efforts and monitor for rebound hypothermia, and prepare for rewarmin measures. Actively warm the dog if the temperature <100°F
- Treat seizures with midazolam or diazepam 0.3 mg/kg IV, IO or Intranasal prn
MWD CPR Management

Cardiopulmonary Arrest Confirmed

BEGIN BASIC LIFE SUPPORT - SUSTAIN CPR for 2-3 minute cycles
- **Circulation**: Chest compressions, FAST and HARD, 100 compressions per minute
- **Airway**: Clear airway and intubate; perform tracheostomy if obstructed airway
- **Breathing**: Manually ventilate with 100% O₂ at 8-10 breaths per minute

BEGIN ADVANCED LIFE SUPPORT
ECG (determine arrest rhythm)
IV / IO access for drug delivery

**VF or VT**
- Defibrillate- 2-5 J/kg biphasic
- Resume chest compressions x 1 cycle (2 min)
- Defibrillate twice more, with 1 compression cycle between each counter-shock, if refractory
- Drug therapy if counter-shock no successful:
  - Epinephrine 0.01 mg/kg IV/IO
  - Epinephrine 0.01 mg/kg IV/IO or
  - Vasopressin 0.8 U/kg IV/IO once
  - Lidocaine 2 mg/kg IV/IO
  - Amiodarone 5-10 mg/kg IV/IO
- Repeat counter-shock (50% INCREASED initial energy) if refractory

**ASYSTOLE/ BRADYCARDIA/ PEA**
- Drug therapy:
  - Atropine 0.04 mg/kg IV/IO only if bradycardia preceded arrest
  - Epinephrine 0.01 mg/kg IV/IO and
  - Vasopressin 0.8 U/kg IV/IO once

**CPR Emergency Drugs and Doses**

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<th>Weight (kg)</th>
<th>2.5</th>
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Reprinted with permission from the Veterinary Emergency & Critical Care Society (veccs.org) RECOVER Initiative CPR Emergency Drugs and Doses chart.
Clinical Pearls:
- 70% of MWDs that arrest will have PEA, asystole, or sinus bradycardia as the initial arrest rhythm. Epinephrine or vasopressin are best choices for these rhythms or for empiric use if ECG capability is not available.

- Avoid interrupting chest compressions! The key to successful resuscitation is to SUSTAIN chest compressions aggressively for 2-3 minutes before stopping to check status.

- Most people apply too little force when performing chest compressions! Do not be concerned with breaking ribs or injuring the heart or chest with BLS. In contrast to CPR in people, the thorax of MWDs is more compliant and fractures are rare.
MWD Analgesia and Sedation

Sedation Protocols in the Military Working Dog

MWDs may become fractious during flight and chemical restraint by intramuscular injection will likely be required to facilitate IV catheter placement and treatment of a conscious MWD

MILD SEDATION

- **INDICATION:** Relax MWD for examination, handling, reducing anxiety
- **PROTOCOL:** Midazolam 0.3 mg/kg IM AND Hydromorphone 0.2 mg/kg IM
  - Hydromorphone 0.2 mg/kg IM may be substituted for morphine IM
- **EXPECTATION:** MWD will be calm, but reactive and noise sensitive

DEEP SEDATION

- **INDICATION:** First line protocol for fractious MWD
- **PROTOCOL:** Midazolam 0.3 mg/kg AND Ketamine 5 mg/kg AND Hydromorphone 0.1 mg/kg IM
  - Hydromorphone 0.1 mg/kg IM may be substituted for morphine IM
- **EXPECTATION:** The MWD will not be able to walk but cannot be intubated. MWD may be aroused with significant stimulation and maintains laryngeal and palpebral reflexes

If MWD is suspected of having PAIN or PAIN is anticipated, please provide analgesia

Intermittent IV or IM supplementation

- **Hydromorphone**
  - 0.1-0.2 mg/kg
  - q 2-4 hours
- **Morphine Sulfate**
  - 0.2-0.5 mg/kg
  - q 4-6 hours

Continuous Infusion

- **Fentanyl**
  - 2-10 mcg/kg/hour
- **Morphine**
  - 0.1-0.25 mg/kg/hour
- **Hydromorphone**
  - 0.02-0.05 mg/kg/hour

- Place IV catheter once the MWD is controlled
- Give Midazolam 0.3 mg/kg IM & Ketamine 2 mg/kg IM & Hydromorphone 0.1 mg/kg IM
- Can also use Propofol in 1 mg/kg boluses IV as needed to allow catheterization or intubation

If MWD is suspected of having PAIN or PAIN is anticipated, please provide analgesia

- IV catheter (discretionary)
- Give Midazolam 0.3 mg/kg IM & Hydromorphone 0.2 mg/kg IM q 2-4 hours
Clinical Pearls:
- Dosages for analgesics in dogs are significantly higher than for people.
- Assessment of pain in dogs is difficult. Health Care Providers should err on side of providing analgesia. Properly performed, it is safe and effective, and analgesia is critically important for safe handling and alleviation of pain.
- Note that all protocols have analgesia incorporated into them. Additional analgesia can be provided by the IV/IM or PO route, as necessary.
- Opioids cause emesis, usually within 5 minutes of administration. Be prepared to remove the muzzle to minimize aspiration risk. Hydromorphone causes excessive panting; use caution with head injuries, GDV, and respiratory disease.
  - **CAUTION:** Do NOT use acetaminophen or ibuprofen in MWDs, as these drugs can cause liver toxicity. AVOID use of NSAIDs such as naproxen and aspirin in emergently ill or injured MWDs.
  - **OPIOID REVERSAL:** At appropriate doses, dogs appear less susceptible to opioid-induced respiratory depression and excessive sedation. However, opioid side effects can be reversed in the dog using NALOXONE 0.01-0.02 mg/kg slow IV to effect if needed. Note that this will reverse analgesia as well as sedation!
MWD Gastric Dilation-Volvulus

GDV is a rapidly life-threatening condition common in MWDs. In GDV, the stomach rapidly dilates (gastric dilation) with fluid, food, and air, and then rotates along the long axis (volvulus) and causes shock by interfering with venous return from the abdomen and pelvic limbs.

**Clinical Signs:**
- varying degree of abdominal distention/lympancy, non-productive retching, attempted vomiting without result; signs of pain (grunting when palpating stomach); signs of anxiety; inability to lay comfortably; and signs of compensatory shock (tachycardia, tachypnea)

**Initiate Monitoring:**
- ECG, NIBP, SpO₂, ETCO₂, Evaluate for dysrhythmias, hypotension, hypoxemia, hypo- or hypercapnia

**Treat Shock**
- Give supplemental O₂
- Place at least 2 IV or IO catheters in the forelimbs (preferably one central)
- Give IV or IO crystalloid therapy utilizing the 10-20-10-10 fluid guideline
- Give hydroxyethyl starch (HES) boluses (10-20 mL/kg) IV or IO as needed to maintain normal blood pressure. Repeat this bolus if no response to therapy.
- Give hypertonic saline (HTS) IV bolus of 4 mL/kg over 5 minutes (if 7-7.5% HTS is available) for MWDs that fail to respond to two or three quarter-shock boluses of crystalloids and/or one or two boluses of HES.

**Decompress the Tympanic Stomach**
- Position self on left side, or lay dog on left side
- Locate Insertion point: Palpate last rib, move hand two inches caudal to the last rib, midway between the spine and the ventral border of the abdomen on the right side, auscultate the lateral abdominal wall at most distended area while percussing the wall with a finger. Loudest "ping" is the site of insertion.
- Clip hair over a 6-inch area over the area.
- Prepare area with a surgical scrub.
- Forcefully insert 14-18 gauge IV over-the-needle catheter through the skin, abdominal wall, and stomach wall.
- Note gas or air escaping through the needle from the stomach to signify a successful attempt. (DO NOT ATTEMPT SECOND INSERTION if first is unsuccessful)
- Apply gentle external pressure to abdominal wall to assist exiting air.
- Remove catheter once air is evacuated.

**Clinical Pearls:**
*Goal is to treat for shock, decompress stomach, and transport for surgical intervention.*

*Monitor for ventricular arrhythmias, persistent shock and recurrent dilation*

*Surgery is REQUIRED for definitive treatment to derotate the stomach.*
MWD Shock Fluid Therapy

The “10-20-10-20 Rule”

Shock Fluid Therapy Protocol of MWDs

- Place multiple large-bore intravenous catheters, perform venous cut-down, and/or place intraosseous (IO) catheters. Provide flow-by supplemental oxygen therapy.

- Give IV or IO crystalloid therapy utilizing the 10-20-10-10 fluid guideline:

  1. Calculate total fluid “shock” volume (90 mL/kg) that might be required.
  2. Collect baseline physiologic and clinical data (mentation, NIBP, HCT, TP, HR, pulse quality, CRT, mucous membrane color).
  3. Give one quarter of the calculated “shock” volume over the first 10 minutes.
  4. Reassess the patient’s pulse quality, CRT, mucous membrane color, heart rate, NIBP, etc.
  5. Give another one quarter of the calculated “shock” volume over the next 10-20 minutes, if necessary.
  6. Reassess baseline data.
  7. If HCT > 20% and TP not below 50% of starting value, and further fluid therapy is required, then give another one quarter of the calculated “shock” volume over 10 minutes.
  8. Reassess baseline data.
  9. If fluid therapy is still required, give the final one quarter of the calculated “shock” volume over 10-20 minutes.

- Give a hydroxyethyl starch (HES) IV or IO bolus of 10-20 mL/kg over 5-10 minutes if clinical signs of shock do not abate after the first 30 minutes (first 2 quarter-shock IV challenges) of crystalloid fluids, or response to crystalloid challenges is not sustained. Repeat this bolus if no response to therapy.

- Give a hypertonic saline (HTS) IV bolus of 4 mL/kg over 5 minutes (if 7-7.5% HTS is available) for MWDs that fail to respond to two or three quarter-shock boluses of crystalloids and/or one or two boluses of HES.

Clinical Pearls:

- Quick calculation for shock dose: Add a zero to the dog’s weight in POUNDS for the quarter shock volume in mLs.
- CAUTION: Human blood products and albumin, or other animal blood products, must never be given to dogs, given the high risk of anaphylactic reactions.
- Blood product transfusions for MWDs are ONLY available from Veterinary Service Support units and their administration is only authorized under the direct supervision of a veterinarian.
- Clinical target for resuscitation end point is a mean arterial pressure (MAP) of > 65 mmHg or a systolic of > 90 mmHg. Neonatal or pediatric blood pressure cuffs must be used.
- Consider TXA 10 mg/kg in 100 mL NS or LRS, IV over 15 min but NOT LATER THAN 3 HOURS post injury.
<table>
<thead>
<tr>
<th>DRUG</th>
<th>STANDARD DOSING</th>
<th>SMALL ADULT (60KG)</th>
<th>ADULT (80KG)</th>
<th>LARGE ADULT (100KG)</th>
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<tbody>
<tr>
<td>Sodium Bicarbonate</td>
<td>1mEq/kg IV/IO</td>
<td>60mEq</td>
<td>80mEq</td>
<td>100mEq</td>
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<td>Labetalol</td>
<td>10-20mg IV/IO over 1-2min</td>
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<tr>
<td>Calcium Chloride (100mg/ml)</td>
<td>Ca Glnonate can also be used, total IV fluid limited to</td>
<td>5-100mg over 2-5 min</td>
<td>2-5mg/kg &gt;10-5min for Beta Blocker OD</td>
<td>1Gram,Elevate Hb,2ml/kg in 15min</td>
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<tr>
<td>Erythropoietin</td>
<td>10-30ml/kg IV/IO</td>
<td></td>
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<tr>
<td>Fenoldipine</td>
<td>2-10mg IV/IO</td>
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<td>Magnesium Sulfate</td>
<td>0.5-1.5g IV/IO</td>
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<td>Maxillar/ Seizure/ Other</td>
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<tr>
<td>Diazepam</td>
<td>Anxiety, 2-10mg IV/ IO q 6hrs</td>
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<td>Lorazepam</td>
<td>0.5-2mg IV/IO</td>
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<tr>
<td>Magnesium Sulfate</td>
<td>0.5-2g IV/IO</td>
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<tr>
<td>Midazolam</td>
<td>1-3mg IM</td>
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<tr>
<td>Remorphan</td>
<td>&lt;20mg/kg IV/IO</td>
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ANTIBIOTIC THERAPY CHART

*Post-injury antimicrobial agents are recommended to prevent early post-traumatic infectious complications, including sepsis, secondary to common bacterial flora. Selection is based on narrowest spectrum and duration required to prevent early infections prior to adequate surgical wound management. This narrow spectrum is selected to avoid selection of resistant bacteria. The antimicrobials listed are not intended for use in established infections, where multidrug-resistant (MDR) or other nosocomial pathogens may be causing infection.

<table>
<thead>
<tr>
<th>Injury</th>
<th>Preferred Agent</th>
<th>Frequency</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Extremity Wounds (Includes Skin, Soft Tissue, and Bone)</td>
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<td></td>
<td></td>
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<tr>
<td>Skin, soft tissue, <strong>without</strong> open fractures</td>
<td>Cefazolin 1-2g Or Ertapenem 1g</td>
<td>q 6-8hrs x 1 dose</td>
<td>24 hours</td>
</tr>
<tr>
<td>Skin, soft tissue, <strong>with</strong> open fractures, exposed bone, or open joints</td>
<td>Cefazolin 1-2g Or Ertapenem 1g</td>
<td>q 6-8hrs x 1 dose</td>
<td>24 hours, then with each subsequent I&amp;D until soft tissue coverage</td>
</tr>
<tr>
<td>Thoracic Wounds</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Penetrating chest injury</td>
<td>Cefazolin 1-2g Or Ertapenem 1g</td>
<td>q 6-8hrs x 1 dose</td>
<td>24 hours</td>
</tr>
<tr>
<td>Penetrating chest injury <strong>with</strong> esophageal disruption</td>
<td>Cefazolin 1-2g PLUS metronidazole 500 mg IV Or Ertapenem 1g</td>
<td>q 6-8hrs q 8-12hrs x 1 dose</td>
<td>Stop 24 hours after definitive closure</td>
</tr>
<tr>
<td>Abdominal Wounds</td>
<td></td>
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<tr>
<td>Penetrating abdominal injury <strong>with</strong> suspected/known hollow viscus injury and soilage; may apply to rectal/perineal injuries as well</td>
<td>Cefazolin 1-2g IV PLUS metronidazole 500 mg IV Or Ertapenem 1g</td>
<td>q 6-8hrs q 8-12hrs x 1 dose</td>
<td>Stop 24 hours after control of contamination</td>
</tr>
<tr>
<td>Maxillofacial And Neck Wound</td>
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<tr>
<td>Open maxillofacial fractures, maxillofacial fractures <strong>with</strong> foreign body or fixation device</td>
<td>Cefazolin 1-2g g Or Ertapenem 1g</td>
<td>q 6-8hrs x 1 dose</td>
<td>24 hours</td>
</tr>
<tr>
<td>Central Nervous System Wounds</td>
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<tr>
<td>Penetrating brain injury</td>
<td>Cefazolin 1-2g IV Or Ertapenem 1g</td>
<td>q 6-8hrs x 1 dose</td>
<td>5 days or until CSF leak is closed, whichever is longer</td>
</tr>
<tr>
<td>Penetrating brain injury <strong>with</strong> gross contamination with organic debris</td>
<td>Cefazolin 1-2g IV; Consider metronidazole 500 mg IV Or Ertapenem 1g</td>
<td>q 6-8hrs q 8-12hrs x 1 dose</td>
<td>5 days or until CSF leak is closed, whichever is longer</td>
</tr>
<tr>
<td>Penetrating spinal cord injury</td>
<td>Cefazolin 1-2g IV Or Ertapenem 1g</td>
<td>q 6-8hrs x 1 dose</td>
<td>5 days or until CSF leak is closed, whichever is longer</td>
</tr>
<tr>
<td>Penetrating spinal cord injury <strong>with</strong> abdominal cavity is involvement</td>
<td>Cefazolin 1-2g IV PLUS metronidazole 500 mg IV Or Ertapenem 1g</td>
<td>q 6-8hrs q 8-12hrs x 1 dose</td>
<td>5 days or until CSF leak is closed, whichever is longer</td>
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<tr>
<td>Eye Wounds</td>
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<tr>
<td>Eye injury, burn or abrasion</td>
<td>Erythromycin ophthalmic ointment Or Bacitracin ophthalmic ointment</td>
<td>q 6hrs or PRN for symptomatic relief</td>
<td>Until epithelium healed. No systemic treatment required</td>
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<td>Eye injury, penetrating</td>
<td>Levofloxacin 750 mg IV/PO PLUS vancomycin 15-20 mg/kg IV Or Moxifloxacin 400 mg IV/PO once daily</td>
<td>q 24 hrs q 8-12hrs</td>
<td>7 days or until evaluated by an ophthalmologist. No topical agents.</td>
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<td>Burns</td>
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<td>Superficial burns</td>
<td>Topical antimicrobials (mafenide acetate or silver sulfadiazine) OR silver impregnated dressing, PLUS excision and grafting</td>
<td>q 24hrs</td>
<td>Until healed</td>
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<tr>
<td>Deep partial thickness burns</td>
<td>Topical antimicrobials (mafenide acetate or silver sulfadiazine) OR silver impregnated dressing, PLUS excision and grafting</td>
<td>q 24hrs</td>
<td>Until healed or grafted</td>
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<tr>
<td>Full thickness burns</td>
<td>Topical antimicrobials PLUS excision and grafting</td>
<td>q 24hrs</td>
<td>Until healed or grafted</td>
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<tr>
<td>Delayed Evacuation to Surgical Care</td>
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<tr>
<td>PO tolerable</td>
<td>Moxifloxacin 400 mg PO x 1 dose. Or Ertapenem 1 g IV/IM</td>
<td>X 1 dose</td>
<td>Single dose therapy</td>
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<tr>
<td>Not PO tolerable</td>
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<td>X 1 dose</td>
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### Fluid volume for Dilution

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<td>15mg/ml</td>
<td>7.5mg/ml</td>
<td>3.75mg/ml</td>
<td>1.875mg/ml</td>
<td>0.9375mg/ml</td>
<td>0.46875mg/ml</td>
<td>0.234375mg/ml</td>
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<td>100mg</td>
<td>20mg/ml</td>
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<td>1mg/ml</td>
<td>0.5mg/ml</td>
<td>0.25mg/ml</td>
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<td>250mg</td>
<td>50mg/ml</td>
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<td>6.25mg/ml</td>
<td>3.125mg/ml</td>
<td>1.5625mg/ml</td>
<td>0.78125mg/ml</td>
<td>0.390625mg/ml</td>
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<td>500mg</td>
<td>100mg/ml</td>
<td>50mg/ml</td>
<td>25mg/ml</td>
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<td>750mg</td>
<td>150mg/ml</td>
<td>75mg/ml</td>
<td>37.5mg/ml</td>
<td>18.75mg/ml</td>
<td>9.375mg/ml</td>
<td>4.6875mg/ml</td>
<td>2.34375mg/ml</td>
<td>1.171875mg/ml</td>
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<td>1Gram</td>
<td>200mg/ml</td>
<td>100mg/ml</td>
<td>50mg/ml</td>
<td>25mg/ml</td>
<td>10mg/ml</td>
<td>5mg/ml</td>
<td>2.5mg/ml</td>
<td>1mg/ml</td>
</tr>
</tbody>
</table>

**Value equals amount of fluid in each ml of dilution**

Each ml of medication diluted into your chosen fluid still counts towards total solution volume (i.e. 1ml of drug + 4ml fluid = 5ml solution; 1ml drug + 9ml fluid = 10ml solution). Small volume medications (1-2ml) are inconsequential above dilutions >50ml.

- 1mg=1000mcg
- 0.1mg=100mcg
- 0.01mg=10mcg
<table>
<thead>
<tr>
<th>Amiodarone</th>
<th>Epinephrine</th>
<th>Etomidate</th>
<th>Fentanyl</th>
<th>Hydromorphone</th>
<th>Ketamine</th>
<th>Lorazepam</th>
<th>Midazolam</th>
<th>Morphine</th>
<th>Norepinephrine</th>
<th>Phenylephrine</th>
<th>Propofol</th>
<th>Rocuronium</th>
<th>Sodium bicarb</th>
<th>Succinylcholine</th>
<th>Vecuronium</th>
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</tbody>
</table>

Y-Site Capability Chart
Vasopressor Priority Chart

<table>
<thead>
<tr>
<th>1°</th>
<th>HYPOVOLEMIC SHOCK</th>
<th>SEPTIC SHOCK</th>
<th>CARDIOGENIC SHOCK</th>
<th>NEUROGENIC SHOCK</th>
<th>BURN SHOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vasopressors are not recommended in the initial stabilization of hypovolemic shock.</td>
<td>Norepinephrine</td>
<td>Norepinephrine</td>
<td>Norepinephrine</td>
<td>Vasopressin</td>
</tr>
<tr>
<td>2°</td>
<td>Vasopressin</td>
<td>Dobutamine</td>
<td>Epinephrine</td>
<td>Norepinephrine</td>
<td></td>
</tr>
<tr>
<td>3°</td>
<td>Norepinephrine</td>
<td>Epinephrine</td>
<td>Epinephrine</td>
<td>Vasopressin</td>
<td>Epinephrine</td>
</tr>
</tbody>
</table>

- Vasopressors should only be initiated with/after adequate resuscitation is provided with crystalloids, colloids, and/or blood products.
- Maintain mean arterial pressure (MAP) 65 mmHg or as needed to achieve adequate end-organ perfusion (e.g. cerebral perfusion pressure, abdominal perfusion pressure, urinary output).

1. In low output Cardiogenic Shock, dobutamine may be initiated in combination with norepinephrine.
2. Due to the physiologic nature of Neurogenic Shock, vasopressors may be initiated earlier to avoid volume overload.
3. Phenylephrine should be avoided in most Neurogenic Shock patients due to unopposed alpha activity that can result in reflex bradycardia; further worsening spinal cord injury (SCI) associated bradycardia.
4. In Burn Shock casualties at risk of burn fluid over-resuscitation (e.g. 250mL/Kg in the 1st 24 hours), a continuous, non-titratable infusion of Vasopressin at 0.04 Units/minute (2.4 Units/hour) may be initiated to avoid volume overload.
MEDICATIONS

MEDICATION, DRUG CARDS

a. General Use
   i. Use as clinically indicated per guideline.

b. Medications, all:
   ii. If carried, these medications are available for use, within the limitations of these guidelines, drug cards, and supervising medical director / physician. These medications may be used during transfer of critical care patients or during point of injury. These medications are available for use on any patient, within the limitations of these guidelines, as clinically indicated, to address acute life-threatening emergencies not accounted for on the transferring physician’s written orders. Some medications utilized during critical care transfer requires written orders and guidance from transferring physician or as directed by unit medical director/supervising physician.

Oxygen

Class: Atmospheric gas.

Mechanism of Action: The essential substrate for cellular respiration.

Duration of action: Onset: immediate. Peak effect: not applicable. Duration: less than 2 minutes.

Indications: All causes of decreased tissue oxygenation and/or decreased level of consciousness. (Confirmed or expected hypoxemia, ischemic chest pain, respiratory, insufficiency, prophylactically during air transport, confirmed or suspected carbon monoxide poisoning). Also provides mechanical work for gas-powered ventilators, if supply and flow rate is sufficient (OBOGS will not work).

Contraindications: Coincidental paraquat inhalation (rare); COPD patients may become hypopneic with high O2 flow rates due to “oxygen baroreceptor respiratory drive (relative contraindication).

Adverse Reactions: Retinopathy of prematurity (prolonged use); potential oxygen toxicity in hyperbaric environments; cerebral vasoconstriction.

Drug Interactions: None

How Supplied: Medical grade Oxygen is 93% O2 (+/- 3%) under United States Pharmacopeia (USP) Standards. USP Standard O2 is supplied through compressed gas cylinders (D cylinder) or continuous flow oxygen generator or concentrator systems.

Dosage and Administration:

• Assure adequate ventilation (spontaneous or supported) coincidental to supplemental oxygen therapy, ideally by end-tidal CO2 measurement (Goal EtCO2 35-45).
• All critically ill and injured transport patients will receive supplemental oxygen to maintain SPO2 of > 93%.
• Administer oxygen 2-6 LPM via nasal cannula.
  o If O2 Saturation remains < 95%, apply non-rebreather face mask with oxygen at 15 LPM.
  o If O2 Saturation remains < 90%, refer to Airway guideline.
• Patient on Ventilator:
  o Adjust ventilator settings based on ventilatory goals for patient: ETCO2, peak pressures, SpO2, and patient clinical condition.
  o Adjust FiO2 to maintain pulse oxygen saturations > 93% / tissue oxygen saturation (STO2) > 70%, if applicable.
• When planning for available O2 during non-pressurized, aeromedical transfer, ensure adequate resources to provide 1.5 to 2 times the ground transport volume of O2 to compensate for increased consumption associated with altitude related physiological impact.
0.9% Sodium Chloride (Normal Saline)

**Class:** Isotonic crystalloid solution.

**Mechanism of Action:** Replaces water and electrolytes.

**Indications:** Hypovolemia, Shock, Heat-related injuries, diabetic ketoacidosis, TKO IV, a diluent of choice for blood product transfusion.

**Contraindications:** Avoid for intravascular volume replacement for hemorrhagic shock due to hemodilution and hyperchloremic metabolic acidosis. Use with caution in patients with known congestive heart failure.

**Adverse Reactions:** Rare

**Drug Interactions:** Few in the pre-hospital emergency setting.

**How Supplied:** 250mL, 500mL, and 1,000mL bags.

**Dosage and Administration:** The specific situation being treated will dictate the rate in which normal saline will be administered. Hypovolemic shock requires rapid bolus (see relevant guidelines). In other cases, it is advisable to administer the fluid at a moderate rate (for example, 100 mL/h).

---

Hypertonic Saline 3% Sodium Chloride

**Class:** Hypertonic crystalloid solution.

**Mechanism of Action:** Replaces water and electrolytes, increases intravascular sodium concentration, may induce diuresis

**Indications:** Refractory elevated intracranial pressure (ICP) due to various etiologies (eg, subarachnoid hemorrhage, neoplasm); traumatic brain injury with elevated ICP: (Can be used in place of mannitol).

**Contraindications:** Do not use in the same line as Blood Products – cause crenation and lysis of RBC. Caution or avoid use in patients with known congestive heart failure and kidney disease.

**Adverse Reactions:** Rare

**Drug Interactions:** Few in the pre-hospital emergency setting.

**How Supplied:** 250mL, 500mL, bags.

**Dosage and Administration:**

- **Dosing (Adult):**
  - **Bolus:** 250mL IV Bolus over 15 min.
  - **Infusion:** 50-100 cc/hr

- **Dosing (Pediatrics):**
  - **Bolus:** 5 cc/kg IV Bolus over 15 min.
  - **Infusion:** 0.5 cc/kg/hr
Ringer’s, Lactate (Lactated Ringers/Hartman’s Solution)
Class: Isotonic crystalloid solution.
Mechanism of Action: Replaces water and electrolytes.
Indications: Hypovolemic shock; keep open IV.
Contraindications: Should not be used in the same line with blood components. Use with caution for intravascular volume replacement for hemorrhagic shock due to hemodilution and exacerbation of coagulopathy. Use with caution in patients with known congestive heart failure and kidney disease. Can cause lactic acidosis.
Adverse Reactions: Rare
Drug Interactions: Few in the pre-hospital emergency setting.
How Supplied: 250mL, 500mL, and 1,000mL bags. IV infusion.
Dosage and Administration: Hypovolemic shock; titrate according to the patient’s physiologic response. (See appropriate Guidelines)

Dextrose 5% in Water (D5W)
Class: Hypotonic dextrose-containing solution.
Mechanism of Action: D5W provides nutrients in the form of dextrose as well as free water.
Indications: IV diluent for certain emergency drugs; for dilution of concentrated drugs for intravenous infusion.
Contraindications: Not for use as fluid replacement for hypovolemic states.
Adverse Reactions: Rare
Drug Interactions: Phenytoin (Dilantin)
How Supplied: Supplied in 50mL, 100mL, 150mL, 250mL, 500mL, and 1,000mL bags.
Dosage and Administration: Normally administered through a mini-drip (60 gtt/mL) set at a rate of “to keep open” (TKO).
**PlasmaLyte A**

**Class:** Isotonic crystalloid solution.

**Mechanism of Action:** Replaces water and electrolytes.

**Indications:** Hypovolemic shock; compatible with blood or blood components. It may be administered before or following the infusion of blood through the same administration set (i.e., as a priming solution), added to or infused concurrently with blood components, or used as a diluent in the transfusion of packed erythrocytes. PLASMALYTE A and 0.9% Sodium Chloride Injection are equally compatible with blood or blood components.

**Contraindications:** Use with caution for intravascular volume replacement for hemorrhagic shock due to hemodilution and exacerbation of coagulopathy. Use with caution in patients with known congestive heart failure and kidney disease. Excess administration may result in metabolic alkalosis.

**Adverse Reactions:** Rare

**Drug Interactions:** Few in the pre-hospital emergency setting.

**How Supplied:** 500mL, and 1,000mL bags IV infusion.

**Dosage and Administration:** Hypovolemic shock; titrate according to the patient’s physiologic response. (See appropriate Guidelines)
# ACETAMINOPHEN

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesic</td>
</tr>
<tr>
<td>Blocks cyclooxygenase (COX 1 and 2) enzymes, resulting in reduced formation of prostaglandin precursors. Blocks formation of prostaglandin derivative, thromboxane A2, resulting in inhibited platelet aggregation. Has antipyretic, analgesic, and anti-inflammatory properties.</td>
</tr>
</tbody>
</table>

## Indications

**Labeled Indications:** Treatment of mild to moderate pain and fever, Treatment of moderate to severe pain when provided via IV with opioid analgesia

## Contraindications

- Hypersensitivity to acetaminophen or any component of the formulation
- Hepatic impairment or liver disease

## Adverse Reactions / Precautions

- Use IV form cautiously in volume depleted patients
- Avoid use in patient suffering alcohol toxicity, known alcohol abuse, or renal impairment
- IV form can cause nausea and vomiting (especially in adults), headache

## Dose and Administration:

### ADULT

<table>
<thead>
<tr>
<th>Pain or fever:</th>
<th>(Limit total daily dose to &lt;4 g/day) PO:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular release: 325-650 mg every 4-6 hours or 1000 mg 3-4 times daily (maximum: 4 g daily)</td>
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</tbody>
</table>

### RECTAL:

| 325-650 mg every 4-6 hours or 1000 mg 3-4 times daily (maximum: 4 g daily) |

### IV:

- <50 kg: 15 mg/kg every 6 hours
  - Max single dose: 15 mg/kg/dose (750 mg/dose)
  - Max daily dose: 75 mg/kg/day (≤3.75 g daily)
- ≥50 kg: 1000 mg every 6 hours
  - Max single dose: 1000 mg/dose

### PEDIATRIC

#### Always Reference BROSELOW Tape

<table>
<thead>
<tr>
<th>Pain or fever: Children ≥12 years &amp; Adolescents: Refer to adult dosing PO:</th>
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</thead>
<tbody>
<tr>
<td>Infants and Children &lt;12 years: 10-15 mg/kg/dose every 4-6 hours as needed; do not exceed 5 doses (2.6 g) in 24 hours</td>
</tr>
</tbody>
</table>

#### RECTAL:

| Infants and Children <12 years: 10-20 mg/kg/dose every 4-6 hours as needed; do not exceed 5 doses (2.6 g) in 24 hours. |

#### IV:

<table>
<thead>
<tr>
<th>Children 2-12 years: 15 mg/kg every 6 hours or 12.5 mg/kg every 4 hours</th>
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</thead>
<tbody>
<tr>
<td>Max single dose: 15 mg/kg/dose (≤750 mg/dose)</td>
</tr>
<tr>
<td>Max daily dose: 75 mg/kg/day (≤3.75 g daily)</td>
</tr>
</tbody>
</table>
**ACETAZOLAMIDE**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Diuretic, Carbonic Anhydrase Inhibitor; Anticonvulsant</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Inhibits carbonic anhydrase causing a decrease in hydrogen ion renal secretion with increased renal secretion of sodium, potassium, bicarbonate, and water. Onset of action PO: 2 hours, IV 5-10 minutes</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
<th>Labeled Indications:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prevention or treatment of symptoms of acute mountain sickness</td>
</tr>
<tr>
<td></td>
<td>Edema due to congestive heart failure</td>
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</tbody>
</table>

| Contraindications            | Hypersensitivity to acetazolamide, sulfonamides, or any component of the formulation |
|------------------------------| Confirmed low sodium / potassium levels otherwise none in emergency setting |

| Adverse Reactions / Precautions | May worsen respiratory acidosis |
|---------------------------------| Drowsiness, deceased alertness, impairment of coordination, nausea, headache |
|                                 | Flushing of skin, allergic skin reaction, skin photosensitivity |

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC Always Reference LB tape</th>
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<tbody>
<tr>
<td><strong>Altitude illness (Acute Mountain Sickness):</strong></td>
<td></td>
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<tr>
<td>PO:</td>
<td></td>
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<tr>
<td>125-250 mg twice daily.</td>
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<tr>
<td><strong>Note:</strong> For high altitude cerebral edema (HACE), dexamethasone is the primary treatment; however, acetazolamide can be used (together with dexamethasone) at the AMS dose.</td>
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<tr>
<td><strong>Edema</strong> (Only with referring doctor or medical director instruction):</td>
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<tr>
<td>PO, IV:</td>
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<tr>
<td>250-375 mg once daily.</td>
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| **Altitude illness (Acute Mountain Sickness):** | | |
| PO: (IM not recommended due to alkaline pH) | | |
| 2.5 mg/kg/dose every 8-12 hours | | |
| o MAX dose 250mg/dose. | | |

**Note:** For high altitude cerebral edema (HACE), dexamethasone is the primary treatment; however, acetazolamide can be used (together with dexamethasone) at the AMS dose.
### ACETYSALICYLIC ACID

<table>
<thead>
<tr>
<th>Trade Name: Aspirin</th>
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</table>

### Class / Mechanism of Action

**Nonsteroidal Anti-inflammatory Drug (NSAID)**

Blocks cyclooxygenase (COX 1 and 2) enzymes, resulting in reduced formation of prostaglandin precursors. Blocks formation of prostaglandin derivative, thromboxane A2, resulting in inhibited platelet aggregation. Has antipyretic, analgesic, and anti-inflammatory properties.

### Indications

**Labeled Indications:** Treatment of acute coronary syndromes (ST-elevation MI, non-ST-elevation MI, unstable angina), acute ischemic stroke, and transient ischemic episodes.

### Contraindications

- Hypersensitivity to salicylates, other NSAIDs, or any component of the formulation
- Asthma, Rhinitis
- Inherited or acquired bleeding disorders (including factor VII and factor IX deficiency)
- Do not use in children less than 16 years old (Reye’s syndrome)

### Adverse Reactions / Precautions

- Not for use on trauma patients in the combat environment.
- Risk of bleeding: Avoid use in patients with known or suspected: Bleeding disorders, GI Bleed, GI Ulcers, patients taking Coumadin, or within 24hrs of taking Alteplase (tPA) for suspected stroke

### Dose and Administration:

<table>
<thead>
<tr>
<th>ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
</table>

**Acute coronary syndrome (ST-segment elevation myocardial infarction [STEMI], unstable angina (UA)/non-ST-segment elevation myocardial infarction [NSTEMI]):** (Not for use in trauma patients).

**PO:**

- **324 mg** (chew nonenteric-coated aspirin as a single 325 mg tablet or 4 X 81 mg tablets)

**N/A:**

Contraindicated in children under 16 yrs (Reye’s Syndrome)
**ACTIVATED CHARCOAL**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Antidote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe, Lactation Safe</td>
<td>Non-absorbable agent that absorbs toxins within the GI tract inhibiting GI absorption.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled Indications: Management of suspected or known poisonings when gastrointestinal decontamination is an option.</td>
</tr>
<tr>
<td>• Decontamination within 1 hour of ingestion of toxic substance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Presence of intestinal obstruction or GI tract not anatomically intact</td>
</tr>
<tr>
<td>• Patients at risk of GI hemorrhage or perforation</td>
</tr>
<tr>
<td>• Patients with an unprotected airway (e.g., CNS depression without intubation) or if use would increase the risk and severity of aspiration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• If patient unconscious, must establish airway control and must utilized NG/OG tube.</td>
</tr>
<tr>
<td>• Be prepared for possible emesis. Consider use of antiemetic.</td>
</tr>
<tr>
<td>• Avoid use in patients at risk of GI hemorrhage or perforation</td>
</tr>
</tbody>
</table>

**Dose and Administration:**

<table>
<thead>
<tr>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute Poisoning:</strong></td>
<td><strong>Always Reference BROSELOW Tape</strong></td>
</tr>
<tr>
<td>PO, NG/OG:</td>
<td>PO, NG/OG:</td>
</tr>
<tr>
<td>• Single dose: <strong>50 grams</strong></td>
<td>• Single dose: <strong>1 gram/kg</strong></td>
</tr>
<tr>
<td>• Multidose: After initial <strong>50 gram</strong> dose, follow with <strong>25 grams</strong> every 2 hours</td>
<td>• Multidose: Initial dose: <strong>1Gram/kg</strong> initially, followed by multiple doses of <strong>0.5 Gram/kg</strong> every 2 hours</td>
</tr>
</tbody>
</table>

**Note:** Activated Charcoal has limited efficacy if not utilized within 1 hour of toxin ingestion. Risk-benefit of charcoal must seriously be considered because it does not work for all poisons, it must be given early when the poison is still in the stomach, it does not fully bind all poisons, and serious complications can occur with aspiration. Aspiration can occur if deteriorating mental status and/or vomiting.

**Note:** Some products may contain sorbitol. Co-administration of a cathartic, including sorbitol, is no longer recommended.

**Note:** Activated Charcoal has limited efficacy if not utilized within 1 hour of toxin ingestion.
**ADENOSINE**  
ucceeded Yes (Caution)  
Trade Name: Adenocard®

### Class / Mechanism of Action

**Antiarrhythmic Agent**
- Slows conduction time through the AV node, inhibits re-entry pathways through the AV node, restoring normal sinus rhythm. The half-life of under 10 seconds allows for rapid repeat dosing.

### Indications

**Labeled Indications:** Paroxysmal supraventricular tachycardia (PSVT) when clinically advisable, vagal maneuvers should be attempted first; not effective for conversion of atrial fibrillation, atrial flutter, or ventricular tachycardia.

**Unlabeled:** ALS/PALS Guidelines (2020): Stable, narrow-complex regular tachycardias; unstable narrow-complex regular tachycardias while preparations are made for synchronized direct-current cardioversion; stable regular monomorphic, wide-complex tachycardia as a therapeutic (if SVT) and diagnostic maneuver.

### Contraindications

- Hypersensitivity to adenosine or any component of the formulation
- Second- or third-degree AV block, sick sinus syndrome, or symptomatic bradycardia (except in patients with a functioning artificial pacemaker)
- Use in patients with atrial fibrillation/flutter with underlying Wolff-Parkinson-White (WPW) syndrome (Fuster, 2006); asthma (ALS, 2020)
- Known or suspected bronchoconstrictive (Asthma) or bronchospastic lung disease.

### Adverse Reactions / Precautions

- May cause transient asystole and new arrhythmia after cardioversion (PACs, AF, PVCs) chest discomfort
- Headache, Dizziness, Flushing, GI upset
- Dyspnea, Bronchospasm in asthmatics

### Dose and Administration:

**Paroxysmal supraventricular tachycardia:**
- I.V. (rapid push, over 1-2 seconds, via proximal peripheral line (forearm or above, large bore).
- Initial: 6 mg; if not effective within 1-2 minutes, 12 mg may be given if needed (maximum single dose: 12 mg).

**Notes:** Follow each dose with 20 mL normal saline flush.

**Note:** Initial dose of adenosine should be reduced to 3 mg if patient is currently receiving carbamazepine or dipyridamole, has a transplanted heart or if adenosine is administered via central line (ALS, 2020).

**Note:** Adenosine effects are antagonized by caffeine and theophylline, and patients may require higher doses.

**Paroxysmal supraventricular tachycardia:**
- IV/IO as close to core as possible (rapid push, over 1-2 seconds, see Note): Follow each dose with 10-20 mL normal saline flush.
- Initial: 0.1 mg/kg (maximum initial dose: 6 mg); if not effective within 1-2 minutes, administer 0.2 mg/kg (maximum single dose: 12 mg). Follow each dose with 5-10 mL normal saline flush.
<table>
<thead>
<tr>
<th><strong>ALBUTEROL</strong></th>
<th>♀♂, Lactation Yes</th>
<th>Trade Name: Proventil / Ventolin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class / Mechanism of Action</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta₂ Agonist (Bronchodilator)</td>
<td>Synthetic sympathomimetic that relaxes bronchial smooth muscle, causing bronchodilation, with little cardiac impact. Onset of action is 2-15 minutes</td>
<td></td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labeled Indications: Treatment or prevention of bronchospasm in patients with reversible obstructive airway disease; prevention of exercise-induced bronchospasm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Asthma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reactive Airway / Bronchospasm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• COPD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• May also be used in Crush Syndrome (Hyperkalemia)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hypersensitivity to albuterol or any component of the formulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Symptomatic tachycardia</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adverse Reactions / Precautions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Risk of abortion during 1st or 2nd trimester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Headache, Dizziness, Flushing, Diaphoresis, Tremor, Weakness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Angina, A-Fib, Arrhythmia, Chest Pain, Palpitations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dyspnea, Bronchospasm in asthmatics</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dose and Administration:</strong></td>
<td><strong>ADULT</strong></td>
<td><strong>PEDIATRIC</strong></td>
</tr>
<tr>
<td><strong>Bronchospasm:</strong></td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>Metered-dose inhaler (90 mcg/puff):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2 puffs every 4-6 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solution for nebulization:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2.5 mg 3-4 times daily as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exacerbation of asthma (acute, severe):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metered-dose inhaler:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 4-8 puffs every 20 minutes for up to 4 hours, then every 1-4 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solution for nebulization:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2.5-5 mg every 20 minutes for 3 doses, then 2.5-10 mg every 1-4 hours as needed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bronchospasm:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metered-dose inhaler (90 mcg/puff):</td>
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</tr>
<tr>
<td>• 4-8 puffs every 4-6 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solution for nebulization:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Children ≤4 years: 2.5 mg every 4-6 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Children ≥5 years: 2.5-5 mg every 4-8 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Children ≥12 years: Refer to adult dosing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exacerbation of asthma (acute, severe):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metered-dose inhaler (90 mcg/puff):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Children &lt;12 years: 4-8 puffs every 20 minutes for 3 doses, then every 1-4 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Children ≥12 years: Refer to adult dosing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Solution for nebulization:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Children &lt;12 years: 0.15 mg/kg (minimum: 2.5 mg) every 20 minutes for 3 doses, then 0.15-0.3 mg/kg (maximum: 10 mg) every 1-4 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Children ≥12 years: Refer to adult dosing.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### AMIODARONE

**Class / Mechanism of Action**

**Antiarrhythmic Agent, Class III**

Inhibits adrenergic stimulation (alpha and beta blocking), prolongs action potential and refractory period (prolongs PR and QT intervals); decreases AV conduction and sinus node function (decreases sinus rate)

### Indications

**Labeled Indications:** Management of life-threatening recurrent ventricular fibrillation (VF) or hemodynamically unstable ventricular tachycardia (VT) refractory to other antiarrhythmic agents

**Unlabeled:**
- Recurrent, hemodynamically unstable VT. (after other drugs have failed)
- Ventricular tachyarrhythmias (ACLS/PALS 2015): VF/VT Cardiac arrest unresponsive to CPR, Shock, and Vasopressor.

### Contraindications

- Hypersensitivity to amiodarone, iodine, or any component of the formulation
- Severe sinus-node dysfunction
- 2nd and 3rd degree heart block (except in patients with a functioning artificial pacemaker)
- Bradycardia causing syncope (except in patients with a functioning artificial pacemaker)
- Cardiogenic shock

### Adverse Reactions / Precautions

- Complex drug with multiple complex drug reactions! (Do not administer with procainamide)
- Hypotension
- Dizziness, fatigue, Headache, Poor coordination, Neuropathy
- Nausea, Vomiting
- Dysrhythmias, Asystole, AF, Bradycardia, AV block, Conduction abnormalities, SA node dysfunction

### Dose and Administration:

<table>
<thead>
<tr>
<th><strong>Pulseless VT or VF</strong> (ACLS, 2015):</th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong> Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV/IO push</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 300 mg rapid bolus; should be diluted in 30 mL of NS, PlasmaLyte, or D5W; if pulseless VT or VF continues after subsequent defibrillation attempt or recurs, administer <strong>supplemental dose of 150 mg</strong>.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recurrent, Hemodynamically unstable VT**

(ACLS, 2015):

**Initial Dose:**

**IV/IO slow push**

- 150mg IV over 1st 10 minutes (15mg per minute) dilute in 100 ml of NS, PlasmaLyte, or D5W (concentration 1.5mg/ml).
- May repeat **150 mg** every 10 minutes PRN if VT recurs

**Maintenance Infusion following initial dosing:**

- 360 mg over 6 hours (1 mg/ min) dilute in 500ml of NS, PlasmaLyte, or D5W (concentration 0.72 mg/ml).

---

<table>
<thead>
<tr>
<th><strong>Pulseless VT or VF</strong> (PALS, 2015):</th>
<th><strong>IV/IO push</strong></th>
<th><strong>Pediatric</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>5mg/kg</strong> IV bolus during cardiac arrest, May repeat twice for refractory VF/pulseless VT.</td>
<td>Max single dose: 300mg</td>
<td></td>
</tr>
<tr>
<td>• Max single dose: 300mg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Tachycardia with Pulse and poor perfusion, or symptomatic with adequate perfusion**

(PALS, 2015):

**IV/IO push**

- Loading dose: **5mg/kg** over 20 to 60 minutes (Fast push or bolus can precipitate cardiac failure!)
- Can repeat two times (max dose: 15 mg/kg in 24 hrs)
- Max single dose: 300mg
### AMIODARONE

**Initial Dose: 15mg/min over 10 min (150mg over 10min)**

<table>
<thead>
<tr>
<th>Dose (mg/min)</th>
<th>Rate (mL/min)</th>
<th>Micro (gtt/min)</th>
<th>Macro (gtt/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>10</td>
<td>600</td>
<td>200</td>
</tr>
</tbody>
</table>

Macro-Drip (10gtt/ml) is set of choice for this infusion

Set rate provides complete initial infusion of 150mg over 10 minutes. May repeat Q 10 min PRN if VT recurs

**Maint Dose: 1mg/min over 6 hrs (360mg over 360min)**

<table>
<thead>
<tr>
<th>Dose (mg/min)</th>
<th>Rate (mL/min)</th>
<th>Micro (gtt/min)</th>
<th>Macro (gtt/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.4</td>
<td>84</td>
<td>28</td>
</tr>
</tbody>
</table>

Macro-Drip (20gtt/ml) is set of choice for this infusion

Set rate provides maintenance infusion of 360mg over 6hrs.
**ATROPINE Sulfate**, Lactation: Yes, Use Caution  
Trade Name: AtroPen

### Class / Mechanism of Action
**Anticholinergic, Antidysrhythmic, Antidote for Carbamate Anticholinesterase poisoning**  
Blocks acetylcholine at parasympathetic sites in smooth muscle, secretory glands, and the CNS;  
increases cardiac output, and dries secretions. Atropine reverses the muscarinic effects of cholinergic poisoning. Reverses bronchorrhea and bronchoconstriction, but does not affect the nicotinic receptors responsible for muscle weakness, fasciculations, and paralysis.

### Indications
**Labeled Indications:** Treatment of  
- Symptomatic Sinus Bradycardia, AV block (nodal level)  
- Antidote for anticholinesterase poisoning (carbamate insecticides, nerve agents, organophosphate insecticides)

### Contraindications
- Hypersensitivity to atropine or any component of the formulation  
- Narrow-angle glaucoma; adhesions between the iris and lens (ophthalmic product)  
- Pyloric stenosis  
- Prostatic hypertrophy  
- **Note:** NO contraindications should prevent use of atropine in setting of life threatening organophosphate, carbamate, or nerve agent poisoning

### Adverse Reactions / Precautions
- Tachycardia and arrhythmia (VTach, VFib), Hypotension, Palpitations  
- Dilated Pupils, Angle-closure glaucoma  
- Headache, Dry Mouth, constipation, urinary retention, flushing  
- **Paradoxical Bradycardia** noted with doses less than 0.1mg

### Dose and Administration:  
**ADULT**  
**PEDIATRIC** Always Reference BROSELOW Tape

#### Symptomatic Bradycardia
**IV/IO**
- 1 mg every 3-5 minutes, not to exceed a total of 3 mg or 0.04 mg/kg (ARC, 2020)

**Organophosphate or carbamate insecticide or nerve agent poisoning:**
**IV/IM:** (Used with 2-Pam Chloride auto injector)
- **Initial:** 1-6 mg; repeat every 3-5 minutes as needed, doubling the dose if previous dose did not induce atropinization. Maintain with repeat doses as needed for ≥ 2-12 hours based on recurrence of symptoms.
- **IM (AtroPen®):** anterolateral aspect of thigh and hold in place for 10 seconds. Follow with 2-Pam Chloride auto injector.
- Mild symptoms (≥2 mild symptoms); 2 mg once an exposure is known or strongly suspected.
- Severe symptoms (≥1 severe symptom): **Three** 2 mg doses in rapid succession.  
Mild and Severe Symptoms are noted on product labeling and Pralidoxime Chloride drug card.

#### Symptomatic Bradycardia
**IV/IO**
- **0.02 mg/kg** (Minimum dose is 0.1 mg. Maximum single dose of 0.5 mg. May repeat once in 3-5 minutes. Maximum total dose is 1 mg (PALS, 2020)

**Organophosphate or carbamate insecticide:**
- **IV/IO:** Initial: **0.05-0.1 mg/kg**; repeat every 5-10 minutes as needed, double dose if previous dose does not induce atropinization. Maintain with repeat doses as needed for ≥2-12 hours based on recurrence of symptoms.

#### Severe Nerve Agent Poisoning:
- **IV/IO** 1mg every 3 min. Monitor Patient for signs and symptoms of atropinization, (drying up of secretions). Once clinical improvement is achieved restrict to 10-20% of original dose (approximately 2-4mg/hr)
## CALCIUM Chloride 10%  Safe, Lactation Safe

### Class / Mechanism of Action

**Calcium Salt, Electrolyte Supplement**

Moderates nerve and muscle contractility via action potential excitation threshold regulation.

### Indications

**Labeled Indications:** Treatment of hypocalcemia and conditions secondary to hypocalcemia (e.g., tetany, seizures, arrhythmias); emergent treatment of severe hypermagnesemia; massive transfusion prophylaxis

**Unlabeled:** Calcium channel blocker overdose; beta-blocker overdose (refractory to glucagon and high-dose vasopressors); severe hyperkalemia (K+ >6.5 mEq/L with toxic ECG changes) [ALS guidelines]; malignant arrhythmias (including cardiac arrest) associated with hypermagnesemia [ALS guidelines]

### Contraindications

- Known or suspected digoxin toxicity
- Not recommended as routine treatment in cardiac arrest (includes asystole, ventricular fibrillation, pulseless ventricular tachycardia, or pulseless electrical activity)
- Hypercalcemia

### Adverse Reactions / Precautions

- Hypokalemia: Use with caution in patients with severe hypokalemia. Acute rises in calcium can cause life-threatening arrhythmias
- Rapid push can cause: Arrhythmia, bradycardia, cardiac arrest, hypotension, syncope, vasodilation
- **Use small IV / Large Vein, flush prior and after, AVOID Extravasation** (will cause tissue necrosis)
  - In general, IV Calcium Gluconate is preferred over IV Calcium Chloride in nonemergency settings due to the potential for extravasation with calcium chloride
- **Do not infuse calcium chloride in the same I.V. line as phosphate-containing solutions.**
- Precipitates with NaHCO₃ in IV Bag/Tubing

### Dose and Administration:

<table>
<thead>
<tr>
<th>Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO, SLOW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-1000 mg over 2-5 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Beta-blocker overdose, refractory to glucagon and high-dose vasopressors (unlabeled use):**

<table>
<thead>
<tr>
<th>IV/IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mg/kg over 5-10 minutes followed by an infusion of 20 mg/kg/hour titrated to adequate hemodynamic response</td>
</tr>
</tbody>
</table>

**Calcium channel blocker overdose (unlabeled use) (CaCl preferred over Calcium Gluconate for this use):**

<table>
<thead>
<tr>
<th>IV/IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial: 1000mg over 5 minutes; may repeat every 10-20 minutes with 3-4 additional doses; or a continuous infusion of 2-6 grams/hour may be initiated</td>
</tr>
</tbody>
</table>

**Hypocalcemia prophylaxis from massive transfusion**

<table>
<thead>
<tr>
<th>10ml (10cc) 10% solution over 5 minutes</th>
</tr>
</thead>
</table>

**Damage Control Resuscitation:**

<table>
<thead>
<tr>
<th>IV/IO, SLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 mg after 1st blood unit and after every 4th unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO, SLOW</td>
</tr>
<tr>
<td>20 mg/kg (maximum: 2000 mg/dose); may repeat as necessary</td>
</tr>
</tbody>
</table>

**Calcium channel blocker overdose (unlabeled use):**

<table>
<thead>
<tr>
<th>IV/IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial: 20 mg/kg (0.2ml/kg) (maximum: 1000 mg/dose) over 10-15 minutes; may repeat every 10-15 minutes</td>
</tr>
</tbody>
</table>

**Note:** **Adult and Pediatric** dosages are expressed in terms of the calcium chloride salt based on a solution concentration of 100 mg/mL (10%) containing 1.4 mEq (27 mg)/mL elemental calcium. (1gram = 10cc of a 10% solution)

**Note:** Calcium Chloride is 3X more potent than Calcium Gluconate and therefore lower doses of Calcium Chloride must be used to reach similar therapeutic doses.
**CALCIUM Gluconate**  
*Safe, Lactation Safe*

### Class / Mechanism of Action
**Calcium Salt, Electrolyte Supplement**  
Moderates nerve and muscle contractility via regulation of action potential excitation threshold.

### Indications
**Labeled Indications:** Treatment of hypocalcemia and conditions secondary to hypocalcemia (e.g. tetany, seizures, arrhythmias); cardiac disturbances secondary to hyperkalemia; magnesium sulfate overdose; massive transfusion prophylaxis  
**Unlabeled:** Calcium channel blocker overdose; treatment of hydrofluoric acid exposure

### Contraindications
- Ventricular fibrillation  
- Hypercalcemia  
- Concomitant use of IV calcium gluconate and ceftriaxone in neonates (risk of precipitation of calcium-ceftriaxone)

### Adverse Reactions / Precautions
- Hypokalemia: Use with caution in patients with severe hypokalemia. Acute rises in calcium can cause life-threatening arrhythmias  
- Rapid push can cause: Arrhythmia, bradycardia, cardiac arrest, hypotension, syncope, vasodilation  
  - Do not exceed 200mg/min except in emergency situations  
- Caution in patients receiving digoxin therapy, may cause arrhythmias  
- **Use small IV / Large Vein, flush prior and after, AVOID extravasation** (will cause tissue necrosis)  
  - In general, IV Calcium Gluconate is preferred over I.V. calcium chloride in nonemergency settings due to the potential for extravasation with calcium chloride  
- **Do not infuse calcium chloride in the same I.V. line as phosphate-containing solutions.**
- Precipitates with NaHCO₃ in IV Bag/Tubing

### Dose and Administration:

<table>
<thead>
<tr>
<th><strong>Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO, SLOW</td>
</tr>
<tr>
<td>1500-3000mg over 2-5 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Calcium channel blocker overdose (off-label use): Hypotension/conduction disturbances:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO</td>
</tr>
<tr>
<td>3 Grams (3000mg) over 5 minutes; may repeat every 10-20 minutes with 3-4 additional doses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Hypocalcemia prophylaxis from massive transfusion</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>30mL of 10% solution over 5 minutes</td>
</tr>
<tr>
<td><strong>Note:</strong> Calcium Chloride is 3X more potent than Calcium Gluconate and therefore higher doses of Calcium Gluconate must be used to reach similar therapeutic doses.</td>
</tr>
</tbody>
</table>

| **Hydrofluoric Acid Exposure**  
*— (off-label, see Burn SMOG)* |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Topical therapy: After thorough irrigation, a CaGlu gel (75mL KY Jelly + 25mL 10% CaGlu) can be made and applied to the affected area, left on for 30 minutes, cleaned off, and repeated every 4 hours. Assess for pain relief and monitor EKG. (NO Calcium Chloride!)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong> Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:</strong></td>
<td><strong>Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:</strong></td>
</tr>
<tr>
<td>IV/IO, SLOW</td>
<td>IV/IO, SLOW</td>
</tr>
</tbody>
</table>
| 1500-3000mg over 2-5 minutes | 60-100 mg/kg/dose (maximum: 3000 mg/dose)  
  - 45 mg/kg (maximum 3000mg/dose) over 10-15 minutes; may repeat every 10-15 minutes |

<table>
<thead>
<tr>
<th><strong>Calcium channel blocker overdose (unlabeled use): Hypotension/conduction disturbances:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO</td>
</tr>
<tr>
<td>45 mg/kg (maximum 3000mg/dose) over 10-15 minutes; may repeat every 10-15 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Hypocalcemia prophylaxis from massive transfusion</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>60mg/kg (maximum 30mL of 10% solution) over 5 minutes</td>
</tr>
<tr>
<td><strong>Note:</strong> Calcium chloride may provide a more rapid increase of ionized calcium in critically ill children.</td>
</tr>
</tbody>
</table>
# CEFAZOLIN

**Class / Mechanism of Action**

Antibiotic (Cephalosporin 1st Gen)
Bacteriocidal - Inhibits bacterial cell wall synthesis by binding to one or more of penicillin-binding proteins which inhibits cell wall biosynthesis, causing bacteria to eventually lyse.

**Indications**

Labeled Indications: Used for infection control prophylaxis for traumatic open injuries and surgical prophylaxis.

**Contraindications**

- Hypersensitivity to cefazolin, other cephalosporin antibiotics, other beta-lactams, or any component of the formulation
- Some cross reactions occur in those with penicillin allergies. Use with caution.

**Adverse Reactions / Precautions**

- Superinfection – prolonged use may result in fungal or bacterial superinfection (including C.Difficile)
- Increased INR (bleeding risk) – especially in nutritionally-deficient, hepatic/renal disease, prolonged treatment

**Dose and Administration:**

<table>
<thead>
<tr>
<th>Class</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routine dosing may be based on body mass:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1g if weight &lt;80kg</td>
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<td></td>
</tr>
<tr>
<td>2g if weight 81-160 kg (177-352 lbs),</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3g if weight &gt; 160 kg (&gt;352 lbs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max dose is 12g per day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

War wounds (dirty wounds), 2g in 250 mL NS IV over 5 min every 8 hours for 24 hours is adequate for most dirty wounds of the head and neck, torso, and extremities.

IV:

- 1-2g every 6-8hrs
  - Max daily dose: 12 g/day

<table>
<thead>
<tr>
<th>Class</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV: Pediatrics:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30 mg/kg IV q6-8h (maximum, 100 mg/kg/day)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
  - Max daily dose: 100 mg/kg/day

**Trade Name:** Ancef

Lactation: Yes
### DEXAMETHASONE

**Gender:** ♀

**Lactation:** (?Not Recommended)

**Trade Name:** Decadron

#### Class / Mechanism of Action

Systemic Corticosteroid  
Anti-inflammatory, Immunosuppressant  
Onset of action, IV: Prompt; Duration IV: 72 hours

#### Indications

**Labeled Indications:**
- Anti-inflammatory or immunosuppressant in treatment of a variety of diseases: allergic, dermatologic, endocrine, hematologic, inflammatory, neoplastic, renal, respiratory, rheumatic, and autoimmune
- Management if cerebral edema

**Unlabeled:**
- Treatment of acute mountain sickness (AMS) and high altitude cerebral edema.

#### Contraindications

- Hypersensitivity to dexamethasone or any component of the formulation
- Systemic fungal infection, cerebral malaria

#### Adverse Reactions / Precautions

- Not for use in treatment of head injury; increased mortality has occurred in head injury patients treated with high dose IV methylprednisolone. Corticosteroids should not be used in head injuries.

#### Dose and Administration:

<table>
<thead>
<tr>
<th><strong>Acute mountain sickness (AMS)/high altitude cerebral edema (HACE) (unlabeled use):</strong></th>
<th><strong>PO, IM, IV:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMS:</strong> 4 mg every 6 hours</td>
<td><strong>HACE:</strong> 8 mg as a single dose; followed with: 4 mg every 6 hours until symptoms resolve</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PO, IM, IV:</strong></th>
<th><strong>0.15 mg/kg/dose</strong> every 6 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute mountain sickness (AMS)/high altitude cerebral edema (HACE) (unlabeled use):</strong></td>
<td><strong>consider use in high altitude pulmonary edema because of associated HACE with pulmonary edema</strong></td>
</tr>
</tbody>
</table>

### MEDICATIONS
**DEXTROSE 50%**  
**Trade Name: Glutose / B-D Glucose**

### Class / Mechanism of Action

**Antidote, Hypoglycemia**  
Basic source of calories (fuel) for the body and brain, regulated by insulin. Rapidly increases blood glucose, decreases protein and nitrogen loss, preventing ketosis, and promotes glycogen deposition in liver.

Onset of action: Treatment of hypoglycemia  
Oral dose: 10 minutes  
Maximum effect: Treatment of Hyperkalemia  
IV: 30 minutes

### Indications

**Labeled Indications:** Treatment of:
- Hypoglycemia: Doses may be repeated in severe cases
- Hyperkalemia: (Must be used in combination WITH Insulin)

### Contraindications

- Known Hyperglycemia, otherwise None in the Pre-hospital setting

### Adverse Reactions / Precautions

Most adverse effects associated with excessive dose or infusion rate
- If evidence of malnutrition or alcohol abuse, thiamine should be given 1st
- **Tissue Necrosis if Extravasation occurs;** immediately D/C and change IV site
- Hyperglycemia
- Hypokalemia
- Hyponatremia

### Dose and Administration: ADULT  
**PEDIATRIC** Always Reference BROSELOW Tape

#### Hypoglycemia:

**Oral:**
- **4-20 g** as a single dose; may repeat if necessary

**IV:**
- **10-25 g** (40-100 mL of 25% solution or 20-50 mL of 50% solution)

**Note:** Society of Critical Care Medicine recommends: Treat blood glucose <70 mg/dL (<100 mg/dL in patients with neurologic injury) immediately by stopping insulin therapy (if receiving) and administering 10-20 g (20-40 mL of 50% solution) IV; repeat blood glucose measurement in 15 minutes with repeat dextrose as needed; **avoiding overcorrection.**

#### Hypoglycemia:

**Oral:**
- **4-20 g** as a single dose; may repeat if necessary

**IV:**
- Newborns: **5ml/kg D10** (Max 25 G/dose)
- Infants and Children: **2ml/kg D25** (Max 25 G/dose)
- Adolescents: Refer to adult dosing

**Note:**
- **D25** = 25ml NS + 25ml D50 (12.5g in 50ml's solution)
- **D10** = 100ml NS + 25ml D50 (12.5g in 125ml's solution) or 40ml NS + 10ml D50 (5g in 50ml's solution)
## DIAZEPAM

**Female, Lactation Yes (Unsafe)**

**Trade Name:** Valium

### Class / Mechanism of Action

**Benzodiazepine:**
Acts as an Anxiolytic/Hypnotic, anticonvulsant and sedative – Long Half Life (25-100hrs)

*Onset of action: IV, Almost Immediate
Duration: IV, 20-30 minutes*

### Indications

#### Labeled Indications:
- Anxiety Disorders
- Convulsive Disorders and Alcohol Withdrawal Symptoms
- Skeletal Muscle Relaxant
- Induce Sedation and Amnesia (Midazolam is primary medication)

### Contraindications

- Hypersensitivity to diazepam or any component of the formulation or other benzodiazepines
- Acute narrow angle glaucoma, Acute Alcohol Intoxication
- Respiratory Insufficiency/Depression *(Overdose Reversal: FLUMAZENIL can be used, however it carries elevated risk. Respiratory support until the medication is metabolized is traditionally the best care in Benzodiazepine overdose)*
- Neurologic Depression (Head Trauma)

### Adverse Reactions / Precautions

- **No Analgesic properties** (Narcotic pain control is needed for RSI’d / Intubated trauma patients)
- May Cause Respiratory depression: Do not give without stable IV line and BVM (airway control) ready
- Hypotension, vasodilation
- Amnesia, confusion, drowsiness, slurred speech (Paradoxical Reactions possible: aggressiveness, agitation, anxiety, inappropriate behavior)

### Dose and Administration:

#### ADULT

**Anxiety:**
Oral, IV, IM: (Oral and IV doses more reliable)
- **2-10 mg** 2-4 times/day if needed

**Status Epilepticus:**
IV: (SLOW)
- **5-10 mg** every 5-10 minutes given over 3 minutes (maximum dose: 30 mg)

**Sedation in ICU patient:**
IV:
- Loading dose: **5-10 mg**; Maintenance dose: **0.03-0.1 mg/kg** every 30 minutes to 6 hours

**Muscle Spasm:**
IV:
- Initial: **5-10 mg**, then 5-10 mg in 3-4 hours, if necessary. Larger doses may be required if associated with tetanus.

**Nerve Agent Exposure (CBRNE)**
IM:
- **10mg** for seizures associated with Nerve Agent exposure; or if 3 MARK 1 kits were used on a casualty

#### PEDIATRIC

**Sedation / Muscle relaxation / Anxiety:**
IV, IM (IV doses more reliable)
- Children: **0.04-0.3 mg/kg/dose** every 2-4 hours to a maximum of 0.6 mg/kg within an 8-hour period if needed

**Status Epilepticus:**
IV:
- Infants >30 days and Children <5 years: **0.2-0.5 mg** given slowly every 2-5 minutes (maximum total dose: 5 mg); repeat in 2-4 hours if needed
- Children ≥5 years: **1 mg** given slowly every 2-5 minutes (maximum total dose: 10 mg); repeat in 2-4 hours if needed

**Muscle spasm associated with tetanus:**
IV, IM
- Infants >30 days and Children <5 years: **1-2 mg/dose** every 3-4 hours as needed
- Children ≥5 years: **5-10 mg/dose** every 3-4 hours as needed
**DILTIAZEM**  
[Food & Drug Administration (FDA)](https://www.accessdata.fda.gov/drugsatfda_docs/label/2009/020820s023lbl.pdf)  
Trade Name: [Cardizem](https://www.cardizem.com/)

### Class / Mechanism of Action

**Calcium Channel Blocker; Antiarrhythmic Agent, Class IV**

Inhibits calcium ion from entering the “slow channels” or select voltage-sensitive areas of vascular smooth muscle and myocardium during depolarization; produces relaxation of coronary vascular smooth muscle and coronary vasodilation; increases myocardial oxygen delivery in patients with vasospastic angina. Onset of action: IV: 3 minutes, Duration 1-3 hours

### Indications

**Labeled Indications:** Atrial fibrillation or atrial flutter for acute ventricular rate control, conversion of supraventricular tachycardia, hypertension, chronic stable angina, vasospastic angina.

**Unlabeled:** Hypertrophic cardiomyopathy; Idiopathic ventricular tachycardia; Nonsustained ventricular tachycardia or ventricular premature beats, symptomatic; Pulmonary arterial hypertension (group 1).

### Contraindications

- Sick sinus syndrome (except in patients with a functioning artificial pacemaker); Second- or third-degree AV block
- Atrial fibrillation or flutter associated with accessory bypass tract (WPW, short PR syndrome)
- Severe hypotension; Cardiogenic shock; Hypersensitivity to diltiazem or any formulation component
- Ventricular tachycardia (with wide-complex tachycardia [QRS ≥0.12 seconds], must determine whether origin is supraventricular or ventricular)

### Adverse Reactions / Precautions

- Cardiovascular: Edema, atrioventricular block, bradycardia, hypotension, dyspnea
- Central nervous system: Headache, dizziness, pain, nervousness, vomiting, weakness, myalgia

### Dose and Administration: ADULT

#### Atrial fibrillation or atrial flutter, rate control:
**Note:** For rate control in hemodynamically stable patients. Do not use in patients with preexcitation associated with an accessory pathway, as this can lead to ventricular arrhythmias.

**IV:**
- Bolus dose: 0.25 mg/kg (actual body weight) over 2 minutes (average dose: 20 mg); if rate control is insufficient after 15 minutes, a repeat bolus dose of 0.35 mg/kg over 2 minutes may be given (average dose: 25 mg). Patients who respond after 1 or 2 bolus doses can be started on a continuous infusion.
- Continuous infusion following bolus(es): Initial: 5 to 10 mg/hour; infusion rate may be increased in 5 mg/hour increments according to ventricular response, up to a maximum of 15 mg/hour.

#### Supraventricular tachycardia (alternative agent):
**Note:** For hemodynamically stable patients if vagal maneuvers and/or adenosine are unsuccessful.
- Bolus dose: 0.25 mg/kg (actual body weight) over 2 minutes (average dose: 20 mg); if rate control is insufficient after 15 minutes, a repeat bolus dose of 0.35 mg/kg over 2 minutes may be given (average dose: 25 mg). If bolus(es) do not terminate the arrhythmia, consider alternative therapy.

### Dose and Administration: PEDIATRIC

**Always Reference BROSELOW Tape**

#### Atrial tachyarrhythmias, rate control:
**Note:** Very limited data available: Infants, Children, and Adolescents

**IV:**
- Initial bolus: 0.25 mg/kg over 5 minutes (maximum dose: 20 mg/dose [average adult dose]) followed by a continuous IV infusion. Dose should be individualized based on patient response.
- Continuous infusion (titrated to effect): 0.05 to 0.15 mg/kg/hour (Rate control achieved ≈10min)
**DIPHENHYDRAMINE**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Histamine H&lt;sub&gt;1&lt;/sub&gt; Antagonist:</em></td>
</tr>
<tr>
<td>Competes with histamine for H&lt;sub&gt;1&lt;/sub&gt;-receptor sites within the gastrointestinal tract, blood vessels, and respiratory tract; Also produces anticholinergic and sedative effects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong></td>
</tr>
<tr>
<td>• Anaphylaxis and allergy disorders</td>
</tr>
<tr>
<td>• Motion Sickness</td>
</tr>
<tr>
<td>• Antitussive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to diphenhydramine or any component of the formulation</td>
</tr>
<tr>
<td>• Acute Asthma</td>
</tr>
<tr>
<td>• Use on Neonates, premature infants, Nursing mothers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Normally causes sedation, but may cause paradoxical excitation in children</td>
</tr>
<tr>
<td>• May have increased sedative effects when used with other sedatives or alcohol</td>
</tr>
<tr>
<td>• May cause hypotension (use with caution in patient with cardiovascular disease)</td>
</tr>
<tr>
<td>• Dry mouth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anaphylaxis/Allergic Reactions and Motion Sickness:</strong> Oral:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 25-50mg every 6-8 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Push:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 50mg once, prepare to administer epinephrine</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute Hemolytic reaction</strong> (rapid onset of itching, chills, flushing, nausea/vomiting, coughing, wheezing, laryngeal edema, dyspnea, hypotension hemoglobinuria, rise in venous pressure, distended neck veins, crackles in lung bases): IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 50mg once, after administration of epinephrine 0.5mL in lateral thigh</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max Doses:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 to &lt;6 years:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 6.25mg every 4-6hrs; max of 37.5mg/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 to &lt;12 years:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 12.5-25mg every 4-6hrs; max of 150mg/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;12 years:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• See Adult dosing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**DOBUTAMINE**  
*Lactation? (Caution)*

**Trade Name:** Dobutrex

### Class / Mechanism of Action

**Adrenergic Agonist**
Positive Inotropic agent. Stimulates beta1 adrenergic receptors: Increases HR and contraction force while sparing beta2 and alpha receptors. Onset IV: 1-2 minutes

### Indications

**Labeled Indications:** Short term management of cardiac decompensation.

### Contraindications
- Hypersensitivity to dobutamine or sulfites (some contain sodium metabisulfate), or any component of the formulation
- Idiopathic hypertrophic subaortic stenosis (IHSS)

### Adverse Reactions / Precautions
- Always attempt to correct Hypovolemia 1st when using vasopressors and/or inotropes
  - May be combined with Dopamine or Norepinephrine for hypotension not responding to fluid administration
  - No applicable use in hemorrhagic shock until fluid replacement therapy maximized!
- Increase in BP is common, but does have a rare incidence of causing hypotension
- Increases HR
- May exaggerate ventricular ectopy

### Dose and Administration:

#### Cardiac Decompensation:

**IV:**
Dobutamine may be combined with dopamine or norepinephrine for hypotension not responsive to fluid therapy.

- **2-20 mcg/kg/min,** start low and titrate to targeted MAP > 60 mmHg

**Preparation:** Mix 250mg Dobutamine in 250mL D5W or NS for a concentration of 1000mcg/mL

<table>
<thead>
<tr>
<th>Desired Delivery Rate (mcg/kg/min)</th>
<th>Infusion Rate (mL/kg hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>0.15</td>
</tr>
<tr>
<td>5</td>
<td>0.3</td>
</tr>
<tr>
<td>7.5</td>
<td>0.45</td>
</tr>
<tr>
<td>10</td>
<td>0.6</td>
</tr>
<tr>
<td>12.5</td>
<td>0.75</td>
</tr>
<tr>
<td>15</td>
<td>0.9</td>
</tr>
<tr>
<td>20</td>
<td>1.2</td>
</tr>
</tbody>
</table>

#### Cardiac Decompensation:

**IV**
- Refer to adult dose
**DOPAMINE**  
**Class / Mechanism of Action**  
Adrenergic Agonist; Vasopressor  
Stimulates adrenergic and dopaminergic receptors. High doses stimulate dopaminergic and beta1 adrenergic receptors, producing cardiac stimulation and renal vasodilation. Very large doses stimulate alpha adrenergic receptors.

**Indications**

### Labeled Indications:
Treatment of non-hemorrhagic shock (e.g. neurogenic, renal failure, cardiac decompensation) _**persisting after adequate fluid volume replacement**_

### Unlabeled:
Symptomatic bradycardia or heart block unresponsive to atropine or pacing

**Contraindications**
- Hypersensitivity to sulfites
- Ventricular Fibrillation

**Adverse Reactions / Precautions**
- No applicable use in hemorrhagic shock unless fluid replacement therapy maximized! _**Maximize use of Blood products / Crystalloids before considering use in hemorrhagic shock.**_
- Tachycardia and/or Arrhythmias: May increase HR and worsen arrhythmias
- Vesicant: Avoid extravasation, will cause tissue damage/necrosis
- Assure adequate circulatory volume to minimize need for vasoconstrictors. Monitor BP closely, avoid hypertension and adjust infusion rate as needed.

### Dose and Administration:

#### ADULT

**Hemodynamic Support:**

**IV:** Use microdrip chamber only:
- **5-20 mcg/kg/min;** titrate to desired response. Infusion may be increased by 1-4 mcg/kg/minute at 10 to 30 minute intervals until optimal response is obtained

**Dopamine Dosage Efficacy:**
- 1-5 mcg/kg/min = Dopaminergic effects: increased urine output, increased renal blood flow
- 5-10 mcg/kg/min = Beta1 effects: Increased CO, HR, and contractility
- >10 mcg/kg/min = Alpha1 effects: Increased BP, vasoconstriction

**Note:** Doses >20 mcg/kg/minute likely do not have a beneficial effect on blood pressure and may increase risk of tachyarrhythmias. Add additional vasopressor if Dopamine doses of 20 mcg/kg/min are inadequate. (phenylephrine, norepinephrine, epinephrine)

#### PEDIATRIC

**Hemodynamic Support:**

**IV:**
- "Use adult dosing"

**Note:** Dopamine is a second line medication for hemodynamic support in Pediatric patients behind Epinephrine and Norepinephrine
**Dopamine**

**Dosing Range:** 5‐20mcg/kg/min (300‐1200mcg/kg/hr)

<table>
<thead>
<tr>
<th>Pt. Weight (kg)</th>
<th>Dose Rate (ml/hr)</th>
<th>Micro Rate (60 gtt/min)</th>
<th>Macro Rate (10 gtt/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>5</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>85</td>
<td>5</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>90</td>
<td>5</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>95</td>
<td>5</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>105</td>
<td>5</td>
<td>20</td>
<td>6</td>
</tr>
</tbody>
</table>

**MIX 800 mg/500 mL**

**CONCENTRATION 1600 mcg/mL**

**Micro‐Drip is set of choice for this infusion**

**Titrate to minimum effective dose. Allow 3‐5 minutes between dosing changes to assess hemodynamic effects.**
**EPINEPHRINE**

- **Class / Mechanism of Action**
  - Alpha & Beta Agonist
    - Sympathomimetic, stimulates both alpha and beta adrenergic receptors, causing relaxation of the bronchial tree, cardiac stimulation (increasing myocardial oxygen consumption), and dilation of skeletal muscle blood vessels

- **Indications**
  - Allergic Reactions, Anaphylaxis
  - Asthma (Bronchoconstriction)

- **Contraindications**
  - Not for IV use, must first dilute into 10mL NS syringe for Cardiac / IV use

- **Adverse Reactions / Precautions**
  - No applicable use in hemorrhagic shock unless fluid replacement therapy maximized!
  - Maximize use of Blood products / Crystalloids before considering use in hemorrhagic shock.
  - Chest Pain, Tachycardia, Arrhythmias, Palpitations, Sudden death
  - Anxiety, Cerebral Hemorrhage, Headache
  - Vesicant: Avoid extravasation, will cause tissue damage/necrosis
  - Use with caution in patients taking tricyclic antidepressants; effects of epinephrine may be increased

- **Dose and Administration:**
  - **ADULT**
  - **PEDIATRIC** Always Reference BROSELOW Tape

### Bronchodilator:

- **SubQ, IM:** 1mg/mL
  - 0.3-0.5 mg every 20 minutes for 3 doses
  - Nebulization:
    - Add 0.5 mL to nebulizer and dilute with 3 mL of NS; administer over 15 minutes

### Anaphylaxis / Hypersensitivity reaction

- **IM:** 1mg/mL
  - 0.3-0.5 mg every 5-15 minutes until clinical improvement

### IV Infusion:

  - Initiate with an infusion at 5-15 mcg/minute (with crystalloid) (See infusion chart next page)

### Acute Hemolytic reaction

- **IM:** 1mg/mL
  - 0.5mg IM in lateral thigh
    - Repeat every 5-15min for moderate bronchospasm or facial/laryngeal edema.
  - Follow with Diphenhydramine 50mg IV Push

### Bronchodilator:

- **SubQ:** Infants and Children 1mg/mL
  - 0.01 mg/kg (0.01 mL/kg) (maximum single dose: 0.5 mg) every 20 minutes for 3 doses

- **Nebulization:**
  - Children <4 years: Croup: 0.05 mL/kg (maximum dose: 0.5 mL); dilute in 3 mL of NS. Administer over 15 minutes; do not administer more frequently than every 2 hours
  - Children ≥4 years: Adult dosing

### Anaphylaxis / Hypersensitivity reaction

- **(PALS,2020):** Infants and Children
  - **IM:**
    - 0.01 mg/kg (0.01 mL/kg of 1mg/mL solution) (maximum single dose: 0.3 mg) every 5-15 minutes
  - **EpiPen Jr, Children <15kg:**
    - 0.15 mg; if anaphylactic symptoms persist, dose may be repeated in 5-15 minutes using an additional EpiPen Jr
  - **EpiPen, Children ≥15 kg:**
    - 0.3 mg; if anaphylactic symptoms persist, dose may be repeated in 5-15 minutes using an additional EpiPen
<table>
<thead>
<tr>
<th>Dose (mcg/min)</th>
<th>Rate mL/hr</th>
<th>Micro (60 gtt/min)</th>
<th>Macro 20 gtt/mL</th>
<th>Macro 15 gtt/mL</th>
<th>Macro 10 gtt/mL</th>
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</tbody>
</table>

Macro-Drip (10 gtt/mL) is set of choice for this infusion

Start at lowest dose and titrate to desired effect

Epinephrine 1mg/1ml (1:1,000)

Anaphylaxis

Dosing Range: 5-15 mcg/min (150-450 mcg/hr)

MIX 1 mg/500 mL

CONCENTRATION 2 mcg/mL
**EPINEPHRINE**  
1mg/10mL  (formerly 1:10,000)  

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha &amp; Beta Agonist</td>
</tr>
<tr>
<td>Sympathomimetic, stimulates both alpha and beta adrenergic receptors, causing relaxation of the bronchial tree, cardiac stimulation, and dilation of skeletal muscle blood vessels</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Arrest (VF, pulseless VT, asystole, PEA)</td>
</tr>
<tr>
<td>Drip-Dose: Bradycardia (Symptomatic), Fluid Resistant Shock</td>
</tr>
<tr>
<td>Push-Dose: Bradycardia, Hypotension, Refractory Anaphylaxis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
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</thead>
<tbody>
<tr>
<td>Uncontrolled hypertension is a relative contraindication, otherwise none</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>No applicable use in hemorrhagic shock unless fluid replacement therapy maximized!</td>
</tr>
<tr>
<td>Maximize use of Blood products / Crystalloids before considering use in hemorrhagic shock.</td>
</tr>
<tr>
<td>Chest Pain, Tachycardia, Arrhythmias, Palpitations, Sudden death</td>
</tr>
<tr>
<td>Anxiety, Cerebral Hemorrhage, Headache</td>
</tr>
<tr>
<td>Vesicant: Avoid extravasation, will cause tissue damage/necrosis</td>
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<tr>
<td>Use with caution in patients taking tricyclic antidepressants; effects of epinephrine may be increased</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration: ADULT PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asystole/pulseless arrest, pulseless VT/VF:</td>
</tr>
<tr>
<td>IV: 1mg/10mL (0.1mg/mL) Pre-filled 10cc Syringe</td>
</tr>
<tr>
<td>• 1 mg (10cc of 0.1mg/mL) every 3-5 minutes to ROSC, Follow each with 20mL flush</td>
</tr>
</tbody>
</table>

**Drip-Dose: Bradycardia (Symptomatic), Fluid Resistant Shock:**

<table>
<thead>
<tr>
<th>IV Continuous Infusion</th>
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</thead>
<tbody>
<tr>
<td>2-20 mcg/minute titrate to desired effect (HR &gt;60, MAP &gt;65)</td>
</tr>
</tbody>
</table>

**Push-Dose: Bradycardia, Hypotension, Refractory Anaphylaxis:**

| IV/IO: Mix 100mcg (1mL of 1mg/10mL) Epinephrine in 10cc NS for concentration of 10mcg/mL |
| 5-20mcg IV/IO push q 2-5min, titrate to desired response |

<table>
<thead>
<tr>
<th>Asystole, PEA, pulseless VT/VF, Unresponsive and Symptomatic Bradycardia in Infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: 1mg/10mL – 0.1mg/mL Pre-filled 10cc Syringe</td>
</tr>
<tr>
<td>• 0.01 mg/kg (0.1 mL/kg of 1mg/10mL [0.1 mg/mL]) (maximum single dose: 1 mg) every 3-5 minutes as needed or until ROSC</td>
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</tbody>
</table>

**Severe Hypotension/shock and fluid resistant (unlabeled use):**

<table>
<thead>
<tr>
<th>IV: Continuous Infusion</th>
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</thead>
<tbody>
<tr>
<td>0.1 - 1 mcg/kg/minute titrated to desired effect</td>
</tr>
</tbody>
</table>
**Epinephrine 1mg/10ml (1:10,000)**

**Pressor for Hypotension**

Dosing Range: 2-20mcg/min (120-600mcg/hr)

MIX 1 mg/500 mL

CONCENTRATION 2 mcg/mL

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<thead>
<tr>
<th>Dose (mcg/min)</th>
<th>Rate (mL/hr)</th>
<th>Micro (60 gtt/min)</th>
<th>Macro 20 gtt/mL</th>
<th>Macro 15 gtt/mL</th>
<th>Macro 10 gtt/mL</th>
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<td>200</td>
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</tbody>
</table>

Macro-Drip (10gtt/ml) is set of choice for this infusion

Start at lowest dose and titrate to desired effect
<table>
<thead>
<tr>
<th>Ertapenem</th>
<th>Lactation Yes</th>
<th>Trade Name: Invanz</th>
</tr>
</thead>
</table>

**Class / Mechanism of Action**
Antibiotic (Carbapenem),
Biacteriocidal – broad spectrum, Inhibits bacterial cell wall synthesis by binding to one or more of penicillin-binding proteins which inhibits cell wall biosynthesis, causing bacteria to eventually lyse.

**Labeled Indications**: Used for infection control prophylaxis for traumatic open injuries and surgical prophylaxis.

**Contraindications**
- Hypersensitivity to cefazolin, other cephalosporin antibiotics, other beta-lactams, or any component of the formulation

**Adverse Reactions / Precautions**
- Superinfection – prolonged use may result in fungal or bacterial superinfection (including C.Difficile)

**Dose and Administration:**

<table>
<thead>
<tr>
<th><strong>Infection Control:</strong></th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Give 1g in 250 mL NS IV over 5 min, provides 24 hours of coverage.</strong></td>
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</tbody>
</table>

**IV:**
- **Adults:**
  - 1 g IV every 24 hrs
    - Max daily dose: 12 g/day

**Infection Control:** Children <12 years & ≥12 years

**IV:**
- Pediatrics:
  - <12 years old: 15 mg/kg IV every 12 hrs
    - Max daily dose: 100 mg/kg/day
  - ≥12 years old: 20 mg/kg IV or IM once daily
    - Max daily dose: 1 g/day
### ETOMIDATE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Trade Name: Amidate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Anesthetic</strong></td>
<td></td>
</tr>
<tr>
<td>Very short acting non-barbiturate sedative/hypnotic used for induction of anesthesia with little cardiovascular effects. Onset of action: 30-60 seconds, Duration 5-10 minutes</td>
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</tbody>
</table>

#### Indications

**Labeled Indications:**
- Rapid Sequence Induction

#### Contraindications

- Hypersensitivity to etomidate or any component of the formulation

#### Adverse Reactions / Precautions

- **NO Analgesic properties!**
- Safety in children less than 10 years has not been established
- Inhibits adrenal steroid production; may increase mortality if repeat dosing is required

#### Dose and Administration:

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Trade Name: Amidate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adul</strong></td>
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<tr>
<td><strong>RSI:</strong> IV: 0.3 mg/kg over 30-60 seconds for induction of anesthesia;</td>
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<tr>
<td><strong>Note:</strong> Limit to single dose for anesthesia/induction. Repeat dosing and continuous infusion (maintenance dosing) may increase patient mortality due to adrenal suppression and inability to respond to stress.</td>
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<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Trade Name: Amidate</th>
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<tbody>
<tr>
<td><strong>Pedi</strong></td>
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<tr>
<td><strong>RSI:</strong> IV: Children &lt;10 0.3 mg/kg over 30-60 seconds will produce rapid sedation lasting 10-15 minutes. Max dose: 20 mg</td>
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<tr>
<td><strong>Note:</strong> Limit to single dose for anesthesia/induction. Repeat dosing and continuous infusion (maintenance dosing) may increase patient mortality due to adrenal suppression and inability to respond to stress.</td>
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</table>
### FENTANYL

**Class / Mechanism of Action**
Opioid Analgesic; General Anesthetic
Binds to opioid receptors within the CNS increasing pain threshold and altering pain reception; inhibits ascending pain pathways (blocking painful stimulus); produces CNS depression
Onset: IV almost immediate, Duration: IV 0.5-1 hour

**Indications**

**Labeled Indications:**
- Pain relief
- Adjunct to general or regional anesthesia

**Contraindications**
- Hypersensitivity to fentanyl or any component of the formulation

**Adverse Reactions / Precautions**
- When using only as pain med and not adjunct to general anesthesia, ensure Slow IV Push (3-5 min). Rapid infusion may result in chest wall rigidity, impaired ventilation, or respiratory distress/arrest. Always be prepared for use of paralytic and intubation (positive control of airway).
- **Head trauma:** Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur if patient management is inadequate.
- May worsen Bradycardia
- May cause life-threatening hypoventilation and Reparatory depression
- CNS depression: Impairs physical and mental abilities

**Dose and Administration:**

<table>
<thead>
<tr>
<th>Pain Management:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
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<tbody>
<tr>
<td><strong>IV:</strong> Slow (Unlabeled)</td>
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<tr>
<td>- 0.5-1mcg/kg PRN for breakout pain q 30-60 min</td>
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<td>- 100 mcg</td>
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**Note:** Patients with prior opioid exposure may have increased tolerance and require higher dosing

**Sedation during mechanical ventilation:**

**IV:**
- Initial Bolus: 1-2mcg/kg
- 0.5-1mcg/kg/hr infusion (See Infusion chart next page)
(Combine with 0.05-0.1mg/kg Midazolam for best effect)
- 0.5-2mcg/kg IVP q 30-60 min

**Pretreatment for RSI:**
3-5 min prior to RSI in pt's with Head injuries, Increased ICP, Cardiac Ischemia or Aortic Dissection (if situation allows):
- 3mcg/kg slow IV push

**Non-Traumatic Chest Pain (Cardiac)**
- 25-50mcg IV

**Trade Name:** Sublimaze

**Lactation:** Yes (Not recommended)
# Fentanyl (Sublimase)

Dosing Range: 0.5-1 mcg/kg/hr

MIX 1 mg/100 mL

CONCENTRATION 10 mcg/mL

<table>
<thead>
<tr>
<th>Dose (mcg/hr)</th>
<th>Rate (mL/hr)</th>
<th>Micro (60 gtt/mL)</th>
<th>Macro (20 gtt/mL)</th>
<th>15 gtt/mL</th>
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<td>18</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>185</td>
<td>19</td>
<td>19</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>190</td>
<td>19</td>
<td>19</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>195</td>
<td>20</td>
<td>20</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>200</td>
<td>20</td>
<td>20</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Micro-Drip is set of choice for this infusion

Sample patient: 80kg pt at 0.5-1mcg/kg/hr = 40mcg/hr-80mcg/hr dosing range
**FUROSEMIDE**  
Female, Lactation Yes (Caution)  
Trade Name: **Lasix**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antihypertensive; Loop Diuretic</strong></td>
</tr>
</tbody>
</table>

Inhibits reabsorption of sodium and chloride in the kidney, causing increased loss of water, sodium, chloride, magnesium, and calcium within urine. When given IV it also causes rapid venous dilation. Symptomatic improvement of acute pulmonary edema approximately 15-20 minutes

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications</strong>: Management of edema associated with heart failure and hepatic or renal disease;</td>
</tr>
<tr>
<td>- Management of edema associated with heart failure and hepatic or renal disease; acute pulmonary edema</td>
</tr>
<tr>
<td>- Hypertension (alone or in combination with other antihypertensives)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hypersensitivity to furosemide or any component of the formulation</td>
</tr>
<tr>
<td>- Anuria (No pre-hospital utility in hypovolemic shock)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Can cause profound diuresis with resulting shock and electrolyte depletion. Monitor closely</td>
</tr>
<tr>
<td>- May cause: Hypovolemia, Hypotension, hyponatremia, hypokalemia</td>
</tr>
<tr>
<td>- May potentiate effect of additional antihypertensives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong> Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute pulmonary edema:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 40 mg over 1-2 minutes. If response not adequate within 1 hour, may increase dose to 80 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Edema, heart failure:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV, IM:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Initial: 20-40 mg/dose; if response is not adequate, may repeat the same dose or increase dose in increments of 20 mg/dose and administer 1-2 hours after previous dose (maximum dose: 200 mg/dose).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Continuous IV Infusion:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Initial: IV bolus dose 20-40 mg over 1-2 minutes, followed by continuous IV infusion doses of 10-40 mg/hour. If urine output is &lt;1 mL/kg/hour, double as necessary to a maximum of 80-160 mg/hour.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Edema, heart failure: Infants and Children</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM:</td>
</tr>
<tr>
<td>- Initial: 1 mg/kg/dose; if response not adequate, may increase dose in increments of 1 mg/kg/dose and administer not sooner than 2 hours after previous dose, until a satisfactory response is achieved; may administer maintenance dose at intervals of every 6-12 hours; maximum dose: 6 mg/kg/dose</td>
</tr>
</tbody>
</table>
# GLUCAGON

**Class / Mechanism of Action**

Antidote, Hypoglycemia Antidote, Diagnostic agent

Raising blood glucose levels by stimulating increased production of cyclic AMP, promoting hepatic glycogenolysis and gluconeogenesis

**Indications**

**Labeled Indications:** Management of hypoglycemia (Glucose <70 in adults or <60 in children)

**Unlabeled:**

- Beta-blocker or calcium channel blocker induced myocardial depression (with or without hypotension) unresponsive to standard measures
- Hypoglycemia secondary to insulin or sulfonylurea overdose (as adjunct to dextrose)

**Contraindications**

- Hypersensitivity to glucagon or any component of the formulation
- Insulinoma / Pheochromocytoma

**Adverse Reactions / Precautions**

- Should NOT be used as 1st line medication for hypoglycemia or Altered mental status
  - Hypoglycemia patients should receive dextrose. If IV access cannot be established or if dextrose is not available, glucagon may be used as alternate until dextrose can be given.
- Thiamine should precede use in patient with suspected alcoholism or malnutrition

**Dose and Administration:**

<table>
<thead>
<tr>
<th>Hypoglycemia:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM, SubQ:</td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>1 mg; may repeat in 20 minutes as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Beta-blocker / Calcium channel blocker overdose (myocardial depression) unresponsive to standard measures (unlabeled use):**

**IV:** (ACLS, 2015)

- 3-10 mg (or 0.05-0.15 mg/kg) bolus followed by an infusion of 3-5 mg/hour (or 0.05-0.1 mg/kg/hour); titrate infusion rate to achieve adequate hemodynamic response

*Hypoglycemia:*

<table>
<thead>
<tr>
<th>IV, IM, SubQ:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Children &lt;20 kg: 0.5 mg or 20-30 mcg/kg/dose; repeated in 20 prn.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children ≥20 kg: Adult dosing.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** IV dextrose should be given ASAP; if patient fails to respond to glucagon, IV dextrose must be given

*Only use if hyperinsulinemia thought to be cause of hypoglycemia (rare in kids). If hypoglycemic without glycogen stores, Glucagon will be ineffective.*

**Beta-blocker / Calcium channel blocker overdose (myocardial depression) unresponsive to standard measures (unlabeled use):**

**IV:**

- 30-150mcg/kg bolus. Can be repeated if no response in 15 min. Follow with an infusion of 20-70mcg/kg/hr; titrate infusion rate to achieve adequate hemodynamic response
**HEPARIN**

**Trade Name:**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Anticoagulant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactivates thrombin and activated coagulation factors (IX, X, XI, XII, and plasmin) and prevents conversion of fibrinogen to fibrin.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled Indications: Treatment of thromboembolic disorders</td>
</tr>
<tr>
<td>Unlabeled: ST elevation MI (STEMI) as an adjunct to thrombolysis; unstable angina/non-STEMI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypersensitivity to heparin or any component of the formulation</td>
</tr>
<tr>
<td>Active Bleeding (Trauma Patient)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuously monitor for bleeding: Stop immediately if any bleeding occurs</td>
</tr>
<tr>
<td>Urticarial reactions and anaphylaxis can occur</td>
</tr>
</tbody>
</table>

**Dose and Administration:**

**ADULT**

<table>
<thead>
<tr>
<th>Acute coronary syndromes: STEMI/Unstable Angina as an adjunct to fibrinolysis (full-dose alteplase):</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
</tr>
<tr>
<td>- Initial bolus of <strong>60 units/kg</strong> (MAX: 4000 units)</td>
</tr>
<tr>
<td>- Maintenance: 12 units/kg/hour (MAX: 1000 units/hour) as continuous infusion.</td>
</tr>
</tbody>
</table>

**Treatment of venous thromboembolism:**

<table>
<thead>
<tr>
<th>IV: (unlabeled dosing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1 year</td>
</tr>
<tr>
<td>- DVT/PE: <strong>75 units/kg</strong> IV push followed by continuous infusion of 20 units/kg/hour</td>
</tr>
</tbody>
</table>

**PEDIATRIC**

<table>
<thead>
<tr>
<th>Treatment of venous thromboembolism:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: (unlabeled dosing)</td>
</tr>
<tr>
<td>&gt;1 year</td>
</tr>
<tr>
<td>- DVT/PE: <strong>80 units/kg</strong> (or alternatively 5000 units) IV push followed by continuous infusion of 18 units/kg/hour</td>
</tr>
</tbody>
</table>

**Note:** Heparin is ONLY for use only under written direction of referring provider or direct consultation with medical director.
### HETASTARCH

**Trade Name:** Hextend

<table>
<thead>
<tr>
<th>Lactation</th>
<th>Yes (Caution)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Class / Mechanism of Action</strong></th>
</tr>
</thead>
</table>
| **Plasma Volume Expander, Colloid**
Colloidal starch producing plasma volume expansion. Onset of Action: approximately 30 minutes |

<table>
<thead>
<tr>
<th><strong>Indications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Volume expander used in treatment of hypovolemic / hemorrhagic shock</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Contraindications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to hydroxyethyl starch or any component of the formulation</td>
</tr>
<tr>
<td>• Renal failure with oliguria and anuria (not related to Hypovolemia)</td>
</tr>
<tr>
<td>• Fluid overload conditions, (pulmonary edema, congestive heart failure)</td>
</tr>
<tr>
<td>• Pre-existing bleeding or coagulation disorders (eg, von Willebrand's disease): Use caution in bleeding disorders; may increase risk of more bleeding</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Adverse Reactions / Precautions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Anaphylactoid reactions (allergies to corn)</td>
</tr>
</tbody>
</table>

| **Dose and Administration:**|
|-----------------------------|-----------------------------|
| **ADULT**                   | **PEDIATRIC**               |
| **Plasma volume expansion:**| Always Reference BROSELOW Tape |
| IV                          |                             |
| • 250-500mL Bolus. May repeat PRN (up to 1500 mL/day). Titrate to individual hemodynamic needs (Sys BP >90). |

<table>
<thead>
<tr>
<th><strong>Notes:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• May be administered via infusion pump or pressure infusion.</td>
</tr>
<tr>
<td>• Do not administer with blood through the same line / tubing</td>
</tr>
<tr>
<td>• Change tubing or flush extensively with NS before administering blood through the same line.</td>
</tr>
<tr>
<td>HYDROMORPHONE</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td><strong>Class / Mechanism of Action</strong></td>
</tr>
<tr>
<td>Opioid Analgesic</td>
</tr>
<tr>
<td>Binds to opioid receptors within the CNS increasing pain threshold and altering pain reception; inhibits ascending pain pathways (blocking painful stimulus); produces CNS depression</td>
</tr>
<tr>
<td>Onset: IV 10-20 minutes. Duration 2-4 hours</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
</tr>
<tr>
<td>Labeled Indications: Moderate to severe pain.</td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
</tr>
<tr>
<td>• Hypersensitivity to hydromorphone or any component of the formulation</td>
</tr>
<tr>
<td>• Severe respiratory depression (in absence of resuscitative equipment or ventilator support)</td>
</tr>
<tr>
<td>• Acute or severe asthma</td>
</tr>
<tr>
<td>• Paralytic ileus</td>
</tr>
<tr>
<td><strong>Adverse Reactions / Precautions</strong></td>
</tr>
<tr>
<td>• Always be prepared for use of paralytic and intubation (maintain positive control of airway).</td>
</tr>
<tr>
<td>• Head trauma: Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur.</td>
</tr>
<tr>
<td>• May cause Hypotension, Use with caution in hypovolemic patients.</td>
</tr>
<tr>
<td>• May cause life-threatening Respiratory depression</td>
</tr>
<tr>
<td>• CNS depression: Impairs physical and mental abilities</td>
</tr>
<tr>
<td><strong>Dose and Administration:</strong></td>
</tr>
<tr>
<td><strong>ACUTE PAIN (MODERATE-TO-SEVERE):</strong></td>
</tr>
<tr>
<td><strong>ADULT</strong></td>
</tr>
<tr>
<td>IV: (Slow)</td>
</tr>
<tr>
<td>• 0.5mg (range 0.25-2mg) IV/IO q 1-6hr as prn</td>
</tr>
<tr>
<td>• Critically ill require lower dose, opioid tolerant may require higher dose</td>
</tr>
<tr>
<td>• Continuous infusion: Usual dosage range: 0.5-3 mg/hour (See infusion chart next page)</td>
</tr>
<tr>
<td><strong>PEDIATRIC</strong></td>
</tr>
<tr>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>• Children: 0.015mg/kg IV q 4-6 PRN</td>
</tr>
<tr>
<td>• Adolescents &gt;50kg: Refer to adult dosing</td>
</tr>
</tbody>
</table>
**HYDROMORPHONE (DILAUDID)**

**Dosing Range:** 0.5-3mg/hr (8.3-50mcg/min)

**MIX 2 mg/100 mL**

**CONCENTRATION 20 mcg/mL**

<table>
<thead>
<tr>
<th>Dose (mg/hr)</th>
<th>Rate (mL/hr)</th>
<th>Micro (60 gtt/min)</th>
<th>Macro 20 gtt/mL</th>
<th>Macro 15 gtt/mL</th>
<th>Macro 10 gtt/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>25</td>
<td>25</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
<td>50</td>
<td>17</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>1.5</td>
<td>75</td>
<td>75</td>
<td>25</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>100</td>
<td>33</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td>2.5</td>
<td>125</td>
<td>125</td>
<td>42</td>
<td>31</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
<td>150</td>
<td>50</td>
<td>38</td>
<td>25</td>
</tr>
</tbody>
</table>

Macro-Drip (20gtt/ml) or Micro-Drip is set of choice for this infusion

Start at lowest dose and increase rate by 0.5mg/hr PRN for appropriate pain management
<table>
<thead>
<tr>
<th>HYDROXOCOBALAMIN</th>
<th>Lactation? (Caution)</th>
<th>Trade Name: Cyanokit®</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class / Mechanism of Action</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antidote; Vitamin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precursor to Vitamin B₁₂ (cyanocobalamin). Binds cyanide ion to form cyanocobalamin which is excreted within urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labeled Indications:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• IM: Treatment of pernicious anemia and B₁₂ deficiencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• IV: (Cyanokit®) Treatment of known or suspected cyanide poisoning</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• No contraindications when treating for suspected or known cyanide poisoning</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adverse Reactions / Precautions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• May cause transient hypertension (&gt;180mmHG systolic, &gt;110mmHG diastolic)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Will cause red colored urine and skin</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dose and Administration:</strong></td>
<td>ADULT</td>
<td>PEDIATRIC Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>Cyanide Poisonings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV (Note: If cyanide poisoning is suspected, antidotal therapy must be given immediately)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initial: 5 grams as single infusion given over 15 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Repeat a second 5 gram dose based on severity and clinical response.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Maximum cumulative dose: 10 grams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoke Inhalation / Fire victims: (Closed space exposure with evidence of airway injury: soot in mouth / nose / sputum)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• May present with both cyanide and carbon monoxide poisoning. Hydroxocobalamin is the agent of choice for treating cyanide toxicity in this setting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyanokit®: Reconstitute each vial with 200 mL of NS (LR and D5W also OK).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do not shake vial (gently mix)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do not use if solution is not dark red</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyanide Poisonings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV: (Unlabeled Use)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initial: 70mg/kg (max 5 grams) as single infusion given over 15 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Repeat a second dose of 35mg/kg based on severity and clinical response.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoke Inhalation / Fire victims: (Closed space exposure with evidence of airway injury: soot in mouth / nose / sputum)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• May present with both cyanide and carbon monoxide poisoning. Hydroxocobalamin is the agent of choice for treating cyanide toxicity in this setting.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### KETAMINE

**Class / Mechanism of Action**

**General Anesthetic**

Dissociative anesthetic; produces a cataleptic like state acting directly on the cortex and limbic system. Onset of action IV: 30-60 seconds; Duration is dose dependent averaging 10-20 minutes

**Indications**

- **Labeled Indications:** Induction and maintenance of general anesthesia
- **Unlabeled:** Analgesia and sedation

**Contraindications**

- Hypersensitivity to ketamine or any component of the formulation
- Conditions that cannot tolerate increases in blood pressure
  - E.g. spontaneous cerebral hemorrhage or acute coronary syndrome hypertension
- Children <3 mo age

**Adverse Reactions / Precautions**

- Rapid IV administration may cause hypotension, apnea, or laryngospasm. Large doses may cause hypotension and respiratory depression
- Preferred general anesthetic / sedative for hypo/normotensive head injury patient.
- Dosing between 0.5-0.9 mg/kg IV (and equivalent IM dose) can give patients the feeling of unreality leading to agitation and should be avoided.

**Dose and Administration:**

<table>
<thead>
<tr>
<th>LOW DOSE:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesia:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV/IO Push (over 1 min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0.1 - 0.2 mg/kg, repeat q 10-30 prn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM/IN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0.5 mg/kg, repeat q 10-30 prn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH DOSE:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSI / Induction of anesthesia; Combative Patients:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Push</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1-2 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 4-5 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Maintenance of anesthesia:**
  - IV: 0.5-2 mg/kg dose every 10-20 minutes
  - IV Continuous Infusion
    - 0.5-2mg/kg bolus then 0.5-1 mg/kg/hr. Titrate levels by 0.25mg/kg/hr PRN to achieve appropriate sedation. (See infusion chart next page)

- **Induction of anesthesia (unlabeled dosing):**
  - IV:
    - 1-2 mg/kg (3-5mg/kg for procedural sedation)
  - Maintenance of anesthesia:
    - IV:
      - ½ to Full induction dose every 20-30 minutes
      - IV Continuous Infusion:
        - 0.5-1 mg/kg/hr. Titrate levels by 0.25mg/kg/hr PRN to achieve appropriate sedation.

**NOTE:** Avoid sub-dissociative doses to prevent emergence phenomenon.

**NOTE:** If patient experiences Ketamine Induced Agitation (Emergence Phenomena) give Midazolam 2-5mg IV x1 for adults and 0.05 mg/kg for children not hypotensive or in danger of being hypotensive.
<table>
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<tr>
<th>Pt. Weight</th>
<th>Dose</th>
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<th>Micro (60 gtt/mL)</th>
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</table>

**Macro-Drip is set of choice for this infusion**

Sample patient: 80kg pt at 1-3mg/kg/hr = 81-240mg/hr (81-240ml/hr)
KETOROLAC  

Class / Mechanism of Action

Nonsteroidal Anti-inflammatory Drug (NSAID)
Inhibits cyclooxygenase (COX 1 & 2) enzymes, which decreases production of prostaglandin precursors. Provides antipyretic, analgesic, and anti-inflammatory action.

Indications

Labeled Indications: Short term management of moderate to severe acute pain as an opioid alternative.

Contraindications

- Hypersensitivity to ketorolac, aspirin, other NSAIDs, or any component of the formulation.
- High risk of bleeding, recent history of GI bleeding or perforation, known history of peptic ulcer disease.
  - Not for use as pain management for battlefield trauma patient!
- Suspected cerebrovascular bleeding
- Dizziness, Flushing, Diaphoresis, Tremor, Weakness
- Risk of renal failure secondary to volume depletion
- Concurrent use with other NSAIDs

Adverse Reactions / Precautions

- Inhibits platelet function
- Associated with an increased risk of adverse cardiovascular thrombotic events, including MI and stroke
- May increase risk of GI irritation, inflammation, ulceration, bleeding, and perforation.
- May cause severe bronchospasm in patients with asthma
- May cause new onset hypertension or worsening of existing hypertension.

Dose and Administration:

<table>
<thead>
<tr>
<th>Pain management (acute; moderately severe):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients ≥50 kg</td>
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<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>IM:</td>
<td></td>
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<tr>
<td>• 15-30 mg every 6 hours (maximum daily dose: 120 mg)</td>
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<tr>
<td>IV:</td>
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<tr>
<td>• 15 mg every 6 hours (maximum daily dose: 120 mg)</td>
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<tr>
<td>Adults &gt;65 years and/or adults ≤50 kg</td>
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<tr>
<td>IM:</td>
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<tr>
<td>• 15-30 mg every 6 hours (maximum daily dose: 60 mg)</td>
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<tr>
<td>IV:</td>
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<tr>
<td>• 15 mg every 6 hours (maximum daily dose: 60 mg)</td>
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</tr>
</tbody>
</table>

Adolescents >17 years only:

- Refer to adult dose
LABETALOL  

Class / Mechanism of Action

Beta Blocker with alpha blocking activity
Blocks alpha and beta1/beta2 adrenergic receptor sites. Onset IV: 2-5 minutes

Indications

Labeled Indications: Treatment of hypertension.
- IV: Treatment of severe hypertension and hypertensive emergencies

Unlabeled:
- Pre-eclampsia and severe hypertension in pregnancy, hypertension during acute ischemic stroke, and Pediatric hypertension

Contraindications

- Hypersensitivity to labetalol or any component of the formulation
- Bradycardia <60bpm, heart block >1st degree
- Uncompensated heart failure, Cardiogenic shock
- Asthma

Adverse Reactions / Precautions

- Symptomatic hypotension with or without syncope, Monitor EKG closely
- Use with extreme caution in patients with compensated heart failure and Bradycardia
- Patient with bronchospastic diseases (reactive airway) should not use Beta blockers

Dose and Administration: ADULT  PEDIATRIC 

Always Reference BROSELOW Tape

Acute Hypertension (hypertensive emergency/urgency):

Hypertensive Crisis (Sys: >185/Dia: >110)
- 10-20 mg IV over 1-2 minutes. May repeat one time

Continuous Infusion:
If continued medication required, 2-8mg/min

Note: Goal to lower MAP by no more than 25% within minutes to one hour.

*Hypertension emergencies:

IV Continuous Infusion
- 0.4-1 mg/kg/hour with a maximum of 3 mg/kg/hour have been used; administration requires the use of an infusion pump.
- Intermittent bolus doses of 0.3-1 mg/kg/dose have been reported

*Not 1st Line medication for children

Pearls:

For inter-facility transports with confirmed Ischemic CVA, Intraparenchymal Hemorrhagic CVA, or Spontaneous Non-traumatic SAH manage Hypertension according to diagnosis or guidance from sending facility
- Ischemic CVA Lytic ineligible: SBP < 220 and DBP <120
- Ischemic CVA Lytic eligible: SBP <185 and DBP <110
- Intraparenchymal Hemorrhagic CVA: SBP <180
- Non-traumatic SAH: SBP <160
### LEVETIRACETAM

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticonvulsant</td>
</tr>
<tr>
<td>Causes modulation of synaptic neurotransmitter release through binding to the synaptic vesicle protein SV2A in the brain.</td>
</tr>
</tbody>
</table>

### Indications

#### Labeled Indications
- Treatment of focal (partial) onset seizures

#### Unlabeled:
- Traumatic brain injury, severe acute (short-term seizure prophylaxis); Status epilepticus; Craniotomy, seizure prophylaxis; Subarachnoid hemorrhage (short-term seizure prophylaxis)

### Contraindications
- Hypersensitivity to any component of the formulation

### Adverse Reactions / Precautions
- May cause CNS depression
- Dermatologic reactions, possibly severe (TEN, SJS, etc)
- Hypertension has been reported in children <4 years
- Hematologic effects: Decreases in red blood cell counts, hemoglobin, hematocrit, white blood cell counts, and neutrophils and increases in eosinophils have been observed

### Dose and Administration: ADULT

**Traumatic brain injury (severe acute) (short-term seizure prophylaxis):**
- Loading dose: 20 mg/kg (rounded to the nearest 250 mg) over 60 minutes
- Maintenance dose: 1,000 mg over 15 minutes every 12 hours for 7 days

**Status epilepticus:**
- IV: 1,000 to 3,000 mg administered at a rate of 2 to 5 mg/kg/minute or 40 to 60 mg/kg as a single dose infused over 15 minutes in combination with a parenteral benzodiazepine. Maximum dose: 4,500 mg.

### PEDIATRIC

**Status epilepticus, refractory:** (Limited data available)
- Infants, Children, and Adolescents:
  - IV: 20 to 60 mg/kg over 15 minutes as a single dose
# LIDOCAINE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
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</thead>
<tbody>
<tr>
<td>Antiarrhythmic</td>
<td>Suppresses automaticity of cardiac conduction tissue.</td>
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</tbody>
</table>

## Indications

**Labeled Indications:** Acute treatment of ventricular arrhythmias from myocardial infarction (alternate to amiodarone when amiodarone not available)

**Unlabeled:** (ACLS, 2015)
- Hemodynamically stable monomorphic VT and polymorphic VT
- Pulseless VT / VF (unresponsive to defibrillation, CPR, and vasopressor administration)
- Monomorphic VT secondary to drug, when amiodarone is not available

## Contraindications

- Hypersensitivity to lidocaine or any component of the formulation
- Prophylactic use in AMI
- Bradycardia, severe degrees of SA, AV, or intraventricular heart block
- Wolff-Parkinson-White syndrome, Adam-Stokes syndrome

## Adverse Reactions / Precautions

- Continuous EKG monitoring is necessary
- Increased ventricular rate may be seen when given to a patient in AFib
- At high doses, monitor closely for CNS toxicity, seizure, depression, and respiratory depression.
  - D/C immediately if toxicity develops
- The elderly may have increased chance of CNS and cardiovascular side effects.

## Dose and Administration:

### Cardiac Arrest from VF/VT, (if Amiodarone is not available): (ACLS, 2015):

- **IV, IO:**
  - **Initial dose:** 1 to 1.5mg/kg
  - For refractory VF may give additional 0.5 to 0.75mg/kg IV push, repeat in 5 to 10 minutes
  - Maximum of 3 doses or total of 3mg/kg

### Perfusing Arrhythmia (if amiodarone is not available): Stable VT, wide complex tachycardia, significant ectopy:

- **IV, IO:**
  - Doses ranging from 0.5 to 0.75mg/kg and up to 1 to 1.5mg/kg. Repeat 0.5 to 0.75mg/kg every 5 to 10 minutes
  - Maximum cumulative dose 3mg/kg

### Flush after initiation of IO:

- May add 2-3 ml Lidocaine 2% (without epinephrine) to 5ml NS flush

### Local Anesthesia during Tube/Finger Thoracostomy

- Draw 10ml 2% Lidocaine and locally anesthetize incision area.

### Decompression Illness/Arterial Gas Embolism:

- **1.5mg/kg IV/OO**

## VF/Pulseless VT, Wide Complex Tachycardia (with pulses): (PALS, 2015)

### IV, IO:

- **Initial dose:** 1mg/kg

### 2015 AHA ACLS guidelines state:

“**There is inadequate evidence to support the routine use of lidocaine after cardiac arrest. However, the initiation or continuation of lidocaine may be considered immediately after ROSC from cardiac arrest due to VF/pVT**”

### Maintenance Infusion (Adults and Peds):

- **IV, IO:** Continuous Infusion
  - **1-3 mg/hour** (or 20-50 mcg/kg/minute).
### LORAZEPAM

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Trade Name: Ativan</th>
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<tbody>
<tr>
<td>Benzodiazepine</td>
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<tr>
<td>Acts as an Anxiolytic/Hypnotic, anticonvulsant and sedative.</td>
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<tr>
<td>Onset of action: IV Sedation 2-3 minutes; IM hypnotic, 15-30 minutes. Duration: IV, 8-12 hours.</td>
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</table>

### Indications

**Labeled Indications:** Anesthesia premedication, Status epilepticus

**Unlabeled:**
- Rapid tranquilization of the combative / agitated patient
- Alcohol withdrawal delirium / syndrome
- Seizures
- Induce Sedation and Amnesia (Midazolam is primary medication)

### Contraindications

- Hypersensitivity to Lorazepam or any component of the formulation or other benzodiazepines
- Acute narrow angle glaucoma, Acute Alcohol Intoxication, Sleep apnea
- Respiratory Insufficiency/Depression (except during mechanical ventilation)
  - Overdose Reversal: FLUMAZENIL can be used, however it carries elevated risk.
  - Respiratory support until the medication is metabolized is traditionally the best care in Benzodiazepine overdose
- Neurologic Depression (Head Trauma) (unless having active seizure)

### Adverse Reactions / Precautions

- **No Analgesic properties** (Narcotic pain control is needed for RSI’d / Intubated trauma patients)
- May Cause Respiratory depression: Do not give without stable IV line and BVM (airway control) ready
- Hypotension, vasodilation
- Amnesia, confusion, drowsiness, slurred speech (Paradoxical Reactions possible: aggressiveness, agitation, anxiety, inappropriate behavior)

### Dose and Administration:

<table>
<thead>
<tr>
<th>ADULT</th>
<th>PEDIATRIC</th>
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<tr>
<td>Always Reference BROSELOW Tape</td>
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#### Acute Seizures:

**IV:**
- 2-4mg slow IV push, may repeat x2 every 3-5 minutes as needed.

**Note:** Not recommended IM for seizure due to erratic absorption.

#### Anxiety:

**IV:**
- 0.5-2mg slow IV push

#### Rapid tranquilization of agitated / combative patient (Off-label use):

**IV, IM:**
- 2-4mg every 30-60 minutes; may be used alone or administered with an antipsychotic (i.e. haloperidol)

#### Acute Seizures / Status epilepticus (unlabeled use):

**IV:**
- 0.05-0.1 mg/kg; repeat doses every 5 minutes (max x2) for clinical effect. Max 4mg

#### Agitation:

- 0.05 mg/kg/dose q 20-30 min PRN
### MAGNESIUM SULFATE

**Class / Mechanism of Action**

**Anticonvulsant, Electrolyte Supplement**

IV magnesium decreases acetylcholine in motor nerve terminals and slows rate of SA node impulse formation and prolongs conduction time. Magnesium functions to facilitate the movement of calcium, sodium, and potassium in and out of cells.

**Indications**

**Labeled Indications:**
- Prevention and treatment of seizures in pregnancies with severe pre-eclampsia or eclampsia
- Torsades de Pointes: Cardiac arrhythmias (VT/VF) cause by low serum magnesium

**Contraindications**

- Hypersensitivity any component of the formulation
- Myocardial damage and heart blocks
- Use for pre-eclampsia / eclampsia during 2 hour period before delivery

**Adverse Reactions / Precautions**

- Possible cardiovascular arrest, respiratory depression, and hypotension in large doses
- Hypomagnesaemia is often joined by hypokalemia and requires correction in order to normalize potassium.

**Dose and Administration:**

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<tr>
<th>Condition</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Pediatric Always Reference BROSELOW Tape</th>
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<tbody>
<tr>
<td>Torsades de pointes or VF/pulseless VT associated with torsades de pointes (unlabeled use):</td>
<td>IV, IO:</td>
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<tr>
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<td>• 1-2 g over 15 minutes</td>
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<td>Wheezing in Respiratory Distress (3rd line drug):</td>
<td>IV:</td>
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<td>• 2 Grams over 20min</td>
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<td>Seizure (Refractory to Benzodiazepines):</td>
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<td>• 1-2 Grams over 30 min</td>
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<tr>
<td>Eclampsia/pre-eclampsia, severe (unlabeled):</td>
<td>IV:</td>
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<td>• 4-6 g over 15-20 minutes followed by 2 g/hour continuous infusion</td>
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**Torsades de pointes:**

IV, IO:
- 25-50 mg/kg/dose over several minutes
  - maximum single dose: 2000 mg

**Respiratory Distress:**

IV:
- 25-75 mg/kg over 30 min (max 2 grams)

**Magnesium Sulfate should be diluted into 50-100ml NS or D5W for all Adult and Pediatric infusions**
MANNITOL 20%  Lactation? (Caution)

**Class / Mechanism of Action**
Osmotic Diuretic
Increases osmotic pressure of glomerular filtrate. This reduces kidney reabsorption of water and electrolytes and increases urinary output. Decreases cerebral blood volume and intracranial pressure (ICP) while increasing cerebral blood flow and O2 transport. Onset of action is 15-30 minutes

**Indications**

**Labeled Indications:**
- Reduction of increased ICP secondary to cerebral edema
- Reduction of elevated intraocular pressure
- Urinary excretion of toxic substances

**Contraindications**
- Hypersensitivity to mannitol or any component of the formulation
- Active intracranial bleeding
- Pulmonary congestion and edema
- Severe renal disease, or renal dysfunction after mannitol use
- Severe dehydraiton: (Do NOT use in under-resuscitated or hypotensive casualties)

**Adverse Reactions / Precautions**
- Chest pain, CHF, tachycardia, circulatory overload (with rapid administration), peripheral edema
- Headache, seizure
- Fluid and electrolyte imbalance, dehydration and hypovolemia
- Keep in a temperature controlled climate. Will crystalize at low temperatures.

**Dose and Administration:**

<table>
<thead>
<tr>
<th><strong>MODERATE to SEVERE HEAD INJURY, Patient continuing to deteriorate or showing signs of herniation despite adjustment to ventilation and starting hypertonic saline.</strong></th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong> Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV</strong></td>
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<tr>
<td>1 g/kg IV bolus over &lt;20 minutes.</td>
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<td>Follow with 0.25 g/kg IVP every 4 hours</td>
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</table>

**VITAL FUNCTIONS GOAL IN HEAD INJURY** (Prevention of secondary brain injury):
- Keep SBP >90mmHg, MAP >60mmHg, and SaO2 >93%. [(CPP = MAP – ICP) Minimal goal CPP >60mmHg]

**Note:** Always have urinary catheter in place and monitor output.
## METHYLPREDNISOLONE

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<thead>
<tr>
<th>Lactation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

**Class / Mechanism of Action**

**Systemic Corticosteroid**  
Anti-inflammatory, Immunosuppressant, shock

**Indications**

**Labeled Indications:** Treatment of a variety of diseases: allergic, inflammatory, hematologic, neoplastic, and autoimmune;

**Unlabeled:**  
None identified unless added by medical direction.

**Contraindications**

- Hypersensitivity to methylprednisolone or any component of the formulation
- No other in emergency setting

**Adverse Reactions / Precautions**

- Not for use in treatment of head injury; increased mortality has occurred in head injury patients treated with high dose IV methylprednisolone.
- No immediate effect will be observed while treating in the pre-hospital environment. Onset of action may take several hours

**Dose and Administration: ADULT**

**Asthma exacerbations, including status asthmaticus**

**IV:**
- 125mg x 1 dose

**Allergic Reaction:**

**IV:**
- 125mg x 1 dose

**Note:** Only methylprednisolone sodium succinate can be used for IV doses.

**Dose and Administration: PEDIATRIC**

**Asthma exacerbations, including status asthmaticus**

**IV:**
- Children <12 years: 1-2 mg/kg initial dose; followed by 0.5-1 mg/kg q 6 hrs. (maximum: 60 mg/day)

**Allergic Reaction**

**IV**
- 2 mg/kg x 1 dose

**Note:** Only methylprednisolone sodium succinate can be used for IV doses.
**METOCLOPRAMIDE**  
Trade Name: Reglan

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prokinetic Agent:</strong> Antiemetic, Upper GI Stimulant</td>
</tr>
<tr>
<td>Potent dopamine-receptor antagonist. At higher doses blocks serotonin receptor in chemoreceptor trigger zones of CNS. Increases GI tract motility and gastric emptying. Onset of action 1-5 minutes via IV with a duration of 1-2 hours.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Prevention of postoperative nausea and vomiting; Acid Reflux/Heartburn/GERD; Migraine Headache</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to glucagon or any component of the formulation</td>
</tr>
<tr>
<td>• Insulinoma / Pheochromocytoma</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity, History of tardive dyskinesia or dystonic reaction to Metoclopramide in the past, GI Obstruction or Hemorrhage, and seizure disorder (epilepsy).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10 mg IV/IO slow push; repeat dose x1 every 20-30 minutes PRN for a max of 20mg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rapid IV push may cause intense feelings of anxiety and restlessness</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideal administration to Prevent Agitation/Adverse Effects: Dilute in a 50 or 100ml NS bag and infuse over 10-15 minutes.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not recommended or approved for routine pediatric use*
<table>
<thead>
<tr>
<th><strong>METOPROLOL</strong></th>
<th>Lactation? (Not Recommended)</th>
<th><strong>Trade Name:</strong> Lopressor</th>
</tr>
</thead>
</table>

**Class / Mechanism of Action**

**Beta-1 Selective Beta-Blocker; Antihypertensive; Antianginal Agent**

Selective inhibitor of beta-adrenergic receptors; competitively blocks beta-1-receptors, with little or no effect on beta-2-receptors at oral doses <100 mg (in adults); does not exhibit any membrane stabilizing or intrinsic sympathomimetic activity.

Onset of action: IV: 5 minutes, Duration 3-5 hours

**Indications**

**Labeled Indications:** Angina, Hypertension, Myocardial infarction

**Unlabeled:** Atrial fibrillation/flutter; Hypertrophic cardiomyopathy; Marfan syndrome with aortic aneurysm; Migraine prophylaxis; Supraventricular tachycardia (AVNRT, AVRT, focal atrial tachycardia); Thyrotoxicosis; Ventricular arrhythmias

**Contraindications**

- Hypersensitivity to metoprolol, any component of the formulation, or other beta-blockers; second- or third-degree heart block
- Severe sinus bradycardia (heart rate <45 beats/minute); significant first-degree heart block (P-R interval ≥0.24 seconds); systolic blood pressure <100 mm Hg; moderate to severe cardiac failure

**Adverse Reactions / Precautions**

- Cardiovascular: Hypotension, bradycardia, first degree atioventricular block, arterial insufficiency, cardiac failure, CVA, cold extremities, palpitations, peripheral edema, claudication
- Central nervous system: Dizziness, fatigue, depression, vertigo, confusion, disturbed sleep, hallucination, headache, insomnia, nightmares, temporary amnesia, tinnitus

**Dose and Administration:**

**ADULT**

**Atrial fibrillation or atrial flutter (off-label use):**

**Acute ventricular rate control:**

- IV:
  - 2.5 to 5 mg over 2-5 minutes; repeat dose every 5 minutes as needed; maximum total dose: 15 mg.

**Supraventricular tachycardia/Ventricular arrhythmias (off-label use):**

**Note:** For hemodynamically stable patients if vagal maneuvers and/or adenosine are unsuccessful.

- IV:
  - 2.5 to 5 mg over 2-5 minutes; repeat dose every 5 minutes as needed to achieve a ventricular rate of 90 – 100; maximum total dose: 15 mg.

**Note:** For sustained ventricular tachycardia, Beta-blockers are generally administered in addition to an antiarrhythmic drug (eg, Amiodarone) for these indications. A beta-blocker is also used to reduce shocks in patients who receive an implantable cardioverter defibrillator for these indications; propranolol may be the preferred beta-blocker in these situations

**PEDIATRIC**

**Note:** Guidelines do not recommend beta-blockers as initial therapy in pediatric patients; beta-blockers should be reserved for use in patients who have contraindications to preferred agents or after ≥2 preferred agents have failed in patients with hypertension and chronic kidney disease, proteinuria, or diabetes mellitus.
## MIDAZOLAM

<table>
<thead>
<tr>
<th>Lactation</th>
<th>Trade Name: Versed</th>
<th>(Caution)</th>
</tr>
</thead>
</table>

### Class / Mechanism of Action

**Benzodiazepine**
Acts as an Anxiolytic/Hypnotic, anticonvulsant and sedative.

- **Onset of action:** Sedation; IV: 1-5 minutes, IM: 15 minutes, Intranasal: 4-8 minutes
- **Duration:** IV, less than 2 hours. (20-30 Minutes per ECCN Nurse Protocols, May 2012)

### Indications

**Labeled Indications:** Preoperative sedation, induction and maintenance of general anesthesia

**Unlabeled:** Anxiety / agitation, status epilepticus, conscious sedation (intranasal)

### Contraindications

- Hypersensitivity to midazolam or any component of the formulation or other benzodiazepines
- Acute narrow angle glaucoma, Acute Alcohol Intoxication
- Respiratory Insufficiency/Depression (except during mechanical ventilation)
- (Overdose Reversal: **FLUMAZENIL** can be used, however it carries elevated risk. Respiratory support until the medication is metabolized is traditionally the best care in Benzodiazepine overdose)
- Should not be used in shock
- Neurologic Depression (Head Trauma) (unless having active seizure)

### Adverse Reactions / Precautions

- **No Analgesic properties** (Narcotic pain control is needed for RSI’d / Intubated trauma patients)
- May Cause Respiratory depression: Do not give without stable IV line and BVM (airway control) ready
- Hypotension, vasodilation
- Amnesia, confusion, drowsiness, slurred speech (Paradoxical Reactions possible: aggressiveness, agitation, anxiety, inappropriate behavior)

### Dose and Administration:

- **Induction for RSI; Continued sedation; Hyperthermia:**
  - IV: Induction 0.1mg/kg IV/IO
  - Continued Sedation 0.05 mg IV/IO
  - Infusion sedation 0.05 mg/kg bolus IV, then titrate 0.05-0.1mg/kg/hr IV gtt

- **Transcutaneous Pacing / Cardioversion, Anxiety, Agitation:**
  - IV: 2.5-5mg q 15-30 PRN

- **Seizure Dosage:**
  - If no IV/IO access, 5mg IN (repeat in 10 minutes in opposite nostril if still seizing (preferred) or 10mg IM (alternate)
  - 5mg IV/IO, may repeat
  - After 3 doses should consider addition of another agent.

- **Procedural sedation; Transcutaneous Pacing; Cardioversion:**
  - IV:
    - 0.05-0.1mg/kg q 15-30 PRN
  - Intranasal (unlabeled route):
    - 0.2-0.5 mg/kg (maximum total dose: 10 mg or 5 mg per nare)

- **Induction/RSI (Not preferred drug)**
  - IV:
    - 0.1-0.3 mg/kg

- **Seizure**
  - IV, IM:
    - 0.2 mg/kg Q 15-30 PRN

- **Status epilepticus, prehospital treatment (unlabeled use):**
  - IV:
    - Infants: 1-2 mg
    - 13-40 kg: 4 mg once
    - >40 kg: Refer to adult dosing
### MORPHINE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opioid Analgesic</strong></td>
<td><strong>Binds to opioid receptors within the CNS increasing pain threshold and altering pain reception; inhibits ascending pain pathways (blocking painful stimulus); produces CNS depression</strong></td>
</tr>
<tr>
<td>Onset: IV variable but rapid, Duration variable, patient dependent.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Moderate to severe acute and chronic pain; pain of myocardial infarction; preanesthetic medication</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to morphine sulphate or any component of the formulation</td>
<td></td>
</tr>
<tr>
<td>• Severe respiratory depression</td>
<td></td>
</tr>
<tr>
<td>• Acute or severe asthma (in an unmonitored setting or without resuscitative equipment)</td>
<td></td>
</tr>
<tr>
<td>• Paralytic ileus</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Always be prepared for use of paralytic and intubation (maintain positive control of airway).</td>
<td></td>
</tr>
<tr>
<td>• <strong>Head trauma:</strong> Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur. Some formulations are specifically contraindicated.</td>
<td></td>
</tr>
<tr>
<td>• May cause Hypotension, Use with caution in hypovolemic patients.</td>
<td></td>
</tr>
<tr>
<td>• May worsen Bradycardia</td>
<td></td>
</tr>
<tr>
<td>• May cause life-threatening hypoventilation and Reparatory depression</td>
<td></td>
</tr>
<tr>
<td>• CNS depression: Impairs physical and mental abilities</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chest Pain/AMI:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV/IO:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2-5 mg q 5-15 min PRN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute pain (moderate-to-severe):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM, SubQ: The use of IM/ SubQ injections is no longer recommended especially for repeated administration due to painful administration, variable absorption and lag time to peak effect.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV/IO: (Slow)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 5mg (0.1 mg/kg, range 2.5 – 10mg) every 1-6 hours PRN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute pain (moderate-to-severe):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM, SubQ: The use of IM/ SubQ injections is no longer recommended especially for repeated administration due to painful administration, variable absorption and lag time to peak effect.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV: (Slow)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0.1-0.2 mg/kg q 2-4 hr PRN, not to exceed 10 mg per dose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous infusion:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 10-30 mcg/kg/hour; titrate PRN for pain</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MOXIFLOXACIN | Lactation Yes | Trade Name Avelox
---|---|---
**Class / Mechanism of Action**
Antibiotic (Fluoroquinolone)
Bactericidal - DNA gyrase inhibitor and topoisomerase IV inhibitor – which is an essential enzyme that maintains the superhelical structure, replication, transcription, and repair of bacterial DNA.

**Indications**
**Labeled Indications:** Used for infection control prophylaxis for traumatic open injuries and surgical prophylaxis.

**Contraindications**
- Hypersensitivity to cefazolin, other cephalosporin antibiotics, other beta-lactams, or any component of the formulation
- May cause QT prolongation.
- Avoid use in known aortic aneurysm or dissection

**Adverse Reactions / Precautions**
- Superinfection – prolonged use may result in fungal or bacterial superinfection (including C.Difficile)

**Dose and Administration:**

<table>
<thead>
<tr>
<th>Infection Control:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>For PO tolerable patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 400 mg once daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Max daily dose: 400 mg/day</td>
<td></td>
</tr>
</tbody>
</table>

**Infection Control:**
PO:
Pediatrics:

<15yrs old:
- 10 mg/kg/day PO
  o Max daily dose: 400 mg/day

>15yrs old:
- 400 mg once daily
  o Max daily dose: 400 mg/day
### NALOXONE

**Class / Mechanism of Action**

Antidote, Opioid Antagonist  
Competes and displaces opioids at opioid receptor sites, reversing narcotic effects.

**Indications**

Labeled Indications: Reversal of opioid drug effects, including respiratory depression

**Contraindications**

- Hypersensitivity to naloxone or any component of the formulation

**Adverse Reactions / Precautions**

- When correcting for respiratory depression in a postoperative (intubated patient), carefully titrate the dose to reverse hypoventilation; do not fully awaken patient or reverse analgesic effect.
- Recurrence of respiratory depression is possible continue to watch for respiratory depression until patient hand-off.
- May cause narcotic withdrawal effects

**Dose and Administration:**

<table>
<thead>
<tr>
<th>Opioid overdose (with standard ACS protocols):</th>
<th>ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM, SubQ:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>0.4-2 mg</strong>; may dose every 2-3 minutes if needed;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If no response after 10 mg total, look for other cause of respiratory depression.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Following reversal, may need to readminister after 20-60 minutes.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reversal of respiratory depression with therapeutic opioid doses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM, SubQ:</td>
<td></td>
</tr>
<tr>
<td><strong>0.1-0.4 mg</strong> titrated to adequate respiratory rate. If not improved after 0.8 mg total, look for other cause of respiratory depression.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opioid overdose (with standard PALS protocols):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM, SubQ:</td>
<td></td>
</tr>
<tr>
<td><strong>&lt;5 years or ≤20 kg (unlabeled dose): 0.1 mg/kg/dose</strong> (maximum dose: 2 mg); repeat every 2-3 minutes PRN</td>
<td></td>
</tr>
<tr>
<td><strong>≥5 years or &gt;20 kg: Adult Dosing</strong></td>
<td></td>
</tr>
</tbody>
</table>

Reversal of respiratory depression with therapeutic opioid doses:

- **0.001-0.015 mg/kg/dose**; repeat as needed.
### NIFEDIPINE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Lactation Yes (Not Recommended)</th>
<th>Trade Name: Procardia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antianginal Agent, Calcium Channel Blocker</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhibits movement of calcium ion across cell membranes of smooth muscle and myocardium resulting in relaxation of coronary vascular smooth muscle and vasodilation as well as reduced peripheral vascular resistance (reducing blood pressure).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Indications

**Labeled Indications:** Chronic stable or vasospastic angina  
**Unlabeled:** Prevention and treatment of high altitude pulmonary edema

### Contraindications

- Hypersensitivity to nifedipine or any component of the formulation  
- Cardiogenic Shock  
- Acute MI

### Adverse Reactions / Precautions

- Symptomatic hypotension:  
- Bradycardia, nausea

### Dose and Administration:

<table>
<thead>
<tr>
<th>High altitude pulmonary edema (unlabeled use):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 mg every 4-6 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pulmonary hypertension (unlabeled use)**

| PO: | |
| 30 mg (Extended Release) twice daily; may increase cautiously to 120-240 mg/day | |

**Note:** Do not use for acute anginal episodes; may precipitate myocardial infarction

### High altitude pulmonary edema (Not FDA approved for use in children) (unlabeled use):

| PO: | |
| Immediate release: 0.5 mg/kg/dose (maximum: 20 mg/dose) every 8 hours | |

**Note:** Treatment is needed only necessary if response to oxygen and/or descent is poor.
### Nitroglycerin

**Class / Mechanism of Action**

Antianginal agent, Vasodilator

Induces smooth muscle relaxation and vasodilation of peripheral veins and arteries and coronary arteries thus improving collateral blood flow to ischemic regions of the myocardium. Reduces cardiac oxygen demand by decreasing preload. Onset of action: Sublingual tablet and spray, 1-3 minutes. Duration: 25 minutes

**Indications**

Labeled Indications: Treatment or prevention of angina pectoris

**Contraindications**

- Hypersensitivity to nitrates or any component of the formulation
- Use with phosphodiesterase-5 inhibitors (Sildenafil, Levitra, Cialis) in previous 48hrs
- Increased intracranial pressure
- Hypotension (SBP <90mmHg or >30mmHg below baseline), Bradycardia <50bpm, Tachycardia without heart failure (>100bpm), and Right ventricular infarction.

**Adverse Reactions / Precautions**

- IV/IO access should be placed and SBP should be > 110.
  - Use cautiously in cases of chest pain unless inferior wall / right-ventricular MI can be ruled-out by ECG prior to administration
- Can cause severe hypotension with associated paradoxical bradycardia and increased angina
- Use with caution in volume depleted patients
- Do not use for inferior wall MI and suspected right ventricular involvement

### Dose and Administration:

<table>
<thead>
<tr>
<th>Angina/coronary artery disease:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO:</td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>Sublingual: 0.4 mg every 5 minutes for maximum of 3 doses in 15 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Translingual: 1 spray (0.4mg per spray) onto or under tongue every 3-5 minutes for maximum of 3 doses in 15 minutes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CHF related Respiratory Distress:**

**PO:**

- Sublingual: 0.4 mg every 5 minutes for maximum of 3 doses in 15 minutes as long as SBP>90

**CHF or Cardiogenic Shock:**

**IV Drip:**

- Children: 0.25 - 0.5 mcg/kg/min; titrate by 1 mcg/kg/min q 15-20 min as tolerated (Typical dose=1-5mcg/kg/min)(Max 10mcg/kg/min)
- Adolescents: 5-10 mcg/min (not per kg) (max 200 mcg/min)

**Not indicated in most children, even with heart failure, as their heart failure is not usually due to coronary artery disease. Could cause significant problems in those with depressed myocardial function. Consult Medical Direction (if able) before use in Pediatrics.**
### NOREPINEPHRINE

**Class / Mechanism of Action**

**Alpha and Beta Agonist**

Stimulates beta₁ and alpha adrenergic receptors: increases contractility, heart rate, and vasoconstriction. Increases systemic blood pressure and coronary blood flow. Effects on vasoconstriction (alpha receptors) are greater than inotropic (beta receptors). Onset of action: IV very rapid. Duration: 1-2 minutes.

### Indications

**Labeled Indications:** Treatment of shock persisting after adequate fluid volume replacement; severe hypotension.

ALS 2020: Severe cardiogenic shock and hemodynamically significant hypotension (SBP <70mmHg) with low total peripheral resistance. Agent of last resort for management of ischemic heart disease and shock.

### Contraindications

- Hypersensitivity to norepinephrine, bisulfites or any component of the formulation
- Hypotension from hypovolemia except as an emergency measure to maintain coronary and cerebral perfusion until volume can be replaced

### Adverse Reactions / Precautions

- No applicable use in hemorrhagic shock unless fluid replacement therapy maximized!
  - Maximize use of Blood products / Crystalloids before considering use in hemorrhagic shock.
- Strong Vesicant; ensure proper catheter placement and avoid extravasation, use a large vein (preferably a central line) and avoid leg veins.
- Assure adequate circulatory volume to minimize need for vasoconstrictors. Monitor BP closely, **avoid** hypertension and adjust infusion rate as needed.

### Dose and Administration:

<table>
<thead>
<tr>
<th>Hypotension/shock:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: Administer as continuous infusion with infusion pump. Do not use in same line as sodium bicarbonate. It will inactivate norepinephrine.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initial: <strong>2-20 mcg/minute</strong>; titrate to SBP goal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Maintenance: <strong>2-4 mcg/minute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post ROSC Hypotension:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initial: <strong>0.1-0.5 mcg/kg/minute</strong> titrate to effect.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If unable to maintain MAP >60mmHg, add **Epinephrine** infusion.

#### Use in Burn Patient:

For Burn patients, norepinephrine is only used when target MAP (≥55) and UOP (≥30mL/hr) fail to be reached with fluid resuscitation alone. Its sequence of use follows administration of **Vasopressin**.

*(See infusion chart next page for mix and dosage information)*
## NOREPINEPHRINE (LEVOPHED)

**Dosing Range:** 2-20 mcg/min (120-1200 mcg/hr)

**MIX 4 mg/500 mL**

**CONCENTRATION 8 mcg/mL**

<table>
<thead>
<tr>
<th>Dose mcg/min</th>
<th>Rate (60 gtt/mL)</th>
<th>Micro (20 gtt/mL)</th>
<th>Macro (15 gtt/mL)</th>
<th>Macro (10 gtt/mL)</th>
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</table>

Macro-Drip (20 gtt/ml) or Micro-Drip is set of choice for this infusion

Start at lowest dose and increase rate by 0.5 mcg/min every 2 minutes PRN to target MAP >60 mmHg
# ONDANSETRON

**Class / Mechanism of Action**

**Antiemetic**

Blocks serotonin, peripherally on vagus nerve terminals and centrally. Onset of action is 5-30 minutes dependent on route.

## Indications

**Labeled Indications:** Prevention of postoperative nausea and vomiting

**Unlabeled:** Hyperemesis gravidarum (severe or refractory)

## Contraindications

- Hypersensitivity to ondansetron or any component of the formulation

## Adverse Reactions / Precautions

- Dose dependent QT interval prolongation occurs and IV doses >16mg are not recommended.
  - In most patients, QT changes are not clinically relevant; however, if used with other medications that prolong QT intervals (antiarrhythmics) or in those at risk for QT prolongation, arrhythmia can occur. Torsades de points has been reported.

## Dose and Administration:

### ADULT

**Nausea and Vomiting:**

- IV/IO/IM/PO
  - 4-8 mg

**Treatment of severe or refractory hyperemesis gravidum** (unlabeled use):

- IV:
  - 8 mg administered over 15 minutes every 12 hours

### PEDIATRIC

**Nausea and Vomiting** (Children 1 month to 12 years):

- IV:
  - ≤40 kg: 0.1 mg/kg as a single dose over 2-5 minutes
  - >40 kg: 4 mg as a single dose over 2-5 minutes

---

Trade Name: **Zofran**
**PHENYLEPHRINE**  

**Trade Name:** Neosynephrine

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alpha Adrenergic Agonist</strong></td>
</tr>
</tbody>
</table>
| Potent, direct acting alpha adrenergic agonist with virtually no beta adrenergic activity; causes systemic arterial vasoconstriction.  
Onset of action IV: Immediate, Duration: approximately 15-20 minutes. |

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Treatment of hypotension, vascular failure in shock</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
</table>
| • Hypersensitivity to phenylephrine or any component of the formulation  
• Ventricular Tachycardia and Hypertension  
• Bradycardia |

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
</table>
| • No applicable use in hemorrhagic shock unless fluid replacement therapy maximized!  
Maximize use of Blood products / Crystalloids before considering use in hemorrhagic shock.  
• Not recommended for routine use in the treatment of septic shock  
• Reflexive Bradycardia. Assure adequate circulatory volume to minimize need for vasoconstrictors.  
Monitor BP closely, avoid hypertension and adjust infusion rate as needed.  
• Vesicant: Avoid extravasation, will cause tissue damage/necrosis, ensure proper needle placement |

## Dose and Administration:

### Hypotension / Shock:

**ADULT**

- **IV Push:**
  - **50-200 mcg/dose** q 5-10 minutes
    - Max 1000 mcg
    - Titrate to blood pressure, use as temporary support or bridge to Vasopressor drip
    - Mix 10mg phenylephrine in 100mL NS for a concentration of 100mcg/mL

- **IV Infusion:**
  - **40 - 200 mcg/min;** titrate to MAP > 60 mm Hg.
    - To titrate, increase rate by 10 mcg/min every 2 minutes.
    - Maximum dose is 200 mcg/min.
    - Mix 10mg phenylephrine in 250mL D5W/NS for a concentration for 40mcg/mL

**PEDIATRIC**

- **Always Reference BROSELOW Tape**

- **IV Push:**
  - **5-20 mcg/kg/dose** every 10-15 minutes as needed

- **IV Infusion:**
  - **0.1-0.5 mcg/kg/minute**

**Note:** Almost never used in pediatric shock. Isolated increased afterload usually causes significant problems in this population. Use with caution and contact Medical Direction if able.

If unable to maintain MAP >60mmHg, add [Epinephrine](#) infusion.
## PRALIDOXIME CHLORIDE

### Lactation (Caution)

### Trade: 2-Pam Chloride

### Class / Mechanism of Action

**Antidote for organophosphate anticholinesterase poisoning**

Peak plasma concentration following IM dose is reached in approximately 30 minutes

### Indications

**Labeled Indications:**
- Organophosphate Pesticide Poisoning: Used with Atropine to reverse muscle paralysis
- Chemical Warfare Agent Poisoning: Used with Atropine for treatment of nerve agent (e.g., sarin, soman, tabun, VX [methylphosphonothioic acid])

### Contraindications

- None in emergency setting

### Adverse Reactions / Precautions

- Not effective in exposure to phosphorus, inorganic phosphates, or organophosphates that do not possess anticholinesterase activity.
- Consider cautions and adverse reactions of Atropine when using together
- Monitor BP and cardiac rhythm

### Dose and Administration:

#### Pesticide Poisoning:

**Mild symptoms:** Miosis or blurred vision, tearing, runny nose, hypersalivation or drooling, wheezing, muscle fasciculations, nausea/vomiting. Severe symptoms: behavioral changes, severe breathing difficulty, severe respiratory secretions, severe muscle twitching, involuntary defecation or urination, seizures, unconsciousness.

#### Chemical Warfare Agent Poisoning:

**Mild to moderate symptoms:** Localized sweating, muscle fasciculations, nausea, vomiting, weakness, and/or dyspnea.

**Severe symptoms:** Apnea, flaccid paralysis, seizures, and/or unconsciousness.

##### DOSING:

- **Auto-injector:** IM into anterolateral aspect of thigh and hold in place for 10 seconds.
  - **Pralidoxime chloride auto-injector single dose 600mg:** (administer after **Atropine**). Repeat injections if symptoms remain after 15min. Repeat again if not resolved after 2nd 15min.
  - **DuoDote®, ATNAA:** For ≥2 mild symptoms, inject single dose. If severe symptoms develop, inject 2 additional doses in rapid succession.
  - **DuoDote®, ATNAA:** For severe symptoms, utilize 3 auto-injectors (total dose: atropine 6.3 mg and pralidoxime chloride 1800 mg) in rapid succession.

**Note:** DuoDote® and ATNAA auto-syringe provides a sequential single IM dose of atropine (2.1mg) and pralidoxime chloride (600mg) through one needle.

#### Chemical Warfare Agent Poisoning:

**Pralidoxime (2-PAM) Drip Protocol 8-10mg/kg/hr**

*given after 1800mg IM Injection (3 ATNAAs) if symptoms persist.*

1. Reconstitute 1 gram 2-PAM with 20mL of sterile water
2. Add 10mL 2Pam (500mg) to 100 mL Bag of NS and infuse over 5 minutes
3. Prepare continuous infusion by mixing 1 gram (20mL reconstituted) in 100mL bag of NS which will provide a 10mg/mL solution. Can also prepare 10 grams in 1L NS for a 10mg/mL solution.
4. Begin continuous infusion at 10mg/kg/hr.

#### Chemical Warfare Agent Poisoning:

**Organophosphate Anticholinesterase Nerve Agents:**

**IM:**
- Children 0–10 years of age and adolescents >10 years of age who present with mild/moderate symptoms: 15 mg/kg.
- Children 0–10 years of age and adolescents >10 years of age who present with severe symptoms: 25 mg/kg.
- Children and Adolescents ≥40 kg dose as adult
**PROCAINAMIDE**  
**Lactation? (Not Recommended)**  
Trade Name: Procanbid

### Class / Mechanism of Action

**Antiarrhythmic Agent, Class Ia**  
Decreases myocardial excitability & conduction velocity, may depress myocardial contractility by increasing the electrical stimulation threshold of ventricle, His-Purkinje system and through direct cardiac effects  
Onset of action: IV: 5 minutes, IM: (Not for emergent situations) 10 to 30 minutes, Duration 4-6 hours

### Indications

**Labeled Indications:** Treatment of supraventricular arrhythmias, life-threatening ventricular arrhythmias.  
**Unlabeled:** Atrial fibrillation (preexcited); Junctional tachycardia; Stable monomorphic ventricular tachycardia.

### Contraindications

- Hypersensitivity to procainamide, procaine, other ester-type local anesthetics  
- complete heart block; second-degree AV block or various types of hemiblock  
- SLE (Systemic lupus erythematosus)  
- Torsade de pointes

### Adverse Reactions / Precautions

- Lupus-like syndrome  
- Hypotension  
- Skin rash  
- Diarrhea, dysgeusia, nausea/vomiting

### Dose and Administration: ADULT

<table>
<thead>
<tr>
<th>Ventricular arrhythmias/ Atrial fibrillation (preexcited):</th>
<th>Note: Dose must be individualized and titrated to patient response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV Loading dose:</strong> 10 to 17 mg/kg at a rate of 20 to 50 mg/minute or 100 mg every 5 minutes;</td>
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<tr>
<td><strong>Must dilute prior to IV administration. Dilute loading dose to a maximum concentration of 20 mg/mL; administer loading dose at a maximum rate of 50 mg/minute until:</strong></td>
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<tr>
<td>- Arrhythmia suppression</td>
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<td>- Hypotension</td>
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<td>- QRS widens by &gt;50%</td>
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<td>- total dose 17 mg/kg reached</td>
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<tr>
<td><strong>Maintenance infusion:</strong> 2 to 6 mg/min</td>
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</tbody>
</table>

### Ventricular arrhythmias: Infants, Children, and Adolescents IV:

- Loading dose: 10 to 15 mg/kg over 30 to 60 minutes  
  - Neonates: Administer over 60 minutes  
  - Infants and Children: Administer over 30 to 60 minutes  
  - Adolescents: Administer at usual infusion rate: 20 to 50 mg/minute not to exceed 50 mg/minute  
- Maintenance infusion: 20 to 80 mcg/kg/minute; maximum daily dose: 2000 mg/24 hours  
  **Note:** Infusion rate should be decreased if QT interval becomes prolonged or patient develops heart block; discontinue the infusion if patient develops hypotension or QRS interval widens to >50% of baseline; severe hypotension can occur with rapid IV administration
### PROMETHAZINE

**Class / Mechanism of Action**

Phenothiazine derivative

Antiemetic, Histamine H₁ Antagonist, Sedative

Blocks postsynaptic dopaminergic receptors in the brain; strong alpha adrenergic blocking effect and depresses release of hypothalamic and hypophyseal hormones; reduces stimuli to the reticular system

Onset of action IV: 5 minutes, Duration 4-6 hours

### Indications

**Labeled Indications:** Symptomatic treatment for allergic conditions; antiemetic; motion sickness; sedative; adjunct to postoperative analgesia and anesthesia

**Unlabeled:** Treatment of nausea and vomiting of pregnancy

### Contraindications

- Hypersensitivity to promethazine, phenothiazine allergy, or any component of the formulation
- Coma
- Children <2 years old
- Intra-arterial and SubQ administration

### Adverse Reactions / Precautions

- May cause Bradycardia, hyper-/hypotension, nonspecific QT changes, orthostatic hypotension, tachycardia: Life threatening arrhythmias have occurred with normal dosage
- May cause extrapyramidal symptoms (pseudoparkinsonism, acute dystonic reactions, akathisia, etc.)
- Avoid use in severe respiratory disease (asthma, COPD), and in patients using other sedatives or depressants: may lead to respiratory depression
- **Vesicant:** can cause severe tissue injury regardless of route of delivery
  - Deep IM injection; or IV in line. Slow IVP over 1 minute
  - For IV, ensure proper needle/catheter venous placement; avoid extravasation

### Dose and Administration:

#### ADULT

**Antiemetic:**

- IV push over >1 minute
- **12.5 mg, not to exceed 25 mg**
  - May repeat 12.5mg once after 10 minutes if first dose ineffective
  - Subsequent dose of 25mg may be given every 4 hours
  - Can dilute with 10-20mL of NS

**Sedation, analgesia/hypnotic adjunct:**

- 25-50 mg in combination with analgesic or hypnotic (at reduced dosage)

**Allergic conditions** (including allergic reactions to blood or plasma):

- 25 mg, may repeat in 2 hours when necessary

#### PEDIATRIC

**Antiemetic:**

- IM, IV:
  - Children ≥2 years: **0.25 mg/kg** 4-6 times/day as needed (maximum: 12.5 mg/dose)

**Preoperative analgesia/hypnotic adjunct:**

- IM, IV:
  - Children ≥2 years: **1.1 mg/kg** in combination with an analgesic or hypnotic (at reduced dosage) and with an atropine like agent (at appropriate dosage).

**Note:** Promethazine dosage should not exceed half of suggested adult dosage.
**PROPOFOL**  
**Lactation Yes** (Not Recommended)  
Trade Name: Diprivan

### Class / Mechanism of Action

**General Anesthetic**  
Lipophilic intravenous general anesthetic.  
Onset of action IV bolus: 9-51 seconds (average 30 seconds), Duration is dose and rate dependent: 3-10 minutes, prolonged with continued doses

### Indications

**Labeled Indications:** Induction of anesthesia in patients ≥3 years of age; maintenance of anesthesia in patients >2 months of age; sedation in intubated, mechanically-ventilated ICU patients

### Contraindications

- Hypersensitivity to propofol or any component of the formulation  
- Allergy to eggs, egg products, soybeans, soy products, and peanuts.

### Adverse Reactions / Precautions

- May cause Hypotension especially in hypovolemic patients or if bolus dosing is used.  
  - Hypotension may result in reduction of MAP exceeding 30%  
    - Head Injury patients or those with suspected / known increased intracranial pressure are at increased risk of decreased cerebral perfusion pressure.  
- Do not use in pre-hospital trauma environment or in transfer patients unless directed by medical director or provided written orders by referring provider.  
- No Analgesic properties. Must supplement with analgesic agents.

### Dose and Administration:

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<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
<th>Always Reference BROSELOW Tape</th>
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<tbody>
<tr>
<td><strong>Sedation/ RSI:</strong></td>
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<tr>
<td>IV Push:</td>
<td>1-2.5 mg/kg every 5-10min PRN.</td>
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<td><strong>Maintenance of general anesthesia:</strong></td>
<td>10-75 mcg/kg/min via infusion pump or Dial-a-Drip. Titrate to minimum effective dose. <em>(See infusion chart next page)</em></td>
<td>125-300 mcg/kg/minute (or 7.5-18 mg/kg/hour)</td>
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<td>O MAX DOSE: 100 mcg/kg/min.</td>
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<td>Use of Dial-a-Drip tubing in the absence of an infusion pump will increase accuracy of infusion dosage.</td>
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</table>

Note: Wait 3-5 minutes between dosage changes to clinically assess drug effects. Smaller doses are required when used with opioids.
**PROPOFOL (DIPRIVAN)**

<table>
<thead>
<tr>
<th>Pt. Weight</th>
<th>Dose Rate</th>
<th>Micro Drip (60 gtt/mL)</th>
<th>Macro Drip (50 gtt/mL)</th>
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**Dosing Range:** 10-75mcg/kg/min (400-3000mcg/kg/hr)

---

**Macro-Drip (20 gtt/mL) or Micro-Drip is set of choice for this infusion**

Titrated to minimum effective dose. Allow 1-5 minutes between dosing changes to sedative and hemodynamic effects.
### ROCURONIUM

<table>
<thead>
<tr>
<th>Trade Name: Zemuron</th>
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</table>

#### Class / Mechanism of Action

**Nondepolarizing Neuromuscular Blocking Agent (Paralytic)**

Blocks acetylcholine from binding to motor neuron receptors inhibiting depolarization.

Onset of action IV: 1-2 minutes, Duration: approximately 25-40 minutes (increases with higher doses)

#### Indications

**Labeled Indications:** Rapid Sequence Intubation/Paralysis and routine endotracheal intubation, facilitates mechanical ventilation in ICU patients

#### Contraindications

- Hypersensitivity (eg, anaphylaxis) to rocuronium, other neuromuscular-blocking agents, or any component of the formulation

#### Adverse Reactions / Precautions

- Resistance may occur in burn patients (>30% of body) for period of 5-70 days after injury
- High potential for interactions: Numerous drugs either antagonize (eg, acetylcholinesterase inhibitors) or potentiate (eg, calcium channel blockers, certain antimicrobials, inhalation anesthetics, lithium, magnesium salts, procainamide, and quinidine) the effects of neuromuscular blockade; use with caution in patients receiving these agents.
- **Provides NO analgesia or sedation!**
  - Must provide appropriate sedation and analgesia prior to paralytic use and throughout maintenance.

#### Dose and Administration:

<table>
<thead>
<tr>
<th>RSI:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Push:</td>
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<td>Always Reference BROSELOW Tape</td>
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<tr>
<td>• 1mg/kg</td>
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<tr>
<td>(Dosing ranges from 0.6-1.2 mg/kg)</td>
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<tr>
<td><strong>Note:</strong> In adult patients with morbid obesity (BMI &gt;40 kg/m²), use dose of 1.2 mg/kg using ideal body weight (IBW)</td>
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<tr>
<td>Maintenance dosing: (unlabeled and un referenced dose)</td>
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<tr>
<td>IV Push:</td>
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<td></td>
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<tr>
<td>• 1 mg/kg IV/IO q30-45min PRN or 8-12 mcg/kg/min IV/IO</td>
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<tr>
<td>(Dosing ranges from 0.6-1.2 mg/kg)</td>
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<table>
<thead>
<tr>
<th>RSI:</th>
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<tbody>
<tr>
<td>IV:</td>
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<tr>
<td>• 1mg/kg</td>
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<tr>
<td>(Dosing ranges from 0.6 - 1.2 mg/kg.)</td>
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</table>

**Maintenance bolus dosing:** (unlabeled and un referenced dose)

<table>
<thead>
<tr>
<th>IV Push:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>• 1 mg/kg every 30-45 minutes</td>
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<tr>
<td>(Dosing ranges from 0.6 - 1.2 mg/kg.)</td>
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</tr>
</tbody>
</table>
# Sodium Bicarbonate

**Class / Mechanism of Action**

Alkalizing Agent; Antacid
Provides bicarbonate ion to neutralize hydrogen ion concentration and raise blood and urinary pH
Onset of action IV: 15 minutes, Duration 1-2 hours

**Indications**

Labeled Indications: Management of metabolic acidosis, hyperkalemia, overdose of certain drugs (including tricyclic antidepressants and aspirin), and gastric hyperacidity.

**Contraindications**

- Alkalosis, hypernatremia, hypocalcemia
- Severe pulmonary edema
- Unknown abdominal pain

**Adverse Reactions / Precautions**

- Use should be reserved for documented metabolic acidosis and for hyperkalemia induced cardiac arrest. Routine use in cardiac arrest is not recommended.
- Avoid extravasation, tissue necrosis can occur.
- Can cause Hypernatremia, hypocalcemia, hypokalemia, intracranial acidosis, metabolic alkalosis

**Dose and Administration:**

<table>
<thead>
<tr>
<th></th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TriCyclic Antidepressant OD</strong></td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>IV:</td>
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</tr>
<tr>
<td>1 mEq/kg; May repeat to maintain QRS &lt;100</td>
<td></td>
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</tr>
<tr>
<td>Start Maintenance Infusion: 100-150mEq (2-3 amps) in 1 L D5 / NS @ 100-200 mL/hr IV</td>
<td></td>
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</tr>
</tbody>
</table>

**Cardiac arrest (ACLS Guidelines, 2015):**

IV:

- 1 mEq/kg/dose; repeat doses should be guided by arterial blood gases

**Note:** Routine use in cardiac arrest is not recommended. Use may be considered in cases of prolonged cardiac arrest once adequate alveolar ventilation and effective cardiac compressions have been established. In some cardiac arrest situations (eg, metabolic acidosis, hyperkalemia, or tricyclic antidepressant overdose), sodium bicarbonate may be beneficial.

**Hyperkalemia (ACLS Guidelines, 2015)**

IV:

- 50 mEq over 5 minutes

**Metabolic acidosis:**

If acid-base status is not available: 2-5 mEq/kg infusion over 4-8 hours

**Follow Adult Dosing**
# SUCCINYLCHOLINE

**Class / Mechanism of Action**

**Depolarizing Neuromuscular Blocking Agent (Paralytic)**
Act like acetylcholine, produces myoneural depolarization causing sustained flaccid skeletal muscle paralysis. Onset of action IV: 30-60 seconds, Duration 5-9 minutes with single dose.

**Indications**

**Labeled Indications:** Rapid Sequence Intubation and routine endotracheal intubation

**Contraindications**
- Hypersensitivity to succinylcholine or any component of the formulation
- Acute phase of injury following major burns, multiple trauma (greater than 5 days after injury)
- Myopathies associated with elevated serum creatine phosphokinase and myasthenia gravis
- **DO NOT USE IN PATIENTS WITH BURNS, CRUSH INJURIES, OR HYPERKALEMIA**
- Re-Dosing is not advised due to increased risk of Hyperkalemia
- Neuromuscular disease (Muscular dystrophy, Spinal Muscular Atrophy, etc.)

**Adverse Reactions / Precautions**
- May cause Bradycardia, Malignant hyperthermia, and increased intraocular pressure
- Severe hyperkalemia can develop in cases of chronic abdominal infection, burn injury, children with skeletal muscle myopathy, subarachnoid hemorrhage, or conditions which cause degeneration of the nervous system commonly greater than 5 days old. Potassium increase of 0.5 mEq/L is expected with use.
- **Provides NO analgesia or sedation!**
  - Must provide appropriate sedation and analgesia prior to paralytic use and throughout maintenance.

## Dose and Administration:

<table>
<thead>
<tr>
<th>RSII / Neuromuscular blockade:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>&lt;10kg:</td>
<td></td>
<td></td>
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<tr>
<td>&gt;10kg:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSII / Neuromuscular blockade:</td>
<td></td>
<td></td>
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<tr>
<td>IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10kg:</td>
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<td></td>
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<tr>
<td>&gt;10kg:</td>
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</tbody>
</table>

**Note:** Pretreatment with 10% dosage of non-depolarizing agents prior to neuromuscular-blockade with Succinylcholine is **NO LONGER ADVISED**

---

**Lactation? (Caution)**

**Trade Name:** Anectine
<table>
<thead>
<tr>
<th>THIAMINE</th>
<th>♀</th>
<th>Lactation: Yes (Caution)</th>
<th>Trade Name: Vitamin B1</th>
</tr>
</thead>
</table>

**Class / Mechanism of Action**
Vitamin, water soluble
Essential coenzyme in carbohydrate metabolism. Onset of action IV/IM: Rapid

**Indications**
**Labeled Indications:** Treatment of thiamine deficiency including beriberi, Wernicke's encephalopathy, Korsakoff's syndrome, neuritis associated with pregnancy, or in alcoholic patients

**Contraindications**
- Hypersensitivity to thiamine or any component of the formulation

**Adverse Reactions / Precautions**
- Administration of dextrose may worsen acute symptoms of thiamine deficiency; use caution when low thiamine is suspect

**Dose and Administration:**

<table>
<thead>
<tr>
<th></th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMS; Seizure; Syncope; Malnutrition; Vomiting and Diarrhea; w/ Hx of ETOH abuse:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM/IV:</td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>100mg/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AMS or Seizure w/ signs of Malnutrition:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM/IV:</td>
<td></td>
<td></td>
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<tr>
<td>25mg/day</td>
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</tbody>
</table>
## TRANEXAMIC ACID

**Trade Name:** Cyklokapron/Lysteda

### Class / Mechanism of Action

**Antifibrinolytic Agent, Hemostatic Agent**

Displaces plasminogen from fibrin resulting in inhibition of fibrinolysis and inhibits the proteolytic activity of plasmin

### Indications:

- **Trauma-associated hemorrhage:** Casually likely needing blood transfusion (hemorrhagic shock, elevated lactate, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding)
- **Post-Operative Hemorrhage** by dissection, enteric staples or suspected internal bleeding
- **Signs or symptoms of significant TBI or altered mental status associated with blast or blunt trauma**
- **Postpartum Hemorrhage** (continued bleeding despite Oxytocin and fundal massage)

### Contraindications:

- TXA is contraindicated in trauma if dose is not given within first 3 hours following Traumatic event (Ideal dosing time-frame is within 1 hour of trauma)
- Hypersensitivity to tranexamic
- Subarachnoid hemorrhage
- Thromboembolic disease (Cerebral Thrombosis, DVT, PE)

### Adverse Reactions / Precautions

- Disseminated intravascular coagulation (DIC): Use with extreme caution in patients with DIC requiring antifibrinolytic therapy; patients should be under strict supervision of a physician experienced in treating this disorder. TXA should be used in Pt.’s with trauma related DIC however.
- Thrombosis (especially when given after 3hr from injury)
- Seizure

### Dose and Administration: ADULT PEDIATRIC Always Reference BROSELOW Tape

#### Trauma-associated hemorrhage (unlabeled use):

**IV:**

- Initial Dose: 2 gram of TXA in 100 cc NS or LR ASAP via IV/IO Bolus, or 2 gram IV/IO push (1 gram over 1 minute per push) but NOT later than 3 hours after injury.
- If patient received 1 gram of TXA prior and <3hrs from time of injury: 1 gram TXA IV/IO push over 1 minute or mixed in 100cc NS or LR Bolus. If >3hr from time of injury: **DO NOT** administer TXA.

#### Suspected Post-Operative Hemorrhage by dissection, enteric staples or suspected internal bleeding:

- Initial Dose: 2 gram of TXA in 100 cc NS or LR ASAP via IV/IO Bolus or 2 gram IV/IO push (1 gram over 1 minute push) but NOT later than 3 hours after start of suspected hemorrhage.

#### Trauma-associated hemorrhage (unlabeled use):

**IV:**

- Initial Dose: 15mg/kg via IV/IO Bolus (goal within 1 minute),
## VASOPRESSIN

### Class / Mechanism of Action

**Antidiuretic Hormone Analog-Vasopressor**

Vasopressin, at therapeutic doses used for vasodilatory shock, stimulates the AVPR1a (or V1) receptor and increases systemic vascular resistance and mean arterial blood pressure; in response to these effects, a decrease in heart rate and cardiac output may be seen.

Onset of action IV: Rapid with peak effect occurring within 15 minutes of initiation of continuous IV infusion. Duration: Within 20 minutes after IV infusion terminated.

### Indications

**Labeled Indications:** Treatment of hypotension, vascular failure in shock

### Contraindications

- Hypersensitivity to Vasopressin or any component of the formulation
- Use with caution in patients with asthma, cardiovascular disease, renal disease, or a history of seizure disorder

### Adverse Reactions / Precautions

- **No applicable use in hemorrhagic shock unless fluid replacement therapy maximized! Maximize use of Blood products / Crystalloids before considering use in hemorrhagic shock.**
- Assure adequate circulatory volume to minimize need for vasoconstrictors. Monitor BP closely, avoid hypertension and adjust infusion rate as needed.
- Vesicant: Avoid extravasation, will cause tissue damage/necrosis, ensure proper needle placement
- Cardiac arrhythmias are possible, monitor with 12 lead EKG

### Dose and Administration:

<table>
<thead>
<tr>
<th>Hypotension / Shock:</th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypotension / Shock:</strong></td>
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</tr>
<tr>
<td>Vasopressors should be used if patient is hypotensive after fluid resuscitation to maintain mean arterial pressure (MAP) ≥65 mmHg.</td>
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</tr>
<tr>
<td>Use in addition to norepinephrine for raising MAP to target or to decrease norepinephrine dosage.</td>
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<tr>
<td>Titrate to lowest effective dose.</td>
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<td></td>
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</tr>
<tr>
<td><strong>IV Infusion:</strong></td>
<td>4 Unit bolus IV/IO followed by 0.04 U/min infusion to maintain MAP&gt;65 mmHg</td>
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<tr>
<td><strong>Limited data available; efficacy results have varied.</strong></td>
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<tr>
<td><strong>IV Infusion:</strong></td>
<td>0.17 to 8 MILLIUNITS/kg/minute (0.01 to 0.48 units/kg/hour)</td>
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</table>
**VECURONIUM**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nondepolarizing Neuromuscular Blocking Agent (Paralytic)</strong></td>
</tr>
<tr>
<td>Blocks acetylcholine from binding to motor neuron receptors inhibiting depolarization.</td>
</tr>
<tr>
<td>Onset of action IV: 1.5-3 minutes, Duration: approximately 30-60 minutes</td>
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</table>

<table>
<thead>
<tr>
<th>Indications</th>
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</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Endotracheal intubation, facilitates mechanical ventilation in ICU patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to vecuronium or any component of the formulation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Resistance may occur in burn patients (&gt;30% of body) for period of 5-70 days after injury</td>
</tr>
<tr>
<td>• High potential for interactions: Numerous drugs either antagonize (eg, acetylcholinesterase inhibitors) or potentiate (eg, calcium channel blockers, certain antimicrobials, inhalation anesthetics, lithium, magnesium salts, procainamide, and quinidine) the effects of neuromuscular blockade; use with caution in patients receiving these agents.</td>
</tr>
<tr>
<td>• <strong>Provides NO analgesia or sedation!</strong></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADULT</strong></td>
</tr>
<tr>
<td><strong>PEDiatric</strong> Always Reference BROSELOW Tape</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RSI and maintenance of paralysis:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV Push:</strong></td>
</tr>
<tr>
<td>• Induction: 0.1 mg/kg</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>IV Continuous infusion:</strong></td>
</tr>
<tr>
<td>• 1 mcg/kg/min and titrate to 2:4 train of four (TOF) if stimulation devise is available.</td>
</tr>
</tbody>
</table>

**Note:** Paralytic use and management: If available, utilize the train of four stimulation device with either the temple or radial/ulnar nerve placement. Maintain paralysis at a level of 2/4 twitches with TOF stimulation.

**Note:** Vecuronium is only recommended for use in RSI in the absence of available Succinylcholine or Rocuronium, as they are the preferred induction agents.
AIRWAY

Indications of:
- Respiratory Distress / Failure
- Patient Unable to Protect Airway (GCS <8)

SpO2 Decreasing or <90% (Room Air) with / without supporting Signs / Symptoms of:
  o Tachypnea, Tachycardia, Fever, Cough, Wheezing, Rhonchi, Rales, Shock

Difficulty Breathing or Excess Work as demonstrated by:
  o Pursing of Lips, Accessory Muscle Involvement, Cyanosis, Decreased Ability to Speak, Diaphoresis

Airway Obstruction due to Trauma, Edema, Excess Secretions, Foreign Body, or Tongue

SpO2 <90% on Room Air

Apnea

Decreased LOC (GCS <8)

Definitive Airway Established and SpO2 >93% on O2?

YES

NO

Continuous Monitoring
- Repeat: Sedative & Paralytic per dose and time guideline

Reassess Interventions
- Restart Protocol
- Consider other Causes FAILED AIRWAY GUIDELINE

Indication for Advanced Airway
- Not Protecting Airway (GCS <8)
- Suspect Deterioration

SpO2 <90% (Room Air)

YES

NO

Insert Nasopharyngeal Airway (NPA)
  (If NO basal skull fracture suspected)
- Consider Placing OPA
- Start Supplemental O2
- BVM (Assisted Ventilations) as needed

CheST Trauma Protocol

SpO2 >93% on Supplemental O2?

NO

YES

Definitive Airway if:
  • Intact Gag Reflex
  • Conscious
  • GCS >8

Endotracheal Intubation

BIA

Cricothyroidotomy

RSI PROCEDURE if:

Return to Guideline:
- TACTICAL EVACUATION
- RESPIRATORY DISTRESS

SpO2 >90%?

YES

NO

Heimlich maneuver if indicated

Reposition Airway
(jaw-thrust for c-spine injury)
Sweep (not blind) & Suction as needed

Return to Guideline:
- TACTICAL EVACUATION
- RESPIRATORY DISTRESS

Recheck q5 minutes
- Start Supplemental O2
- Place OPA / NPA prn
- Sweep and Suction prn
- BVM assist with respiration prn
- Restart Guideline if de-compensating (SpO2 <90% on O2)

SpO2 >93% on O2?

YES

NO

Reassess Interventions
• Restart Protocol
• Consider other Causes

SpO2 Decreasing or <90% (Room Air) with / without supporting Signs / Symptoms of:
  o Tachypnea, Tachycardia, Fever, Cough, Wheezing, Rhonchi, Rales, Shock

SpO2 <90% on Room Air

Apnea

Decreased LOC (GCS <8)

Recheck q5 minutes
- Recheck q5 minutes
- Advanced Airway if de-compensating

SpO2 >93% on Supplemental O2?

YES

NO

Consider: Direct Laryngoscopy to visualize for foreign body obstruction if Sweep, Suction and Heimlich fail to open airway

SpO2 >90%?

(Repeat: Sedative & Paralytic per dose and time guideline)

Definitive Airway if:
  • Intact Gag Reflex
  • Conscious
  • GCS >8

SpO2 <90% on Room Air

YES

NO

SpO2 <90% on Room Air

SpO2 >90%?

YES

NO

SpO2 >90%?

YES

NO
Continued from: Tactical Evacuation Guideline or Pediatric Respiratory Distress Guideline

Indications of:
- Respiratory Distress / Failure
- Patient Unable to Protect Airway (GCS <8)

Need for Advanced Airway?
- Not Protecting Airway (GCS <8)
- Suspect Deterioration

Airway Open?

Reposition Airway
(Rolled towel under shoulders jaw-thrust for c-spine injury)
Sweep & Suction as needed Heimlich maneuver or Back Slap for Infants as indicated

Consider: Direct Laryngoscopy to visualize foreign body obstruction. If present: Remove, Suction, and Heimlich to open airway

Definitive Airway Established and SpO2 >93 percent on O2?

Establish Advanced Airway per Procedure in the following sequence: (Move to next procedure per individual contraindications and attempt failures)
1. KING-LT™ (Size 2 for 12-25kg, 2.5 for 25-35kg, or 3 for child 4'-5' tall)
2. ENDOTRACHEAL INTUBATION
3. CRICOTHYROIDOTOMY (Use only when able to palpate cricothyroid membrane: typically children >12y/o)
4. Needle CRICOTHYROIDOTOMY (Unable to palpate cricothyroid membrane: Children < 8y/o)

SpO2 >93 percent (Room Air)

Consider: RSI PROCEDURE if:
- Intact Gag reflex
- Conscious OR
- GCS >8

Breathing Impacted by:
- Penetrating or Blunt Chest Trauma OR
- Penetrating Abdominal Trauma?

Return to Guideline: TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS

Return to Protocol: TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS
- Recheck every 5 minutes
- Advanced Airway if de-compensating

SpO2 >93 percent on Supplemental O2?
AIRWAY Pearls

**Signs and Symptoms of Respiratory Distress and/or Failure**

- **SPO2 decreasing <90%** (Room Air) with / without supporting Signs / Symptoms of:
  - Tachypnea, Tachycardia, Fever, Cough, Wheezing, Rhonchi, Rales, Shock
- **Difficulty Breathing or Excess Work** as demonstrated by:
  - Purpling of Lips, Accessory Muscle Involvement, Cyanosis, Decreased Ability to Speak, Diaphoresis, Tripod Breathing
- **Airway Obstruction** Due to Trauma, Edema, Excess Secretions, Foreign Body, or Tongue
- Apnea
- Cyanosis, Central and/or Peripheral: Blue/Pale Tinting and Mottling of Skin
- Decreased LOC (GCS <8), Altered Responsiveness, Weak Cry

**Pearls:**

- PCO2 is affected by respiratory rate and tidal volume (ventilation), while PO2 is affected by PEEP and FiO2 (oxygenation)
- Capnography is mandatory for all intubations. Record results. Capnometer (standalone END TIDAL CO2 detector) is an alternate if monitor capnography not available. For capnography, normal range is 35-45 mm Hg; adjust vent as needed.
- All intubated patients should receive nasogastric / orogastric tube (time permitting) and continuous pulse oximetry.
- Maternal Medication:
  - Adverse effects can include respiratory insult to newborn.
- Pediatric is defined as anyone <12yo.
- If RSI is impractical or provider is not credentialed to perform, but patient requires an advanced airway with / without ventilatory support, consider:
  - Pharmacologically-Assisted Sedation using KETAMINE followed by supraglottic airway device placement (do not attempt BIAD placement without sedation in semi-conscious patients)
  - Surgical cricothyroidotomy using approved device. (modified 6.0 ET not ideal)
  - Medical personnel should not actively seek to determine if gag reflex is present by touching the palate, posterior larynx, or posterior pharynx.

**RSI MEDICATIONS: IV/IO Doses**

**Pretreatment:**
- Fentanyl 3mcg/kg IV
- Atropine 0.02mg/kg IV Min: 0.1mg (Infants <1yo)

**Induction Agents:**
- Etomidate 0.3mg/kg 24mg
- *Ketamine 1-2mg/kg 80-160mg
- Midazolam 0.1mg/kg 8mg
- Propofol 1-2.5 mg/kg 80-200mg

**Paralytics:**
- Vecuronium 0.08-0.15 mg/kg
- *Rocuronium 0.6-1.2 mg/kg, q25-40min
- Succinylcholine 1.0-1.5mg/kg

**Continued Sedation:**
- Fentanyl 0.5-2mcg/kg, q20-60min
- Ketamine 0.5-2mg/kg, q10-20min
- Ketamine 0.5-2mg/kg bolus then 0.5-1mg/kg/hr
- Midazolam 0.05mg/kg-NO Pain!, q15-30m
- Midazolam 0.05 mg/kg bolus IV x 1 pm, then titrate 0.05-0.1mg/kg/hr IV gtt
- Propofol 10-75 mcg/kg/min IV

**VOCAL CORD VISUALIZATION MANEUVERS:**
- Ensure correct alignment- External auditory meatus is aligned with sternal notch and head is in neutral to sniffing position.
- BURP = Backward; Upward; Rightward; Pressure on thyroid cartilage.

**RSI (Abbreviated: see RSI PROCEDURE as needed)**

1. **Preoxygenate** (100% FiO2 via mask or PPV as needed)
2. **Pretreat** (Premedicate) as able or mission allows (Atropine blocks reflex bradycardia in pediatric (<2yo only) population)
3. **Induce** (Primary Sedation / Anesthesia)
4. **Paralyze** (Neuromuscular blocking agent)
5. **Wait for Fasciculation, Jaw Relaxation, Absence of Movement**
6. **Pass ET Tube or insert BIAD** (throughout attempt, ensure good O₂ saturation. If below 94% stop and provide PPV)
7. **Confirm Placement and Secure Tube**
8. **Continue Sedation and Paralytic** as needed per dosing time.

Note: Midazolam and Propofol should only be used for continued sedation when pain management is NOT a concern (i.e., Non Trauma Patient or Patient is already on adequate narcotic pain control).

**Rescue Breathing Ventilation Rate Without Advanced Airway:**
- **NEWBORN** = 40-60/min when performed without compressions
- **Infant / Child** = 1 breath / 3-5 seconds
- **Adult** = 1 breath / 5-6 seconds

**VENTILATOR SETTINGS:**
- **Mode:** AC, SIMV, or ASV
- **Rate:** 14 initially, then adjust PRN
- **Tidal Volume:** 6mL/kg initially, then adjust 4-8 mL/kg
- **I:E = 1:2**
- **PEEP:** 5
- **FiO2:** 100% initially. Try to decrease FiO2 as much as possible while keeping O2 saturation > 93%.
- **Goal FiO2 = 50-60%** to conserve battery life and O2, while maintaining patient SpO2 >93%.
AIRWAY CONFIRMATION

CLINICAL INDICATIONS:

• Post endotracheal intubation to confirm proper placement of endotracheal tube (ETT)

CONTRAINDICATIONS:

• None

PROCEDURE:

• Primary / First confirmation of proper placement is always good visualization of tube passing through cords.

• Provider or second individual should listen for bilateral breath sounds and absence of gastric sounds. Also evaluate for equal chest rise. Look for ETT fogging.

• Ensure ETT is at appropriate depth and good pilot cuff tension is present.

• WAVEFORM CAPNOGRAPHY is gold standard for patient airway monitoring.

• Capnometer: Place onto ETT and bag patient 2-3 breaths. Proper placement will result in color change to Gold / Yellow. Esophageal placement will result in a purple color. (Gold = good, Barney = bad) Change will only occur with perfusion (e.g. High quality CPR required.)

• Esophageal detection device: Squeeze bulb expressing all air out of the EDD. Place this onto end of ETT. Rapid refilling suggests proper placement (the rigid trachea does not collapse and therefore there is no obstruction to air return). Poor filling or no filling suggests improper placement (the flaccid esophagus will collapse around ETT preventing refilling).

• Pulse oxygenation: After a short delay (30-60 seconds in young children, particularly those with poor perfusion), the pulse oxygenation should increase to normal range (this is not reliable in excessively cold patients, methemoglobinemia, or CO poisoning). Do not extubate if other confirmation measures say it is in!

Document procedure, results, and vital signs.

At any time, doubt as to correct placement should prompt removal of tube, oxygenate with BVM, and re-attempt with BIAD before rescue airway!
PROCEDURE A-IV

[PROCEDURE GUIDELINE]

BLIND INSERTION AIRWAY DEVICE (BIAD)

CLINICAL INDICATIONS:
Patient with inadequate respiratory drive or respiratory failure due to any reason (e.g., altered mental status, trauma, infection) other than airway burns, anaphylaxis, or other causes of airway swelling / obstruction.

CONTRAINDICATIONS:
- Massive upper airway trauma distorting anatomy
- Penetrating neck trauma

PROCEDURE:
Consider paralytic/analgesia/sedation medications when placing supraglottic airways devices. In any instance of BIAD placement, caregiver must be prepared for vomiting and aspiration.

- Prepare, position, and pre-oxygenate the patient with 100% O₂. Ensure patient on monitor if possible.
- Select appropriate size BIAD and ensure proper cuff inflation / deflation.
- Lubricate with water-soluble jelly.
- Advance tube towards posterior pharynx until seated in correct position.
- Inflate balloon as per package insert and attempt to ventilate with BVM.
- If good airflow / chest rise / PO₂, secure device in place and ventilate patient with BVM / Vent.
- If unable to ventilate / resistance, leave first BIAD in place, deflate balloon, and pass a second BIAD in the same manner as the first (second should only be able to enter the trachea as the first may have entered into the esophagus approx 5-10%). Once second BAID is in place, remove first and inflate the cuff on the second device. Attempt to bag as above. If successful, ventilate patient.

WARNING: BIADs may not prevent or block aspiration of gastric contents.

Document procedure, results, and vital signs.
**PEARLS:**
- Continuous pulse oximetry should be utilized in all patients with an inadequate respiratory function.
- Continuous \(\text{ETCO}_2\) monitoring should be attached when available to monitor adequacy of ventilation.
- **Contraindication for Oropharyngeal Airway (OPA):** Intact gag reflex, conscious or semiconscious, severe facial trauma
- **Contraindication for Nasopharyngeal Airway (NPA):** Known esophageal disease, recent ingestion of caustic substances, severe facial trauma, possible nasal and adjacent (basilar skull) fracture
- In the setting of significant facial/neck trauma or distortion of anatomy (i.e. angioedema) laryngoscope and intubation may be difficult or impossible. Based on physical examination of the airway, Cricothyroidotomy may be the initial airway of choice. Consider procedural sedation with Ketamine in awake patients.
- Cricothyroidotomy can be performed by all medics once approved by medical director. This should be utilized quickly with severe airway trauma or inability to intubate.
- **Needle Cricothyroidotomy** can be performed by all CCFPs once approved by medical director. This should be utilized quickly with severe airway trauma or inability to intubate.
NASOPHARYNGEAL AIRWAY

CLINICAL INDICATIONS:

- Depressed mental status with need for airway augmentation to ensure patency / access.

RELATIVE CONTRAINDICATIONS:

- Patient at high-risk of aspiration and/or unable to protect airway
- Massive facial trauma, burns, or suspicion of basilar skull fracture (e.g., CSF otorrhea, Battle’s sign, raccoon eyes, mechanism).

PROCEDURE:

- Position patient in the sniffing position.
- Select appropriate sized NP tube and lubricate with water-soluble jelly (can measure tube by placing exterior (lipped) end next to nare and tip should reach to angle of mandible).
- Select most patent nare, orient open angle medially, and pass tube in a posterior – not superior – direction. If resistance is met, attempt to corkscrew slightly or remove and attempt in other nare. If unsuccessful, try the next smallest sized tube.
- Pass tube until lip of NP tube rests against nare.
- Bag patient with BVM / mask as needed.

Document procedure, results, and vital signs.
# Pre-Intubation Checklist

**PRE-INTUBATION CHECKLIST**

**INSTRUCTIONS FOR USE**

The Pre-Intubation Checklist serves as a final reference prior to administering a sedative and paralytic during a Rapid Sequence Intubation. Run the checklist to ensure preparation is complete before embarking on induction and paralysis. Refer to [Rapid Sequence Intubation](#) for how to do an RSI.

**PLAN**

- **Consider Dangerous Physiology Issue: SBP <100, SpO2 <94%, Metabolic Acidosis**
  - Appropriately modify or avoid RSI in unstable patient
  - SBP < 100: Consider resuscitation with IVF and vasopressors, Lower the dose of sedative
  - SAT < 94%: Consider use of CPAP or BVM with PEEP valve to increase Mean Airway Pressure during Pre-Oxygenation
  - Severe Met. Acidosis: Consider awake intubation or delayed sequence intubation with severe Metabolic Acidosis
- **Difficult Airway Evaluation** (LEMON, HEAVEN Criteria)
  - Consider alternate airway, cricothyrotomy, or modify plan
- **Rapid Sequence Intubation, Delayed Sequence Intubation, Rapid Sequence Airway (SGA), or Cricothyrotomy**
  - Choose the most appropriate technique for physiology and anatomy
- **Evaluate Cricothyrotomy Landmarks and Assess Procedural Difficulty**
- **Induction Agent / Paralytic**
  - Choose and draw up appropriate Sedative and Paralytic
- **Push-Dose Pressors**
  - Consider drawing up or administering Push-dose Epinephrine
- **Post-tube Sedation / Analgesia**
  - Prepare Post-intubation Sedation and Analgesia
- **Consider Pretreatment 3-5 minutes prior**
  - Fentanyl (TBI, CVA, MI, Ao Dissection); Atropine (Pediatric)
- **Failed Airway Plan Verbalized to the team**
  - Discuss management plan for failed intubation

**PATIENT PREPARATION**

- PreOx ≥ 3 minutes with 15 LPM NRB or BVM + PEEP, and NC 4-6 LPM
- Apneic Oxygenation with NC 15 LPM once Induced/Sedated
- Oxygenated ≥ 94% prior to Induction
  - Consider using CPAP or BVM + PEEP if unable to reach 94% with NRB
- **Positioning:** 30° Head-up for Pre-Ox, Ear-to-Sternal Notch for Intubation
  - If C-Spine Consideration, open front of C-Collar and perform Manual In-line Stabilization
- **Monitor is Visible** (HR, BP, SpO2%, RR, etCO2)
- **Reliable IV Access Tested**

**EQUIPMENT**

- BVM (± PEEP Valve) on Oxygen
- Waveform Capnography on BVM (minimum Colorimetric)
- ± Video Laryngoscope powered on
- ± Back-up Laryngoscope ETT, ETT size down, 2x Stylet, 2x Syringe, Tube Securing
- Bougie
- OPA, NPA, SGA (iGel, LMA, King LT)
- Nasogastric or Orogastric Tube
- Cricothyrotomy Kit
- Suction on and accessible
## Rapid Sequence Intubation

### CLINICAL INDICATIONS:
- Airway Compromise or Inability to Protect Airway
- Respiratory Failure (Hypoxic, Hypercapnic)
- Expected Clinical Deterioration
  - >40% TBSA Burns, Severe Sepsis, TBI with AMS, etc
- Patient or Crew Safety
  - Combative, prolong transfer in critically sick, etc

### CONTRAINDICATIONS:
- High likelihood of failure (Distorted Anatomy)
- Penetrating neck trauma

### PROCEDURE:
- Make a plan, prepare patient and equipment (See PRE-INTUBATION CHECKLIST)

Conduct seven “P” pneumonic (7Ps):

#### PREPARE
- **SOAPME**:
  - Suction: available, check for function
  - Oxygen: Pre-Oxygenation + Apneic Oxygenation
  - Airways: ETT, SGA (iGel, King, etc), Cricothyrotomy
  - Pharmacology: Induction, Paralysis, Post-intubation Sedation
  - Monitor: BP, HR, RR, SpO2%, etCO2 capnography, 4-lead
  - Equipment: Bougie, Laryngoscope, Video Laryngoscope, Cric Kit
- **Difficult Airway Evaluation** (LEMON or HEAVEN Criteria)
  - Consider alternate airway, cricothyrotomy, or modify plan
- **Evaluate Cricothyrotomy Landmarks and Assess Procedural Difficulty**

#### PRE-OX
- **PreOxygenate / Denitrogenate** ≥ 3 minutes or 8 Vital Capacity Breaths with 15 LPM NRB or BVM + PEEP, and NC 4-6 LPM
- **Oxygenated ≥ 94%**
  - Patients remaining <94% may require CPAP or BVM + PEEP safe O2 saturation
- **Apneic Oxygenation with NC 15 LPM** once Induced/Sedated

#### POSITIONING
- **30° Head-up for Pre-Oxygenation**
- **Ear-to-Sternal Notch for Intubation**
- **C-Spine Consideration**: Open front of C-Collar; perform Manual In-line Stabilization

#### PRETREAT
- **Resuscitate** with IVF or Blood Products and Push-Dose Pressors to ensure SBP>100mmHg
- **3 - 5 Minute prior to Sedative / Paralytic**
  - **Fentanyl** 3mcg/kg slow IV push to prevent Hypertension in head injury, cardiac ischemia, or aortic dissection
  - **Atropine** 0.02 mg/kg IV to prevent bradycardia in Peds (age <1y)

#### PARALYZE / SEDATE
- **Push** Ketamine or Etomidate; and then Rocuronium or Vecuronium
- **Apneic Oxygenate**: Turn Nasal Cannula to 15LPM once patient becomes drowsy
- **Monitor SpO2%** and Wait 45-60 second for adequate paralysis

#### PASS TUBE
- **Visualize Cords and Pass Tube**

#### POST-TUBE MANAGEMENT
- **Inflate Bulb and Begin Bagging**
- **Verify Tube Place with etCO2 waveform capnography**
  - Direct visualization, mist in tube, equal rise and fall, bilateral breath sounds with absent gastric sounds, improving SpO2%, etCO2 colorimetric gold color change x6
- **Secure Endotracheal Tube with commercial securing device**
- **Place patient on Post-intubation Sedation**

### RSI MEDICATIONS

#### Induction Agents:
- Ketamine 1-2 mg/kg IV
- Etomidate 0.3 mg/kg IV
- Midazolam 0.1 mg/kg IV
- Propofol 1-2.5 mg/kg IV

#### Paralytics:
- Rocuronium 0.6-1.2 mg/kg IV
- Vecuronium 0.08-0.15 mg/kg IV
- Succinylcholine 1.0-1.5 mg/kg IV

#### Maintenance Sedation:
- Ketamine 0.5-2 mg/kg IVP or 0.5-2 mg/kg bolus then 0.5-1mg/kg/hr
- Propofol 10-75 mcg/kg/min
- Midazolam .05 mg/kg IVP or .05 mg/kg bolus then 0.05-0.1mg/kg/hr

#### Push Dose Epi:
- Epinephrine 5-20mcg IV q2-5min
CRICOTHYROIDOTOMY

CLINICAL INDICATIONS:

- DIFFICULT AIRWAY - Airway can receive one (1) RSI attempt before calling it a failed airway. Two exceptions exist:
  - Inability to maintain proper O₂ saturation above 90% or major trauma or obstruction
- NON-DIFFICULT AIRWAY - Airway can receive two (2) attempts so long as O₂ saturation is >90%.
- Inability to place / ventilate with blind insertion airway device (BIAD) or inability to provide ventilation with Bag-Valve mask.
- Massive facial trauma or neck trauma precluding the use of orotracheal intubation / BIAD.

CONTRAINDICATIONS:

- Age <12yo, abnormal anatomy. (See Needle Cricothyroidotomy)

PROCEDURE:

- Maintain patient in sniffing position or place them into sniffing position. Utilize inline stabilization if indicated.
- Oxygenate the patient with 100% O₂. Identify and cleanse the cricoid area with betadine / alcohol while oxygenating if possible.
- Before incising place static non-dominant hand using the middle and thumb to hold either side of the thyroid cartilage with the palm towards the head leaving an area between the fingers inferiorly to make the incision. This hand will not move until bougie is confirmed in the trachea.
- Using a scalpel, make an adequate (2-3cm) vertical incision over the cricothyroid membrane. Then, using hemostats, bluntly dissect until membrane fully visualized.
- Make an adequate horizontal incision through the cricothyroid membrane into the trachea. Spread incision with either hemostats or scalpel handle.
- At this point the index finger of the hand gripping the thyroid cartilage can be placed within the opening and the posterior aspect of the trachea can be palpated. The index finger maintains the tract should the airway be extremely bloody as this procedure is prone to be. The bougie/stylet is then placed along the index finger ensuring tracheal guidance and not subcutaneous plane dissection or posterior tracheal perforation into the esophagus.
- Once the bougie/stylet is inserted, pass a cricothyroid tube or 6-0 ETT into the trachea (if ETT used, only insert until just past the cuff, then inflate the cuff). Secure tube in place and begin to ventilate with BVM / 100% O₂.
- Confirm placement with capnography, capnometer, bilateral chest rise / breath sounds, good PO₂, ETCO₂, lack of increasing SQ air (a small amount is normal).
- Document procedure, results, and vital signs.
NEEDLE CRICOTHYROIDOTOMY

CLINICAL INDICATIONS:
- Child <10yo in whom open cricothyroidotomy is contraindicated with the following:
  - Failed intubation attempts x 3 by the most experienced provider present with inability to ventilate
    with BVM / high risk to ventilate with BVM.
  - Inability to place / ventilate with blind insertion airway device (BIAD).
  - Massive facial trauma or neck trauma precluding the use of orotracheal intubation / BIAD.

CONTRAINDICATIONS:
- Ability to ventilate adequately with BVM.
- Prolonged time to definitive care (relative).

NOTE: this technique requires a minimum of 50 psi O₂ or pressurized air flow and a special adapter to connect
the line to the catheter hub; do not attempt otherwise.

PROCEDURE:
- Maintain patient in sniffing position or place them into sniffing position. Utilize inline stabilization if indicated.
- Oxygenate the patient with 100% O₂. Identify and cleanse the cricoid area with betadine / alcohol while
  oxygenating if possible.
- Using a 14Ga IV attached to a 3mL syringe, puncture the cricothyroid membrane at a 90° angle. Do not
  advance needle once air returned.
- Change angle to 45° and advance Catheter only. Should advance with no resistance. Remove needle and
  syringe.
- Secure catheter in place. Remove needle and plunger from syringe and place an adapter from a 7-0ETT on
  end of syringe in place of plunger. Attach this to the catheter.
- Attach a BVM attached to 100% O₂ to the adapter / syringe and ventilate. A large amount of resistance will
  be felt due to the small catheter size. Evaluate for chest rise and oxygenation. The provider needs to allow
  a 1:3 ratio of inhalation / exhalation.

Document procedure, results, and vital signs.

NOTE: Needle Cricothyroidotomy only allows for oxygenation, not ventilation. It is meant as a
temporizing measure until definitive care – tracheostomy – can be performed at an MTF.
This airway should be used for only 20-30min maximum if able.
- Start working alternatives immediately after initiation - such as retrograde wire intubation,
surgical cric with needle as an anatomical landmark.
SIMPLE (FINGER) and TUBE THORACOSTOMY

CLINICAL INDICATIONS:
- Pneumothorax + positive pressure ventilation or interfering with oxygenation
- Hemothorax + positive pressure ventilation or interfering with oxygenation
- Chest injury with suspected pneumo / hemothorax as above
- Evidence of tension pneumothorax after needle thoracostomy attempts

CONTRAINICATIONS:
- Stable patient oxygenating well, no tension PTX
- Blood clotting abnormalities (relative)

PROCEDURE (STERILE):
- Ensure all equipment prepared / available: Scalpel, 4X4 gauze, petroleum gauze, suture material (0 – 1-0 silk), 28Fr or larger chest tube, Heimlich valve / Water seal, large Kelly clamp x 2, betadine / skin cleanser, 1-2% lidocaine, 10mL syringe with needle for lidocaine, sterile gloves.
- If possible, position patient supine with shoulder flexed up and hand under his / her head.
- Identify and clean area of insertion with skin cleanser. Area of insertion should be over the 4th or 5th rib (3rd or 4th intercostal space) on injured side.
- If possible, with conscious patient, anesthetize the area with lidocaine. Take care to anesthetize the rib by passing needle perpendicular to skin until bone contacted and backing off slightly to inject lidocaine. May also anesthetize the pleura by advancing needle just until air returned and then injecting area while pulling back needle.
- Make incision in skin / SQ tissue overlying 5th rib. Ensure incision large enough for insertion of tube / finger (approximately 1-2 inch).
- Bluntly dissect tissue going over 5th rib with second clamp until pleura is reached, then puncture the pleura with the clamps. Prevent overly deep insertion by using non-dominant hand to guide insertion or holding clamps in hand with index finger on shaft of the instrument.
- Open clamps as wide as possible to enlarge the pleural opening and remove clamps. Blood and/or air may present at this time.
- Place finger into opening and palpate for any adhesions.
  - If Simple Thoracostomy ONLY, place vented chest seal over opening and position patient on ipsilateral side (if possible) and monitor for signs of tension pneumothorax.
  - If proceeding to tube placement, continue below ensuring tube is clamped closed on distal end before insertion.
- Advance tube into opening directing the tip of the tube posteriorly and superiorly towards the lung apex along the posterior aspect of the chest wall, ensuring all fenestrations are moved into opening. This method ensures tube will drain both hem o and pneumothoraces.
- Holding tube in place – Pad under tube with Kerlix and place modified chest seal around the tube ensuring seal of the wound and securing tube in place. If possible, stitch or staple tube into place.
- Apply suction to tube / Heimlich valve and remove clamp.

CHEST TUBE TROUBLESHOOTING:
- Ensure tube not clamped / kinked and that suction is working.
- Ensure tube has not become dislodged.
- If evidence of tension PTX – remove attachments from end of chest tube (e.g., suction adapter, Heimlich valves, suction devices) to convert to open PTX. Troubleshoot attachments and re-apply if appropriate.
NEEDLE THORACOSTOMY

CLINICAL INDICATIONS:

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

- Severe or progressive respiratory distress or tachypnea, absent or markedly decreased breath sounds on one side of the chest, chest pain, distended neck vessels, hemoglobin oxygen saturation < 90% on pulse oximetry, shock, traumatic cardiac arrest without obviously fatal wounds

* Note: If not treated promptly, tension pneumothorax may progress from respiratory distress to shock and traumatic cardiac arrest.

CONTRAINDICATIONS:

- None

PROCEDURE: Note: This intervention is a BRIEF stopgap utilized in order to buy time for a definitive tube thoracostomy. It is not a solution unto itself.

- Decompress the chest on the side of the injury with a 14-gauge or a 10-gauge, 3.25-inch needle/catheter.

- If a casualty has significant torso trauma or primary blast injury and is in traumatic cardiac arrest: decompress both sides of the chest before discontinuing treatment. Clean area if possible with betadine / alcohol, but do not delay treatment for this step.

Note: Either the 5th intercostal space (ICS) in the anterior axillary line (AAL) or the 2nd ICS in the mid-clavicular line (MCL) may be used for needle decompression (NDC.) If the anterior (MCL) site is used, do not insert the needle medial to the nipple line.

- The needle/catheter unit should be inserted at an angle perpendicular to the chest wall and just over the top of the lower rib at the insertion site. Insert the needle/catheter unit all the way to the hub and hold it in place for 5-10 seconds to allow decompression to occur.

- After the NDC has been performed, remove the needle and leave the catheter in place.

- The NDC should be considered successful if:
  - Respiratory distress improves; there is an obvious hissing sound as air escapes from the chest when NDC is performed (this may be difficult to appreciate in high-noise environments); hemoglobin oxygen saturation increases to 90% or greater (note that this may take several minutes and may not happen at altitude); casualty with no vital signs has return of consciousness and/or radial pulse.

- If the initial NDC was successful, but symptoms later recur:
  - Perform another NDC at the same site that was used previously. Use a new needle/catheter unit for the repeat NDC.

- If the second NDC is also not successful:
  - Fix appropriate circulation issues and consider finger/tube thoracostomy.

Document procedure, results, and vital signs.
VENTILATOR MANAGEMENT

CLINICAL INDICATIONS:
- Patient received from transferring facility, intubated, and requires ventilator support.
- Patient requiring intubation in the field and subsequent respiratory support.

CONTRAINDICATIONS:
- Equipment malfunction / failure.

PROCEDURE:
- Turn on ventilator and ensure that machine is functional and battery is charged.
- Attach ventilator tubing and O₂ tubing to machine.
- If patient is a transfer and already on vent, maintain ventilator settings from medical treatment facility.

If patient “newly” on ventilator, initial settings include:
- **Mode:** Assist Control (AC) / CMV+ or ASV (Hamilton T1 only). AC / CMV+ are the preferred modes over ASV.
- **Tidal Volume (Vt):** Initially 6 cc/kg, (Ideal Body Weight (IBW) then adjust based on ventilatory needs (4-8 cc/kg)
  - IBW calculation for Predicted Body Weight in Kg:
    - Men: [(height in inches – 60) x 2.3] + 50
    - Women: [(height in inches – 60) x 2.3] + 45.5.
  - **Tidal Volume should not be altered to fix ventilation, adjust rate instead for increased or decreased minute volumes!** Vt only gets changed for lung protection (i.e. to prevent barotrauma/volutrauma)
  - Reduce VT by 1 ml/kg at intervals ≤ 2 hours until VT = 6cc/kg PBW
  - SEE PBW Tidal Volume Chart Below
- **Rate (RR):** Initially 14, adjust based on CO₂ (If CO₂ >45mmHg) and ventilatory needs (10-30)
- **I:E:** 1:2 (Patients with obstructive lung diseases should have increased I:E around 1:4 or 1:5; If rate > 20 (most children) will need to titrate iTime down to achieve appropriate I:E ratio)
- **FiO₂/PEEP (Should be adjusted in concert per the chart below)**
  - Start at 100% (1.0) FiO₂ and PEEP of 5; PEEP no higher than 16 on Pediatrics w/out expert consult
  - Wait 5 minutes and assess SpO₂
Set the FiO2 to 30% and start titrating FiO2 and PEEP collectively based on the chart to achieve oxygenation goals. Go up every 5-10 minutes; quicker if low SpO2 sats develop.

### Lower PEEP/higher FiO2

<table>
<thead>
<tr>
<th>FiO2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.4</th>
<th>0.5</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FiO2</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>0.9</th>
<th>0.9</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP</td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>18</td>
<td>18-24</td>
</tr>
</tbody>
</table>

* Hypotensive patients (MAP <70 or SBP <90) may respond negatively to increased PEEP causing decreased venous return. Monitor for increased hypotension and tachycardia.

- Alternate Higher PEEP settings

### Higher PEEP/lower FiO2

<table>
<thead>
<tr>
<th>FiO2</th>
<th>0.3</th>
<th>0.3</th>
<th>0.3</th>
<th>0.3</th>
<th>0.3</th>
<th>0.4</th>
<th>0.4</th>
<th>0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FiO2</th>
<th>0.5</th>
<th>0.5-0.8</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>

- **Oxygenation Goal:** PaO2 55-80 mmHg or SpO2 88-95%
- **Plateau Pressure Goal:** ≤ 30 cm H2O
  - Check Pplat (0.5 second inspiratory pause), at least q 4h and after each change in PEEP or VT.
  - If Pplat > 30 cm H2O: decrease VT by 1 ml/kg steps (minimum = 4 ml/kg).
  - If Pplat < 25 cm H2O and VT < 6 ml/kg, increase VT by 1 ml/kg until Pplat > 25 cm H2O or VT = 6 ml/kg.
  - If Pplat < 30 and breath stacking or dys-synchrony occurs: may increase VT in 1 ml/kg increments to 7 or 8 ml/kg if Pplat remains < 30 cm H2O.
- **Alarm Settings:**
  - High Pressure Alarm: 10 cmH2O above peak airway pressure
  - Low Pressure Alarm: 5 cmH2O below peak airway pressure
  - or
  - High Pressure Alarm 50% above the baseline PIP (1.5 x current PIP)
  - Low Pressure Alarm 50% below the baseline PIP (0.5 x current PIP)

  **Pressures will be determined by placing patient on vent for ~1-2 minutes and determining intrinsic peak inspiratory pressure. (Labeled as PEAK on 754 Ventilator (top right); Labeled as Ppeak on Hamilton T1 ventilator (top left).**

- Monitor waveform on machine and patient to ensure not “breathe stacking” – if this occurs, a high-pressure alarm may sound. However, if breath stacking suspected even in absence of alarm – disconnect tubing and allow exhalation. Increase I:E.
PROCEDURE A-XII

[PROCEDURE GUIDELINE]

Predicted Body Weight and Tidal Volume (VT)
Male PBW and Tidal Volume
Ft'In"

4'0"
4'1"
4'2"
4'3"
4'4"
4'5"
4'6"
4'7"
4'8"
4'9"
4'10"
4'11"
5'0"
5'1"
5'2"
5'3"
5'4"
5'5"
5'6"
5'7"
5'8"
5'9"
5'10"
5'11"
6'0"
6'1"
6'2"
6'3"
6'4"
6'5"
6'6"
6'7"
6'8"
6'9"
6'10"
6'11"
7'0"

Inches

Predicted
Body
Weight

ml per kg of PBW (total VT)
4.0 5.0m 6.0m 7.0 8.0
ml
l
l
ml
ml

48
22.4
90
112
134
157
49
24.7
99
124
148
173
50
27
108
135
162
189
51
29.3
117
147
176
205
52
31.6
126
158
190
221
53
33.9
136
170
203
237
54
36.2
145
181
217
253
55
38.5
154
193
231
270
56
40.8
163
204
245
286
57
43.1
172
216
259
302
58
45.4
182
227
272
318
59
47.7
191
239
286
334
60
50
200
250
300
350
61
52.3
209
262
314
366
62
54.6
218
273
328
382
63
56.9
228
285
341
398
64
59.2
237
296
355
414
65
61.5
246
308
369
431
66
63.8
255
319
383
447
67
66.1
264
331
397
463
68
68.4
274
342
410
479
69
70.7
283
354
424
495
70
73
292
365
438
511
71
75.3
301
377
452
527
72
77.6
310
388
466
543
73
79.9
320
400
479
559
74
82.2
329
411
493
575
75
84.5
338
423
507
592
76
86.8
347
434
521
608
77
89.1
356
446
535
624
78
91.4
366
457
548
640
79
93.7
375
469
562
656
80
96
384
480
576
672
81
98.3
393
492
590
688
82
100.6
402
503
604
704
83
102.9
412
515
617
720
84
105.2
421
526
631
736
PBW Males = 50 + 2.3 [height (inches) - 60]

179
198
216
234
253
271
290
308
326
345
363
382
400
418
437
455
474
492
510
529
547
566
584
602
621
639
658
676
694
713
731
750
768
786
805
823
842

Height
Ft'In"

4'0"
4'1"
4'2"
4'3"
4'4"
4'5"
4'6"
4'7"
4'8"
4'9"
4'10"
4'11"
5'0"
5'1"
5'2"
5'3"
5'4"
5'5"
5'6"
5'7"
5'8"
5'9"
5'10"
5'11"
6'0"
6'1"
6'2"
6'3"
6'4"
6'5"
6'6"
6'7"
6'8"
6'9"
6'10"
6'11"
7'0"

Inches

Predicted
Body Weight

ml per kg of PBW (total VT)
4.0m 5.0 6.0 7.0 8.0
l
ml
ml
ml
ml

48
17.9
72
90
107 125
49
20.2
81
101 121 141
50
22.5
90
113 135 158
51
24.8
99
124 149 174
52
27.1
108
136 163 190
53
29.4
118
147 176 206
54
31.7
127
159 190 222
55
34
136
170 204 238
56
36.3
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182 218 254
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193 232 270
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205 245 286
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216 259 302
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228 273 319
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239 287 335
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251 301 351
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262 314 367
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274 328 383
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331 397 463
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343 411 480
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354 425 496
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366 439 512
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377 452 528
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389 466 544
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400 480 560
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82.3
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412 494 576
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84.6
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423 508 592
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435 521 608
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446 535 624
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458 549 641
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93.8
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469 563 657
82
96.1
384
481 577 673
83
98.4
394
492 590 689
84
100.7
403
504 604 705
PBW Males = 45.5 + 2.3 [height (inches) - 60]

143
162
180
198
217
235
254
272
290
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327
346
364
382
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658
677
695
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732
750
769
787
806

ARDSnet, NIH NHLBI ARDS Clinical Network Mechanical Ventilation VT card

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PROCEDURE

Height

Female PBW and Tidal Volume


Troubleshooting: Airway compromise or lost airway in-flight

- If at any time patient begins to desaturate or develop respiratory problems, immediately disconnect ventilator and ventilate patient with BVM (with PEEP valve if available) and 100% O2 while correcting issues utilizing the D.O.P.E. algorithm:
  
  o **Displacement:** ETT in place, patient not extubated/tube did not move during transfer. If advanced – pull back to original length and attempt to bag; if tube has pulled farther out of trachea, **DO NOT ATTEMPT TO ADVANCE IT** without placement of bougie to verify tracheal placement. When advancing bougie, feel for tracheal rings or carina stop. If in doubt, pull tube and attempt BVM. If this fixes problem, continue to bag patient. Upon stabilization, consider alternative advanced airways (extraglottic airway or cric).

  **If ETT moves freely, access for ETT bulb rupture.**

  o **Obstructions:** Assess for secretions in ETT. Suction if indicated.

  o **Pressure:** Ensure that a tension pneumothorax/hemothorax has not developed (if chest tube in place, ensure it is functioning/not kinked or clamped). If tension pneumo/hemothorax suspected, perform immediate needle thoracostomy. Assess the need for escharotomy if circumferential burn. Consider additional paralysis and sedation if patient does not tolerate ventilation.

  o **Equipment:** Ensure that vent did not fail; O2 tank not empty. If ventilator is operational, trace all tubes to the patient connection (airway tube, transducer line, exhalation line) ensuring patency and connections.

- **High pressure alarms/Peak airway pressure alarms** (Peak pressure >35 cm H2O): Correct problems causing increased airway resistance and decreased lung compliance, including pneumothorax or pulmonary edema. Check ventilator to make sure prescribed tidal volume is being delivered. Check for linked/crushed tubing.

- **Air leaks causing low pressure alarms/volume loss:** Assess, correct air leaks in endotracheal tube, tracheostomy cuff, ventilator system; recheck ventilator to make sure prescribed tidal volume is delivered.

- **Ventilator desynchrony:** Agitation and respiratory distress that develop in a patient on a mechanical ventilator who has previously appeared comfortable represents an important clinical circumstance that requires a thorough assessment and an organized approach. The patient should not always be automatically re-sedated but must instead be evaluated for several potentially life-threatening developments that can present in this fashion.

- **Lung hyperinflation (air trapping) and auto-PEEP:** Dynamic hyperinflation is associated with positive end-expiratory alveolar pressure, or auto-PEEP. The physiologic effects include decreased cardiac preload because of diminished venous return into the chest. The reduced cardiac output that results from the reduction in preload can lead to hypotension and, if severe, to Pulseless Electrical Activity and cardiac arrest. Dynamic hyperinflation can also lead to local alveolar over-distention and rupture. Prevent, manage lung hyperinflation by decreasing tidal volume, changing inspiratory and expiratory phase parameters, switching to another mode, and correcting physiological abnormalities that increase airway resistance.

- **Document procedure, results, and vital signs.**
Ventilator Transfer Procedure

1. Ensure endotracheal tube is secure, document size and position of ETT at the teeth. Clamp tube immediately before disconnecting patient from vent in order to maintain PEEP and un-clamp only after connected to new vent circuit.

2. Ventilator settings should be coordinated with the transferring physician, anesthesia provider or respiratory therapist. Verify settings, review arterial blood gas (ABG) analysis, and current SPO2 and ETCO2 readings. Place those setting on transport vent and place patient on transport vent early to verify patient tolerance and compatibility.

3. ABG should be done within 30 minutes of flight. If time allows, patient should be on transport ventilator for at least 15 minutes prior to transport.

4. Ventilator settings for en-route care team should initially be matched to those of the transferring facility. Adjust settings PRN in order to maintain appropriate clinical parameters listed on first page of ventilator management protocol or transferring physician orders.

5. Ensure adequate sedation and analgesia medications are on hand.
VENTILATOR Terms

Volume-targeted modes: (Examples: CMV Continuous Mandatory Ventilation, A/C Assist/Control, SIMV Synchronized Intermittent Mechanical Ventilation) - Volume constant, inspiration terminates when preset Vt delivered. Peak airway pressure is variable and increases as needed to deliver prescribed Vt.

Pressure-targeted modes: (Examples: PSV Pressure Support Ventilation, PCV Pressure Controlled ventilation) - Volume variable, terminates when preset pressure reached. Volume is variable. Peak airway pressure is fixed, determined by set pressure level.

Adaptive Support Ventilation (ASV): Only available on the Hamilton T1. ASV provides intelligent ventilation mode that continuously adjusts respiratory rate, tidal volume, and inspiratory time depending on the patient’s lung mechanics and effort.

Tidal volume (Vt): The volume of gas, either inhaled or exhaled, during a breath and commonly expressed in milliliters. Vt is generally set between 4-8ml/kg IBW (ideal body weight), to prevent lung over-distension and barotrauma.

Minute Ventilation (Ve): The average volume of gas entering, or leaving, the lungs per minute, commonly expressed in liters per minute. The product of Vt and RR (respiratory rate). Normal Ve is 5 – 10 L/min.

Inspiratory (I) and Expiratory (E) time and I:E ratio: The speed at which the Vt is delivered. Setting a shorter inspiratory time (I) results in a faster inspiratory flow rate. Average adult I time is 0.7 to 1 second. I:E ratio is usually 1:2 to 1:4

Positive end-expiratory pressure (PEEP): The amount of positive pressure that is maintained at end-expiration. It is expressed in centimeters of water. The purpose of PEEP is to increase end-expiratory lung volume and reduce air-space closure at end-expiration. Normal Physiologic PEEP is 5cm/H2O.

Peak flow rate or peak inspiratory flow: The highest flow, or speed, that is set to deliver the Vt during inspiration, usually measured in liters per minute. When the flow rate is set higher, the speed of gas delivery is faster and inspiratory time is shorter.

Peak Airway Pressure (PAw): Represents the total pressure that is required to deliver the Vt and depends upon various airway resistance, lung compliance, and chest wall factors. It is expressed in centimeters of water (cm H2O).

Sensitivity or trigger sensitivity: Effort, or negative pressure, required by the patient to trigger a machine breath, commonly set so that minimal effort (-1 to -2 cm H2O) is required to trigger a breath.
Provide Continuous Positive Airway Pressure (CPAP/BiPAP)

Contraindications: Suspected Pneumothorax, SBP < 90mmHg, facial trauma, lack of airway protective reflex (unconscious) respiratory or cardiac arrest, vomiting or active upper GI bleed

1. If possible, place patient in seated position and explain the procedure.

2. Perform an initial respiratory assessment and assess vital signs.

3. Use the mask-sizing gauge to measure the patient for the correct mask size and attach the mask to the circuit.

Note: The mask selected should come close to, but not in contact with the nasal bone, external nares, and upper lip.

4. Turn the unit on and operate device according to manufacturer's specifications.
   - Initial settings: CPAP 5 cm H2O
   - Initial settings: BiPAP 10 cm H2O/ 5 cm H2O
   - **Adjusted on most ventilators by using PEEP input button**

5. Place the head straps on the patient IAW the manufacturer's instructions. Check for leaks and readjust if necessary.

6. Initiate positive airway pressure and adjust the CPAP/BiPAP pressure with the lowest continuous pressure that is effective.

7. Perform a respiratory assessment and titrate treatment to physiological goal.

8. Monitor patient continuously, assess and record vital signs at a minimum of every 5 minutes.

9. Observe for signs of deterioration or failure to respond to CPAP/BiPAP.

10. Consider low-dose benzodiazepine for anxiety and mask tolerance.
IMPACT 754 Ventilator Pre-mission checks and Troubleshooting

Routine Care

Clean unit and hose attachments with damp soapy cloth and wipe dry. Inlet filter may be removed to check for dirt or debris. Check metal hose couplings for thread wear and debris.

Duty Inspection

1. Power Off Checks
   a. Within calibration date (6 month maintenance cycle)
   b. Air inlet clear and filter in place (Right side of vent)
   c. Gas ("OXYGEN IN" and "AIR IN") and Patient ("EXHALATION VALVE" and "TRANSUDER") connections clear and tight (Top of vent)
d. GAS OUT clear leaf valve installed and seated (Reseat if loose, Replace if missing) See replacement instructions at the end of this document.

![Image of gas out valve]

![Image of green high pressure oxygen hose]

e. Inspect green high pressure oxygen hose for cracks, dry rot, threads, Black O-ring (Replace if damaged).

![Image of green hose and fitting]

f. Connect ventilator to high pressure oxygen source, turn on Oxygen tank and ensure no leaks present. Turn off O2 when complete. (Conduct in environment conducive to hearing leaks)
2. Power On Checks
   a. Turn “MODE” knob (1) to desired setting (A/C, SIMV, CPAP)
      
      i. The ventilator will run a SELF-TEST upon set up. **CAUTION:** SELF-CHECK must be performed with the disposable ventilator circuit disconnected. Ignoring this requirement could cause the SELF-CHECK process to sense a residual airway pressure leading to a SELF-CHECK failure.

      1. At this point, CAL is not required. If SELF-TEST results in a Calibration Failure, place (1) to CAL until CAL OK is displayed. If calibration fails, ventilator is deadlined.
b. Check BATT OK

C. Preset ventilator knobs to:
   i. Rate (2) 18
   ii. Inspiration Time (3) 1:2
   iii. Vt (4) 500
   iv. FiO2 (5) 100%
   V. HIGH pressure alarm to 35 cmH2O vi. LOW pressure to 15 cmH2O

   d. Turn OFF

   e. Store Ventilator with Air Inlet and Gas Out Ports protected and covered.

   **Ventilator is now pre-set for duty and able to be rapidly employed as needed with minor adjustments to Vt based on patient ideal body weight and turning on O2 source**
Weekly Inspections

*ALL CAUTIONS, WARNINGS, AND NOTIFICATIONS THAT CORRESPOND WITH THE 754 SCREEN WILL BE IN ALL CAPS AND HIGHLIGHTED YELLOW*

1. Complete Duty Inspection
2. Set FiO2 to 21%
3. Attach vent circuit to vent and field expedient training lung:
   a. Slide one large exam glove inside another.
   b. Wrap open end of the gloves around the patient end of the circuit tube.
   c. Secure with rubber band (DD1380) / Cut-off wrist bead of another glove / Penrose drain / Tape

4. Connect high pressure oxygen source and turn on O2
5. Turn vent on and allow respirations to begin (listen for compressor)
6. Set FiO2 to 100%
   a. Internal compressor will stop (audible)
7. Turn off oxygen source
   a. Ventilator will alarm and show
   b. “O2 LOW/FAIL-CHECK OXYGEN SOURCE/CONNECTIONS”
   and
   “FIO2-GAS MIX ERROR. CHECK SOURCE/SETTINGS/CONNECTIONS”
   c. Compressor will turn on (audible)
8. Set FiO2 to 21%.
9. Set HIGH pressure alarm to 5 cmH2O below PEAK.
   a. Ventilator will “stutter” and show “HIGH PRESSURE-PEAK INSPIRATORY PRESSURE TOO HIGH” warning and signal an alarm.
10. Turn PLATEAU pressure ON
    a. Ventilator will display “HIGH PRESSURE-PEAK INSPIRATORY PRESSURE TOO HIGH” and “PLATEAU VOLUME-DELIVERED VOLUME LESS THAN SET VOLUME” and trigger an alarm.
11. Turn HIGH Pressure alarm to 100.

12. Set LOW pressure alarm to 5 cmH2O **above** PEAK
   a. Ventilator will display **“LOW PRESSURE-PEAK INSPIRATORY PRESSURE TOO LOW”** and trigger an alarm.

13. Remove circuit from ventilator.
   a. Ventilator will display **“DISCONNECT-CHECK CIRCUIT CONNECTIONS”** and trigger an alarm.
14. Preset ventilator for use per Duty Inspection Power On Checks and turn off.
IN-FLIGHT EMERGENCY

***These procedures should be practiced before performed on live patients***

**Any known malfunction of ventilator should be addressed prior to flight. The following are not for routine use but for emergencies when alternate ventilatory measures are not available and long term BVM is not practical**

☐ Loss of high pressure O2 delivery when needs exceed 21% FiO2 (i.e. missing/unserviceable green high pressure hose.) will alarm and show “O2 LOW/FAIL-CHECK OXYGEN SOURCE/CONNECTIONS” on screen

*NOTE: First place Patient on BVM with supplemental O2. Second, check oxygen tank volume. Third, check the O2 lines and connections*

Alternative methods to increase delivered oxygen content

1. Commercial oxygen reservoir kit for low pressure supply is available (Part # 820-0097-15)

2. Oxygen reservoir fashioned from primary circuit and BVM
   a. Connect short portion of main circuit tube to the BVM and to the airinlet port.
   b. Connect BVM O2 hose to the BVM and the regulator.
   c. Set regulator to desired setting (~10LPM, but no lower than total minute volume.

3. Oxygen reservoir fashioned from second ventilator patient circuit.
   a. Cut/disconnect exhalation valve off of second ventilator circuit.
   b. Remove transducer fitting from exhalation valve at attach it to the main circuit.
c. Connect the transducer hose to the original transducer fitting and the other end to regulated oxygen source.

d. Connect the transducer fitting (still attached to the circuit) to the air inlet port.

e. Set regulator on O2 source to 10 LPM to deliver up to 99% FIO2.

NOTE: Ventilator circuit tubing will provide reservoir for 650-700 ml of O2. Vt of greater than 650-700ml may result in lower FIO2.
Missing or damaged “GAS OUT” leaf valve

1. Missing “GAS OUT” leaf valve will trigger an alarm, give a “DISCONNECT- CHECK CIRCUIT CONNECTIONS”, no “PEAK” value will display, and little to no volume will be delivered to patient.
   a. Place patient on BVM with supplemental O2
   b. Perform DOPE (Dislodgment, Obstruction, Pneumothorax, and Equipment) assessment.
   c. Check “GAS OUT” leaf valve for installation and proper seating.
      i. If folded, use small object to gently unfold or push valve back into place
      ii. If missing, replace ventilator immediately if able. If unable to replace, cover GAS OUT side ports with occlusive dressing. (Replacing GAS OUT leaf valve is optimal but time consuming.)

**WARNING:** Occluding GAS OUT side ports will enable ventilator to provide full respirations, however, this will eliminate the antiasphyxia function these ports provide (Ventilator failure will result in increased resistance in spontaneous respiration) and strict surveillance must be kept on ventilator to ensure any further failure is caught immediately. Patient must immediately be transitioned to BVM in the event of any failure.

Compressor failure/alarms (may show CODE 2)

1. Place patient on BVM with supplemental O2
2. Cycle ventilator to OFF
3. Turn FiO2 knob (#5) to 100%
4. Cycle back on and to desired settings leaving FiO2 at 100%
   a. PEEP will have to be reset when vent is cycled on.

*Note: This technique will transition the ventilator to using oxygen pressure instead of the
compressor to drive ventilation and may hasten oxygen usage*

- Battery Failure
  1. Place patient on BVM with supplemental O2
  2. Turn ventilator OFF
  3. Replace ventilator battery with battery from 326M suction apparatus. (Per the
     manufacturer, they are the exact same!)
     a. 326M battery is in the same location as the 754.
  4. Resume normal operations
     a. PEEP will have to be reset when vent is cycled on.

Fail Code 6
Suctioning to long with inline suction and/or patient inspiratory effort is significant
enough to trigger.
1. Place Patient on BVM with O2
2. Assess Patient
3. Cycle Vent off and on (will have to reset Peep)
4. Check vent settings
5. Place patient on ventilator

REPLACING GAS OUT LEAF VALVE

1. Feed suture through small center hole.

2. Tie small square knot over end of tail of leaf valve.

3. Pull gentle tension on suture while guiding the leaf valve into place.
4. Maintain gentle traction against suture while applying pressure against the leaflet valve inside gas port with finger. Remove string once valve is seated. (Use caution to not apply too much tension to suture as leaf valve tail can tear.)

**ALTERNATIVE FOR MISSING INTERNAL COMPRESSOR AIR FILTER**
Ventilator inspiratory bacteria filter can be attached to air inlet (Missing air filters allow dust, debris, and/or moisture to be pulled into the ventilator compressor. This results in increased work-load of the ventilator leading to diminished battery life and eventual compressor failure)

**Common Replacement Parts**

**Zoll/ NSN Part Numbers**

- Zoll Part #: 820-0097-15 Oxygen reservoir kit for low pressure supply
- MEDSILS: OXYGEN ADAPTER BLEED-IN RESERVOIR FOR VENTILATORS

**NSN: 6515-01-518-5060**

- Zoll Part #: 704-0754-01 Battery Pack
- MEDSILS: BATTERY POWER SUPPLY USED ON VENTILATOR

**NSN: 6130-01-468-8361**

- Zoll Part #: 490-0005-00 Valve, Leaf
- MEDSILS: VALVE REGULATING SYSTEM PRESSURE

**NSN 6530-01-464-0267**
ZOLL 731 Ventilator Pre-mission Checks and Troubleshooting

Routine Care

- Keep the ventilator and its accessories clean at all times.
- Clean the unit’s housing and hose connections with a damp, soap cloth
- For general decontamination, apply a 10% bleach solution with a damp cloth.
- After cleaning, thoroughly dry the unit with a lint free cloth. Make sure all exposed surfaces are cleaned and dried.

Duty Inspection

- Ensure the ventilator is clean and free of visible damage
- Inspect all accessories and connectors for signs of damage or excessive wear. Replace worn or defective items.
- Examine high pressure hose for cracking, discoloration, or disfigurement. Examine end connection fittings for damaged threads and sharp edges. Replace worn or defective hoses.
  *DO NOT attempt to repair hoses
- Examine the ventilator circuit for damage or wear including cracking or discoloration. If there are signs of physical degradation or the unit is indication ventilator circuit problems, replace the circuit
- Examine the filters and replace them if dirty or clogged
- Inspect the external AC/DC adapter, line cords, and DC power cables for wear or damage. Replace if worn or damaged.

*Recommended to use a disposable external filter when operating in areas where fine dust or dirt is airborne due to wind.

* The Zoll Ventilator can operate over the range of -25 to 49 degrees Celsius in emergency situations. When operating at high temperatures, you should remove the unit from its padded case, which allows the unit to pass heat into the surrounding environment.

Operational Test

Before attaching the patient to the ventilator, you must perform an Operational Test to ensure that the breathing circuit is properly attached and that the primary patient safety alarms, such as PATIENT DISCONNECT and AIRWAY PRESSURE HIH, are functioning properly.

1. Press the MANUAL BREATH button; gas should flow out of the patient connection each time the button is pressed.

2. Close the patient port with a gloved hand. During inspiratory phase, the HIGH AIRWAY PRESSURE LIMIT alarm should activate after 2 breaths.
a. If the AIRWAY PRESSURE HIGH alarm fails to activate, ensure all the tubing connections are secure, the exhalation valve is closing during inhalation, and that the High Airway Pressure Limit is set to 35 cm H2O or less.

3. After a breath or two, release the patient port while allowing the ventilator to operate. The PATIENT DISCONNECT alarm should activate.

4. Partially close the patient port to reset the PATIENT DISCONNECT alarm.

5. With no other alarms occurring, remove external power from the ventilator. The EXTERNAL POWER LOW/DISCONNECT alarms should activate. Reconnect external power to reset alarms. **MAY SKIP THIS STEP IF NOT CONNECTED TO EXTERNAL POWER**

6. If operating using internal battery, verify the Battery Icon indicates sufficient available battery capacity remains to support the anticipated duration of operation.

If either the HIGH AIRWAY PRESSURE, PATIENT DISCONNECT, or EXTERNAL POWER LOW/DISCONNECT alarms fail to activate, continue to manually ventilate the patient, replace the ventilator, and send the unit in for service.
**COVID-19 Management**

**Criteria:**
Only as last resort if all ground/fixed wing options have been exhausted. MEDEVAC crews WILL follow OTSG guidance for transport of COVID patients, and transport only if required PPE, PM, decon material and appropriate approval authorities are available BEFORE transport.

**Pearls:**
- Recognize severe hypoxemic respiratory failure when a patient with respiratory distress is failing to respond to standard oxygen therapy. Prepare to provide advanced oxygen and ventilatory support. Patients may deteriorate rapidly, continuous monitoring is critical!
- Avoid fluids if not in shock. If required, use balanced crystalloids (LR) instead of unbalanced crystalloids (0.9% NS). If patient remains hypotensive, refer to Hypotension/Shock.
- Do not prone position patients in flight; rehearse for emergency re-proning in event of accidental lost airway.
- Favor HFNC over BiPAP/noninvasive ventilation (NIV) if early intubation and mechanical ventilation is not possible.
- Avoid use of nebulized medications, Bag Valve Mask ventilations (BVM), NIV, and suctioning when possible.
- Avoid BiPAP if HFNC is unsuccessful and consider early intubation.
- Perform continuous ETCO2 monitoring. Permissive hypercapnia is acceptable.
- If high pressure alarms are presenting, it may be necessary to reduce Vt if SpO2 and ETCO2 are within normal limits.
- *Post-mission Decon- Crewmembers should remain in full PPE until completion of mission, not just patient drop-off if aircraft is not being deconned at drop-off site.
**PROCEDURE A-XV**

### PROCEDURE GUIDELINE

<table>
<thead>
<tr>
<th>Epidemiologic risk factors</th>
<th>Exposure category</th>
<th>Recommended Monitoring for COVID-19 (until 14 days after last potential exposure)</th>
<th>Work Restrictions for Asymptomatic HCP</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

**Prolonged close contact with a COVID-19 patient who was wearing a facemask (i.e., source control)**

<table>
<thead>
<tr>
<th>HCP PPE: None</th>
<th>Medium</th>
<th>Active</th>
<th>Exclude from work for 14 days after last exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCP PPE: Not wearing a facemask or respirator</td>
<td>Medium</td>
<td>Active</td>
<td>Exclude from work for 14 days after last exposure</td>
</tr>
<tr>
<td>HCP PPE: Not wearing eye protection</td>
<td>Low</td>
<td>Self with delegated supervision</td>
<td>None</td>
</tr>
<tr>
<td>HCP PPE: Not wearing gown or gloves</td>
<td>Low</td>
<td>Self with delegated supervision</td>
<td>None</td>
</tr>
<tr>
<td>HCP PPE: Wearing all recommended PPE (except wearing a facemask instead of a respirator)</td>
<td>Low</td>
<td>Self with delegated supervision</td>
<td>None</td>
</tr>
</tbody>
</table>

**Prolonged close contact with a COVID-19 patient who was not wearing a facemask (i.e., no source control)**

<table>
<thead>
<tr>
<th>HCP PPE: None</th>
<th>High</th>
<th>Active</th>
<th>Exclude from work for 14 days after last exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCP PPE: Not wearing a facemask or respirator</td>
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<td>None</td>
</tr>
</tbody>
</table>

***Report all potential high and medium exposures to Flight Surgeon as soon as possible***

**Self-Monitoring with delegated supervision** in this setting means HCP perform self-monitoring with oversight by their Flight Surgeon or delegate. On days HCP are scheduled to work, healthcare facilities could consider measuring temperature and assessing symptoms prior to starting work.
Ventilator Exchange Checklist

Two person procedure- One for airway, one for ventilator.

- All persons in the room/area in full PPE
- All equipment gathered and field prepped
- Transport ventilator preset / staged in sequence with circuit-ETCO2- *Filter-Inline Suction
- Temporarily hyper-oxygenate with 100% FiO2 prior to exchange
- Allow patient to inhale
- Clamp tube at end of inhalation (ensure use of smooth clamps or pad ET tube)
- Place primary/in use ventilator in Stand-by (ex. T1) or disconnect inspiratory limb from ventilator side- ensuring to minimize contamination from in-use vent and circuit
- Break the circuit
- Place transport ventilator on patient
- Unclamp ET Tube (ensure tube is open)
- Verify Ventilation

* HME/viral filters should be placed as close to patient as possible and in accordance with manufacturer guidelines
HEMORRHAGE CONTROL PROCEDURES

CLINICAL INDICATIONS:
- Hemorrhage

CONTRAINdicATIONS:
- None

PROCEDURE:
- Rapid bleeding and/or arterial source recognized (extremities, axial, inguinal) – immediate application of extremity and/or junctional tourniquets, as appropriately needed, to stop bleeding.
- For compressible (external) hemorrhage not amenable to limb tourniquet use Combat Gauze, the CoTCCC hemostatic dressing of choice.
  - Alternative hemostatic adjuncts:
    - Celox Gauze, ChitoGauze, XStat (best for dep, narrow-tract junctional wounds) or iTCLamp (may be used alone or in conjunction with hemostatic dressing or XStat).
  - Hemostatic dressings should be applied with at least 3 minutes of direct pressure (optional for XStat). Must apply adequate force to compress vessels. If size of wound and bleeding are concerning for adequate control, place hemostatic dressing as close to the bleeding vessel as possible followed by 5 min of direct pressure. Each dressing works differently, so if one fails to control bleeding, it may be removed and a fresh dressing of the same type or a different type applied. (Note: XStat is not to be removed in the field, but additional XStat, other hemostatic adjuncts, or trauma dressings may be applied over it.) If bleeding continues, apply a pressure dressing to the wound if applicable.
  - If unable to control bleeding in extremity wounds with above, apply tourniquet. Note: immediate transition to a tourniquet in an extremity wound hemorrhage is preferred.
  - In penetrating injuries to the abdomen, after removing blood, hemostatic dressings should be pushed into the wound and pressure held for five minutes to encourage clotting. Do not remove bandage after placement. Penetrating abdominal/thoracic injuries require a large amount of pressure to compress vessels.
In pelvic wounds – utilize pelvic binding to limit capacity for hemorrhage (tie pelvis with sheet/commercial binder).

For external hemorrhage of the head and neck where the wound edges can be easily re-approximated, the iTClamp may be used as a primary option for hemorrhage control. Wounds should be packed with a hemostatic dressing or XStat, if appropriate, prior to iTClamp application. DO NOT APPLY on or near the eye or eyelid (within 1cm of the orbit).

- The iTClamp does not require additional direct pressure, either when used alone or in combination with other hemostatic adjuncts.
- If the iTClamp is applied to the neck, perform frequent airway monitoring and evaluate for an expanding hematoma that may compromise the airway. Consider placing a definitive airway if there is evidence of an expanding hematoma.

- Administer IVFs as per guideline – use care with internal bleeding so as not to raise SBP above 80mmHg. MAP should be greater than >60mmHg.
- Consider 2 Grams TXA if significant blood loss.

Document procedure, results, and vital signs.

***Clear endpoints for fluid resuscitation remain unclear. Resuscitation should be geared towards patient response to therapy. A MAP greater than 60mmHg or a systolic BP between 70-80mmHg is a reasonable goal in trauma patients without a head injury. A MAP between 80-110mmHg or systolic pressure between 110-160mmHg is a recommended goal in patients with a head injury.

MAP = Mean Arterial Pressure: \[ \text{MAP} = \left( \frac{2 \times \text{diastolic BP} + \text{systolic BP}}{3} \right) \]

### Hemorrhage Classification (ATLS)

<table>
<thead>
<tr>
<th></th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Blood Loss (mL)</td>
<td>&lt;750 15%</td>
<td>750-1500 15-30%</td>
<td>1500-2000 30-40%</td>
<td>&gt;2000 40%</td>
</tr>
<tr>
<td>Heart Rate (min)</td>
<td>Normal to slightly elevated</td>
<td>Mild Tachycardia 100-119</td>
<td>Tachycardia 120-140</td>
<td>Tachycardia &gt;140</td>
</tr>
<tr>
<td>Respiratory Rate (min)</td>
<td>Normal 12-20</td>
<td>Mild Tachypnea 20-24</td>
<td>Tachypnea 24-40</td>
<td>Tachypnea 24 - &gt;40</td>
</tr>
<tr>
<td>Blood Pressure (from baseline)</td>
<td>Normal or slightly elevated</td>
<td>SBP with mild decline</td>
<td>SBP decreased*</td>
<td>SBP decreased (&lt;90mmHg)</td>
</tr>
<tr>
<td>Urine Output (mL/hr)</td>
<td>Normal &gt; 30</td>
<td>Slight decrease 20-30</td>
<td>Decreased 5-15</td>
<td>Negligible &lt;5</td>
</tr>
<tr>
<td>Capillary Refill</td>
<td>1-2 seconds</td>
<td>2 seconds</td>
<td>&gt;2 seconds</td>
<td>&gt; 3 seconds</td>
</tr>
<tr>
<td>Mental Status and Skin (color/texture)</td>
<td>Normal or slightly anxious</td>
<td>Mildly anxious, skin may become cool, clammy</td>
<td>Anxious, confused, skin cool, clammy</td>
<td>Confused, lethargic, skin will be cool/cold, pale</td>
</tr>
</tbody>
</table>
TOURNIQUET APPLICATION

CLINICAL INDICATIONS:
- Extremity trauma with continued hemorrhage or amputation.

CONTRAINDICATIONS:
- None

PROCEDURE: All medical personnel should be regularly practiced in deploying and applying all CoTCCC approved tourniquets. Tourniquets should be pre-set and removed from wrapping (ready for immediate use and application).

Initial HASTY placement (over uniform, clearly proximal to bleeding. If site of life-threatening bleeding is not readily apparent, place the tourniquet “high and tight” as proximal as possible on the injured limb.) HASTY tourniquet placement is appropriate for initial treatment of massive hemorrhage or hemorrhage while in care under fire phases. Reassess all HASTY placement tourniquets and assess if hemorrhage is manageable by other methods while in tactical field care or transition to tactical evacuation care. If tourniquet is necessary to manage hemorrhage, replace all HASTY placement tourniquets with DELIBERATE placement tourniquets, preferably prior to patient evacuation, per the following steps:

- Remove clothing as necessary to visualize bleeding area.
- Place tourniquet (commercial or any 2” wide piece of fabric, leather, etc.) directly on skin proximal to wound. Tourniquet should be placed at least 2-3” above bleeding site, proximal or distal to joints, as appropriate.
- Tighten tourniquet by twisting included rod (commercial) or piece of 6” rigid material (e.g., stick) until bleeding stops. If converting from HASTY to DELIBERATE tourniquet placement, loosen HASTY tourniquet. If bleeding is not well controlled with the first tourniquet, apply a second tourniquet side-by-side with the first.
- Secure ends of tension bar to prevent unwinding.
- Document presence of tourniquet and time of placement. (“T” signifies tourniquet). Do not cover tourniquet. Recheck tourniquet intermittently (q 15min) and after any movements to ensure no new bleeding/loosening has occurred.

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

Document procedure, results, and vital signs.
JUNCTIONAL TOURNIQUET APPLICATION

CLINICAL INDICATIONS:

• High level amputation not amendable to a standard tourniquet, non-compressible hemorrhage in a transition zone (inguinal and axilla), and pelvic immobilization.

CONTRAINDICATIONS:

• None

PROCEDURE: All medical personnel should be proficient in deploying and applying all available tourniquets. Junctional tourniquets (JT) should be pre-set and removed from wrapping (ready for immediate use and application). Junctional tourniquets should be applied according to manufacturer’s instructions.

• Remove clothing as necessary to visualize area of application if possible. Remove objects from patient’s pockets or pelvic area. Slide device into place as necessary to proper position.

• Tighten tourniquet by twisting or pumping up balloon/bladder until bleeding stops. (depends on JT used)

• Secure all straps in order to ensure security of device.


• Recheck tourniquet intermittently (q 15min) and after any movements to ensure no new bleeding/loosening has occurred.

• Junctional tourniquets are recommended to be in place for up to four hours.

• ***If using a JT with pump device, additional inflation may be necessary with changes in altitude.

• The uniqueness of junctional tourniquets do not lend themselves to conversion well and should be left to Roles with surgical capability. Use caution if attempting Junctional Tourniquet Conversion. Must have high index of suspicion that injury is compressible and can be managed by other adjuncts.

Document procedure, results, and vital signs.
TOURNIQUET CONVERSION

CLINICAL INDICATIONS:
- Wounds that have high possibility of compressible hemorrhage control with hemostatic or pressure dressings where hemorrhage was originally controlled by a tourniquet.

CONTRAINDICATIONS:
- Patient showing signs and symptoms of hypotensive/hemorrhagic shock.
- Tourniquets controlling hemorrhage for amputated or partial-amputated extremity.
- Tourniquets that have been in place >6 hours.
- Unable to monitor wound for bleeding post tourniquet conversion due to task saturation, limited visibility or poor positioning.

PROCEDURE:
Limb tourniquets and junctional tourniquets should be converted to hemostatic or pressure dressings as soon as possible if no above contraindications are present. 

Every effort should be made to convert tourniquets in less than 2 hours if bleeding can be controlled with other means. **Do not remove a tourniquet that has been in place more than 6 hours.**

- Confirm patient is not showing any signs of hypotensive/hemorrhagic shock.
- With Tourniquet in place, attempt to pack wound with hemostatic dressing and apply a pressure dressing.
  - Combat Gauze is the CoTCCC hemostatic dressing of choice
  - Alternate hemostatic adjuncts:
    - Celox Gauze
    - ChitoGauze
    - XStat (best for deep, narrow-tract junctional wounds)
    - iTClamp (may be used alone or in conjunction with hemostatic dressing or XStat)
- Loosen but don’t remove the tourniquet by unwinding the windlass until pulses return and closely monitor for return of bleeding for 5 minutes.
- If bleeding returns, retighten tourniquet until loss of distal pulse and document procedure failure.
- If no bleeding returns, loosen tourniquet completely but leave loosely looped around limb and monitor for return for bleeding for 5 minutes.
- If bleeding returns, retighten tourniquet until loss of distal pulse and document procedure failure.
- If no bleeding returns, document procedure success and time. Continue to monitor and assess for bleeding.

**Document procedure, results, and vital signs.**
VASCULAR ACCESS
(INTRAVENOUS)

CLINICAL INDICATIONS:
- Need for intravascular access to provide resuscitative fluids and/or medications.
- Anticipated need for intravenous access in emergency patients.

CONTRAINDICATIONS:
- Injuries proximal to IV site/ipsilateral to IV site (relative).

PROCEDURE:
- Prepare all necessary equipment: PPE, tourniquet, IV catheters, alcohol/betadine wipe, saline lock or IV tubing, IVFs if administering, and tape/securing device.
- Ensure all IV tubing/saline locks flushed prior to attempting IV.
- Place venous tourniquet proximal to anticipated IV puncture site.
- Identify vein to be cannulated and cleanse overlying area with alcohol/betadine.
- While holding vein, cannulate the vessel (use a shallow angle of attack with the needle). Once flash returned, advance slightly to ensure catheter in vessel, then advance catheter only fully into vessel (should pass without resistance).
- While holding pressure proximally on vein and maintaining catheter position, remove tourniquet and needle. Attach NS flush and flush IV — this fluid should flow easily into the vein — any resistance suggests missed attempt or "blown" vein. (Note: If blood samples being drawn — they should be taken prior to removing tourniquet and always prior to flush (after flushing — may obtain dilute sample which will alter results.)
- Secure catheter using transparent dressing or tape.
- Repeat until 2 IV sites have been established and are functional.

Document procedure, results, and vital signs.
VASCULAR ACCESS (INTRAOSSEOUS)

CLINICAL INDICATIONS:
- Need for intravascular access to provide resuscitative fluids and/or medications with inability to obtain adequate peripheral intravascular access (2 failed attempts or greater than 90sec).
- Anticipated need for intravenous access in emergency patients.

CONTRAINDICATIONS:
- Only absolute contraindication is fracture at affected site or prior IO attempt in the same bone.
- Cellulitis overlying puncture site (relative contraindication).
- Injury (not fracture) proximal to puncture site (relative – site dependent).
- FAST Tactical™ device contraindicated in pediatric patients less than 18 years old.

PROCEDURE:
- Prepare all necessary equipment: PPE, IO device, betadine scrub, and IV tubing.
- Ensure all IV tubing/saline locks flushed prior to attempting IV.
- Identify appropriate puncture area as follows:
  - **FAST Tactical™**
    - Sternum – follow manufacturer instructions or training guidelines.
  - **EZ IO™**
    - Proximal Humerus (YELLOW 45mm) – 1 to 2 cm above the surgical neck into the most prominent aspect of the greater tubercle lateral to intertubercular (bicipital) groove, aiming 45-degrees downward towards contralateral hip.
    - Distal Femur (peds, BLUE 25mm) – Proximal to patella (max 1cm) and 1-2cm medial to midline.
    - Proximal tibia (BLUE 25mm or PINK 15mm) – 2cm (2 finger widths) distal to tibial tuberosity on medial aspect.
    - Distal tibia (BLUE or PINK) – 2cm (2 finger widths) proximal to medial malleolus.
  - **Manual IO**
    - Proximal tibia and distal tibia – same as EZ IO™ site.
- Cleanse site well as failure to appropriately disinfect the area can lead to bone infections.
- Applying firm pressure, puncture skin at 90° angle (45 degree down for Humeral IO), puncture bone (felt as loss of resistance, give or “pop”).
  - Confirm placement by (1) needle felling firm in bone and (2) aspiration of blood/bone marrow. If unable to aspirate blood, attempt to aspirate after the flush
  - Flush IO catheter with normal saline. May add 2% preservative-free Lidocaine without epinephrine to flush to decrease pain (2mL or 40 mg in adults, 0.5mg/kg not to exceed 40mg in pediatric).
  - Constantly monitor for increased tension in muscular compartments as misplacement into a compartment with subsequent fluid administration can lead to iatrogenic compartment syndrome.
  - With the exception of adult proximal humerus insertions, routinely inserting the needle set to the hub is not recommended technique.
- Document procedure, results, and vital signs.
**PROCEDURE B-VII**

**PROCEDURE GUIDELINE**

**IV / IO PROTOCOL**

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**Universal Patient Care Guideline**

- Assess need for IV
  - Emergent or potentially emergent medical or trauma condition

**Peripheral IV x 2**

- Catheter ≥18ga
  - If unable to obtain peripheral IV access after two attempts or >90 secs, proceed to IO.

**Intraosseous Device**

- Life/limb-threatening event if unable to obtain peripheral IV access
  - If patient is deemed a “hard stick”, IO should be conducted first.

**Ensure open and functioning**

- Fluid bolus per specific protocol
  - At a minimum, maintain a slow “to-keep-open” (TKO) drip

---

**Pearls:**

- **GAIN VASCULAR ACCESS** where available based upon patient
- Any pre-hospital fluids or medications approved for IV use may be given through an intraosseous line – including blood products.
- All trauma patients or potentially ill patients should have **AT LEAST TWO functioning** IV / IO lines whenever possible.
- Upper extremity IV sites are preferable to lower extremity IV sites.
- Following IV attempt failure and IO attempt failure, external jugular lines can be attempted for life-threatening events with no peripheral access.
- Utilize EZ-IO™, FAST-1™, EZ T.A.L.O.N.™ or unit Medical Director approved IO device.
  - Sternal or humeral head sites are preferred over all other sites.
  - (Tibia is preferred for pediatrics).
  - Correct needle size is critical for the EZ-IO; use of universal/adjustable depth needle or:
    - Yellow - 45mm for humerus and *heavy sternal
    - Blue - 25mm for adult *sternum/tib
    - Pink - 15mm for children and *sternal/tib
  - Pressure infusion bag is recommended for IO starting at 300mmHg

*NOTE: Use of EZ-IO in sternal is off label emergency procedure only see VASCULAR ACCESS (INTRAOSTEOUS)
PROCEDURE B-VIII

[PROCEDURE GUIDELINE]

VASCULAR ACCESS via CENTRAL CATHETERS

CLINICAL INDICATIONS:
- In the presence of a life threatening condition, with clear indications for immediate use of medication or fluid bolus. (Not for prophylactic IV access.)

CONTRAINDICATIONS:
- Suspected infection at skin site.

PROCEDURE:
- Determine the type of catheter present: PICC, Broviac, Hickman, Groshong Mediport, etc.

Procedure for peripherally inserted Central Catheter (Cook, Neo-PICC, etc.) and Tunneled Catheter (Broviac, Hickman, Groshong, etc.):
- Prepare equipment:
  - 2 - 3 10 ml prefilled syringes of 0.9% NaCl
  - Sterile gloves (if available)

- If more than one lumen is available (PICCs, Hickmans and Broviacs can have one, two, or three lumens), select the largest lumen available.

- Vigorously cleanse the cap of the lumen with chlorhexidine or 70% alcohol prep pad, allow to dry.

- Unclamp the selected catheter lumen and using a prefilled 10 ml syringe:
  - Vigorously flush the catheter using a pulsating technique and maintaining pressure at the end of the flush to prevent reflux of fluid or blood
  - If catheter does not flush easily (note that a PICC line will generally flush more slowly and with greater resistance than a typical intravenous catheter), re-clamp the selected lumen and attempt to use another lumen (if present)
  - If unable to flush any of the lumens, the catheter is unable to be used

- Attach primed IV administration set and observe for free flow of IV fluid.
  - Utilizing an IV pump, set the flow rate based on the patient condition and IAW SMOG

Document procedure, results, and vital signs.
Procedure for implanted catheter (Port-a-Cath, P.A.S. port, Medi-port):

- Prepare all necessary equipment:
  - Non-coring, right angle needle specific for implanted vascular access ports
  - 2 - 3 10 ml prefilled syringes of 0.9% NaCl
  - Sterile infusion port cap
  - Sterile gloves (if available)
  - Sterile occlusive dressing large enough to completely cover the insertion site
- Identify the access site; usually located in the chest.
- Vigorously cleanse the cap of the lumen with chlorhexidine or 70% alcohol prep pad, allow to dry.
- Attach the infusion port cap to the end of the non-coring, right angle needle tubing.
- Prime the non-coring needle with attached tubing with saline using one of the prefilled 10 ml syringes. Leave the syringe attached to the tubing.
- Palpate the port to determine the size and center of the device.
- Secure the access point port firmly between two fingers and firmly insert the non-coring needle into the port, entering at a direct 90° angle.
- Aspirate 3 – 5 ml of blood with the syringe.
  - If unable to aspirate blood, re-clamp the catheter and do not attempt further use
  - Asking the patient to cough may facilitate access of the port
- Flush the catheter with 3 – 5 ml 0.9% NaCl using a prefilled 10ml syringe.
  - If catheter does not flush easily, do not attempt further use
- Attach IV administration set and observe for free flow of IV fluid.
  - Utilizing an IV pump, set the flow rate based on the patient condition and IAW SMOG
- Cover the needle and insertion site with the sterile occlusive dressing.

**Document procedure, results, and vital signs.**
**PROCEDURE B-VIII**

**CATHETER SIZE MAX FLOW RATE**

<table>
<thead>
<tr>
<th>CATHETER</th>
<th>SIZE</th>
<th>MAX FLOW RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICC</td>
<td>Less than 2.0 fr</td>
<td>125 mL/hr</td>
</tr>
<tr>
<td>PICC</td>
<td>Greater than 2.0 fr</td>
<td>250 mL/hr</td>
</tr>
<tr>
<td>Groshong PICC</td>
<td>3 fr</td>
<td>240 mL/hr</td>
</tr>
<tr>
<td>Groshong PICC NXT</td>
<td>4 fr</td>
<td>540 mL/hr</td>
</tr>
<tr>
<td>Groshong PICC NXT</td>
<td>5 fr</td>
<td>200 mL/hr</td>
</tr>
<tr>
<td>Hickman/Broviac</td>
<td>8 – 9.5 fr</td>
<td>3000 mL/hr</td>
</tr>
</tbody>
</table>

**PEARLS:**

- Do not exceed recommended flow rates.
- Avoid taking a blood pressure reading in the same arm as the PICC.
- Only non-coring, right angle needles specific for implanted ports are to be used for vascular access devices that are implanted in the patient. These are generally not carried MEDEVAC units but may be provided by the patient.
- Priming the tubing of the non-coring needle is essential to prevent air embolism.
- There are many peripherally inserted, tunneled and/or implanted ports options. Providers should do their best to discern what option the patient has. Patient may be carrying a reference/wallet card about their device.
- PICC lines will not tolerate rapid infusions or infusions under pressure.
VASCULAR ACCESS via External Jugular Vein Cannulation

CLINICAL INDICATIONS:
- In the presence of a life threatening condition, with clear indications for immediate use of medication, blood or fluid bolus. It should only be used when a peripheral IV site cannot be established (Not for prophylactic IV access.)

CONTRAINDICATIONS:
- Inability to obtain any other suitable peripheral IV access
- Administer IV fluids or blood
- Administer medications

Equipment:
- IV start kit (alcohol swabs 4 x 4s, tourniquet, tape)
- Large bore IV catheter (14 or 16 gauge)
- IV fluid tubing

PROCEDURE:
- Explain the procedure to the patient
- Select the insertion site
- Find the landmarks midway between the angle of the jaw and the midpoint of the clavicle.
- Turn the patient’s head away from the intended site of insertion. Consider placing the patient in the Trendelenburg position or holding the thumb over the vein to facilitate insertion.
- Insert the IV catheter pointing towards the ipsilateral acromioclavicular joint until a flash fills the chamber of the catheter, then advance the catheter over the stylet and remove the stylet.
- Attach the IV fluids to the catheter and infuse to verify the intravenous line is patent and does not infiltrate.
- Secure the IV catheter using tape and a Tegaderm dressing or a clear occlusive dressing.
- Dispose of sharps in an approved biohazard container.
- Document procedure, results, and vital signs.

Complications:
- Infiltration
- Hematoma formation
- Cellulitis/infection
- Thrombosis
- Phlebitis
**ENROUTE DAMAGE CONTROL RESUSCITATION (DCR)**

**Indications:**
- Systolic BP <100mmHg
- Heart Rate >100 bpm
- Hematocrit <32%
- pH <7.25

**Injuries associated with need for DCR:**
- Above the knee traumatic amputation (especially if pelvic injury present)
- Multi-Amputation
- Penetrating injury to chest or abdomen
- Intra-abdominal/thoracic hemorrhage
- 2 regions positive on eFAST scan
- Lactate > 2.5

**Blood Products IAW Trauma Fluid Hierarchy:**
See Blood Component Therapy Guideline

**If No TXA given prior and <3hrs from time of injury/surgery:**
- TXA 2 Grams / IV/IO / 100ml .09% NS / Bolus or IVP (see drug card)

**If 1 Gram TXA given prior and <3hrs from time of injury/surgery:**
- TXA 1 Gram IV/IO (see drug card)
  - If >3hrs from time of injury/surgery:

**Continued From:**
Hypotension Guideline

**Trauma Fluid Hierarchy**
- Whole Blood (low-titer grp O if available)
- pRBCs, plasma, platelets 1:1:1
- pRBC’s, plasma 1:1
- Crystalloid (Plasmalyte-A)

**IN THE ABSENCE OF ALL BLOOD PRODUCTS, BEGIN/CONTINUE RESUSCITATION AT STEPS FOLLOWING UTILIZATION OF BLOOD PRODUCT**

**If continued decompression due to uncompressible hemorrhage**
- Consider 125ml Boluses Plasmalyte A to target MAP > 65 mmHg

**Consider (as LAST Resort):**
Pressors (Preferred)Vasopressin
4 Unit bolus followed by 0.04U/Min to maintain MAP > 65mmHg

**Pearls:**
- **All patients requiring DCR should be transferred to the closest facility capable of Damage Control Surgery or REBOA ASAP!!!**
- **Blood Product:** Continue to resuscitate with blood product as available and PRN to achieve/maintain target SBP of > 100mmHg (>110mmHg in patients with TBI/Head Injury). If a unit is transfused in a sending hospital the unit must be delivered to the receiving hospital
- **Hypothermia Management:** Blood fluid warmer use and blankets/HPMK/APLS contribute to effective hypothermia management.
- **Calcium:** 30mL of 10% Calcium Gluconate or 10mL of 10% Calcium Chloride, given during or after the first unit of blood product and additionally after every 4 units of blood product during continued resuscitation. Calcium Gluconate preferred over Calcium Chloride (if available). Use extreme caution to avoid extravasation.
- **Calcium**—May be given before TXA due to hypocalcemia and blood product use.
- Optimize hemostasis and correct volume loss first!! Avoid the use of pressors or crystalloids unless absolutely necessary to maintain BP in the absence of blood products and ongoing hemorrhage. Hypertonic saline **SHOULD NOT** be used for treatment of hemorrhagic shock.
- The use of hydroxyethyl starch (Hextend, Hespan) or Factor VII (rhFVIIa) is NO LONGER RECOMMENDED
- Administering TXA < 3 hours from time of injury includes both point of injury and post-operative
BLOOD COMPONENT / FRESH WHOLE BLOOD USE

IMMEDIATE CLINICAL INDICATIONS in trauma patients with SERIOUS INJURIES and evidence of hemorrhage / shock:

- Systolic blood pressure less than 100 mm Hg or absence of radial pulse
- Tachycardia greater than 100 beats per minute (BPM) or higher
- One or more major amputations

CLINICAL INDICATIONS:

- Uncontrolled hemorrhage or evidence of hemorrhagic shock
  - Trauma patients with amputation (complete or partial with distal circulation compromise)
  - Non-compressible penetrating thoracic, abdominal, and transitional zone injuries (axilla, inguinal, neck)
  - Pelvic Fractures in conjunction with traumatic injury (significant mechanism of injury)
  - Clinical signs of coagulopathy
    - Tachycardia, tachypnea, fever, altered mentation, hypoxemia
  - Severe hypothermia associated with blood loss

CONTRAINdications:

- None

PRIOR TO BLOOD PRODUCT TRANSFUSION:

- Maximal hemorrhage control
- Treatment of suspected tension pneumothorax
  - Clinical signs may include: hypotension, hypo-perfusion, diminished or absent breath sounds. Late signs include: tracheal deviation and distended neck veins.
- Patent airway or airway control
- IV/IO access
- Hypothermia prevented and/or treated
PROCEDURE B-XI

ORDER OF PRECEDENCE:

- Resuscitate with Whole Blood
- Plasma, RBCs, Platelets in a 1:1:1 Ratio (no particular order)
- Plasma and RBCs in a 1:1 Ratio
- Plasma (thawed, liquid, reconstituted) alone or RBCs alone

PROCEDURE:

- Document all items on the SF 518 (only authorized document for blood products aboard Army Aeromedical Evacuation platforms).
  - Two person verification of patient and blood products given matching SF 518.
- Observe units of blood
  - Look for gas, discoloration, clots, and sediment
  - Safe-T-Vue must remain white on color indicator. Red coloration indicates that temperature has been exceeded and is no longer acceptable for use.
- Initiate large bore IV (18G min, 14G preferred) or IO access.
  - IO access via sternum or humerus is preferred. Tibia site can be utilized as alternate, but attempt should be made to gain another access point.
  - Lidocaine 2% (2-3 mL) flush in IO sites provides analgesia and increases compliance.
- All blood and blood products will be administered through a dedicated line of NS using Y-tubing with filter.
- Transfuse blood through an approved fluid warming device if available.
- Rapid transfusion can be achieved by using an approved pressure infusion device.
  - Inflated pressure bag to at least 300 mmHg
  - 60 ml syringe or manual pressure can also be utilized in the event a pressure infuser is not available.
- Slow all other concurrent infusions unless they are TXA or RFVIIa.
- Resuscitation Goal:
  - until palpable radial pulse, improved mental status or SBP 100 (SBP >110 w/ head injury) and MAP >60 mmHg.
- Addition of Calcium when administering any amount blood will be given. Citrate binding can adversely affect serum Calcium levels. 30 ml of 10% calcium gluconate or 10 ml of 10% calcium chloride IV/IO should be given to patients in hemorrhagic shock during or immediately after transfusion of the first unit of blood product and with ongoing resuscitation after every 4 units of blood products. Ideally, ionized...
calcium should be monitored and calcium should be given for ionized calcium less than 1.2mmol/L.

- Monitor patient every 5 minutes and document any patient signs and symptoms consistent with a transfusion reaction. These include: chills, back/chest pain, rash, fever, hives, and/or wheezing.

  Document procedure, results, and vital signs on the SF 518.

**CLINICAL PEARLS AND CONSIDERATIONS:**

- **Febrile Reaction** - Temperature increase (1°C or 2°F) from baseline, chills, flushing, headache and rapid pulse
- **Allergic/Anaphylaxis Reaction** - itching, chills, flushing, nausea/vomiting, coughing and/or wheezing, or laryngeal edema
  - Treat with Diphenhydramine 50mg IVP or IM. Have Epinephrine standing by.
- **Acute Hemolytic Reaction** - rapid onset of dyspnea, hypotension, hemoglobinuria, rise in venous pressure, distended neck veins, cough and/or crackles at the bases of the lungs. Treatment is to stop the transfusion, titrate O2 saturations above 94%, and increase IV fluid hydration to 100-200mL/hr to support a urine output above 100-200mL/hr.
- **Circulatory Overload** - onset of shortness of breath, tachycardia, hypertension, jugular vein distention, pulmonary rates, and hypoxia. This condition may be difficult to distinguish from a hemolytic reaction.
- If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to restore and maintain a normal radial pulse. If BP monitoring is available, maintain a target systolic BP goal of at least 110 mmHg.
- Blood is very viscous, use the largest line available to infuse.

*** Blood component therapy is location specific and is not standard for all missions OCONUS and CONUS.
BLOOD TRANSFUSION RELATED REACTIONS

Differential Diagnosis:  

Anaphylaxis reaction  
Acute hemolytic transfusion reaction (AHTR)  
Febrile non-hemolytic transfusion reaction (FNHTR)  
Transfusion-related acute lung injury (TRALI)  
Transfusional volume/circulatory overload (TACO)  
Mechanical-caused hemolysis  
Transfusion-transmitted bacterial infection

Signs and Symptoms:  

Rapid onset of shock, hypotension (<100mmHg systolic), angioedema, and respiratory distress  
Fever (>100.4°F), chills, flank pain, red/brown urine  
Fever (>100.4°F) or temperature increase of (1°C or 2°F) from baseline, chills, possible dyspnea  
Hypoxemia (SPO2 <94%), Fever (>100.4°F), hypotension (<100mmHg systolic), cyanosis, tachypnea (>24 breaths per minute), tachycardia (>100 bpm)  
Dyspnea, orthopnea, tachycardia (>100 bpm), wide pulse pressure, hypertension (>140mmHg systolic), hypoxemia (SPO2 <94%), headache, possible seizure  
Varies with each device. Fever (>100.4°F), chills, possible dyspnea  
Fever (>102.2°F or >3.6°F change after transfusion), rigors, tachycardia (>120 bpm or >40 bpm increase following transfusion), rise or fall of systolic blood pressure (>30mmHg)

Pearls:  

- **GENERAL RULES:**  
  - Stop the transfusion  
  - Keep the intravenous line open with saline  
  - Identify and treat cause of the reaction  
  - Re-institute the transfusion only if it is deemed to be clinically essential  
- Before initiating IVF bolus, ensure IV tubing is new. DO NOT USE existing Y-tubing from blood administration set.  
- The most common transfusion reaction is a febrile, non-hemolytic transfusion reaction. These are mostly benign with no lasting sequelae. Treatment consists of antipyretics. (Acetaminophen 500mg PO every 4 hours.)  
- TRALI is the leading cause of transfusion-related mortality and commonly occurs in patients who have undergone recent surgery, massive blood transfusion, or who have an active infection. Goal of treatment is supportive and aimed at maintaining oxygenation and reducing respiratory distress.  
- TACO is essentially pulmonary edema secondary to congestive heart failure usually occurring in elderly, small children and those with compromised cardiac function. Large volumes of fluid given rapidly are a common precursor to this reaction. Goal is aimed at mobilizing fluids (diuretics) and treating underlying condition. Both TACO and TRALI require immediate resuscitation by an advanced level practitioner.  
  - A unit of packed cells should be given at a rate of 2.5-3.0 mL/kg per hour.  
- Mechanical-caused hemolysis is commonly caused by rapid transfusion, poor collection and storage, or heating the blood above 42°C during transfusion.
**PROCEDURE B-XII**

### Universal Patient Care Guideline

- **O₂** (if hypoxic)
- **IV/IO Guideline**
- Cardiac Monitor (ASAP)

### Definitive Airway
- Established and SPO₂ >93%

### Establish Advanced Airway
- per individual competencies, contraindications, and/or attempt failures
  1. Endotracheal Intubation
  2. Cricothyroidotomy
  3. Blind Insertion Airway Device
  4. Non-invasive positive pressure ventilation CPAP or BiPAP

### If concerned for anaphylaxis:
- Epinephrine 1:1000
- 0.3mg-0.5mg IM

### 500mL NS
- if not previously started

### Diphenhydramine
- 50mg IV/IO/IM/PO

### Methylprednisone
- 125mg IV/IO
  - Consider:
  - Albuterol 90mcg
  - 2 puffs or 2.5mg nebulized

### Febrile Non-hemolytic Transfusion Reaction (FNHTR)
- Acetaminophen
  - 500mg PO or 1G
  - IV

### Acute Hemolytic Reaction (AHTR)
- MEDICAL Emergency
- Draw blood from adjacent limb
- 100 - 200mL/ hour NS to support UOP of 100-200mL/ hour

### Pearls:
- Blood transfusions conducted during point of injury for casualties suffering from blood loss/massive hemorrhage may not show any transfusion reaction during the limited transport time.
BLOOD GLUCOSE ANALYSIS

CLINICAL INDICATIONS:
- Suspicion of blood glucose abnormalities – hyperglycemia/hypoglycemia.

CONTRAINDICATIONS:
- None

PROCEDURE:
- Gather and prepare equipment.
- Obtain blood samples for analysis as per manufacturer’s recommendations.
- Place blood sample onto reagent strip and place into machine for analysis as per manufacturer recommendations.
- Record result and treat any glucose abnormalities per appropriate guideline.
- Perform quality assurance on glucometers weekly. If any suspicious recordings are noted, follow manufacturer’s recommendations

Document procedure, results, and vital signs.
Invasive Pressure Monitoring

**Purpose:**

MEDEVAC Crews are required to monitor invasive pressure on any patient with central venous or arterial access.

**Procedure:**

- If the referring facility’s transducer unit is not compatible with transport unit’s cable, replace with compatible transducer setup using aseptic technique.
- Ensure IV pressure bag is preset and inflated to 300mmHg with stopcock closed
- Place transducer at phlebostatic axis and secure with tape
- Zero the line to obtain a “zeroed” reading on the transport monitor
- Flush the line and perform a square waveform test
  - Evaluate the waveform and numeric values for correlation with recent patient trends

**Notes:**

- Evaluate the insertion site for bleeding, swelling, hematoma, or dislodgement
- Tightly secure stopcocks and cover openings with non-vented endcaps
- Continue monitoring correlation between NIBP and ABP
- Zero the line after movement of patient, at altitude, and if suspected erroneous reading
  - Adjust/re-calibrate monitor every 1000’ if required based upon monitoring device
- If waveform dampened, check pressure bag inflation and reassess position of leg/wrist
- If invasive line is in the femoral artery, keep patient head <30° and leg straight. Reassess distal pulses with any patient movement
- Flush line and evaluate square waveform test as needed
- If invasive line becomes dislodged, immediately apply direct pressure
REBOA MANAGEMENT

Purpose:
Surgical Team or SOF Medic placement for trauma arrest or non-compressible hemorrhage in the pelvis. Secondary to emergency thoracotomy or external junctional tourniquets.

Procedure:
- Receive report from team that placed device.
  - Who inserted the device?
  - What type of device (ER-REBOA)?
  - Where located (Zone 1 or Zone 3)? How confirmed? (xray, ultrasound)
  - When was the balloon inflated?
  - Why was it placed (Arrest? Peri-arrest? Pelvic bleed?)
  - How is the device secured?
- Confirm vital sign trends with sending team
- Confirm security of REBOA device with sutures, commercial securing device, or tape.
- Record the length measurement at insertion site.
- Confirm balloon pressure.
- Check distal circulation and any external hemorrhage (Doppler)
- Connect Arterial line to hemodynamic monitoring device.
- Verbalize plan to move patient to next level of care. Ensure time of balloon inflation.
- Continue to closely monitor until patient is secured in the next level of care (Hemodynamic monitoring, distal circulation, device security, catheter depth)

CONCERNS:
- Changes in altitude
- Transient drop in blood pressure
- Change in balloon pressure
- Dislodge of device
- Loss of distal circulation
- Distal external hemorrhage
CARDIAC DEFIBRILLATION

CLINICAL INDICATIONS:

- Patient who is in pulseless cardiac arrest with either ventricular fibrillation or ventricular tachycardia seen on monitor.

CONTRAINDICATIONS:

- None

PROCEDURE:

- Ensure patient attached to monitor / defibrillator. If paddles used, ensure that they are several centimeters away from monitor leads to prevent arcing. Use pediatric paddles as indicated – if unavailable and pads used, should place in anterior / posterior position for pediatric patients.

- Set energy level to appropriate level. Start 200J adult (biphasic) or 360J adult (monophasic), or 2J/kg pediatric.

- Press “charge” button 30 seconds prior to end of compressions. This maneuver minimizes time between compressions and defibrillation. Compressions should continue until end of cycle.

- Ensure all personnel clear of patient and pilots aware of cardioversion.

- Press and hold “shock” button until energy delivered.

- If rhythm converts – treat as per post resuscitation protocol.

- Following shock delivery, immediately begin / return to CPR for 2 minutes before checking for pulse.

- If pediatric patient fails to convert – repeat steps 2-7 above using escalating energy levels.

- Document procedure, results, and vital signs on run sheet following mission.

AUTOMATED EXTERNAL DEFIBRILLATOR (AED):

- Turn on power to machine and follow prompts to attach pads to patient and machine.

- Ensure no one touching / moving patient and press the “Analyze” or equivalent button. (If not present, the machine will automatically check the rhythm at dedicated time intervals. A vocal warning will tell you when this is occurring).

- If shock advised, press button to deliver shock and return to CPR for 2 minutes.

- After analysis, if subsequent shocks advised, repeat steps 2-3 up to 3 shocks, until further care arrives, or until no further shock advised. If no shock advised at any time, CHECK PULSE. Continue CPR if no pulse. If pulse present, place patient in recovery position and transport.
12-LEAD ELECTROCARDIOGRAM

CLINICAL INDICATIONS:

- Suspicion of arrhythmia.
- Chest pain believed to be of cardiac origin.
- Toxic ingestion with cardiac side effects.

CONTRAINDICATIONS:

- None

PROCEDURE:

- Ensure patient lying flat on bed and place leads as per diagram.
- If patient is unstable, address any emergent issues prior to attempting the 12-lead EKG.
- May have to shave and/or dry patient for pad adhesion.
- Once leads are in place, instruct the patient to remain still and limit any movements around the patient (as possible).
- Press button to obtain 12-lead EKG.
- If questions exist, maintain supportive care and contact medical control if able.

Document procedure, results, and vital signs.
SYNCHRONIZED CARDIOVERSION

CLINICAL INDICATIONS:

- Unstable patient with tachycardia-dysrhythmia noted on monitor/EKG.
- Patient who has failed conservative and/or chemical cardioversion.
- Patient not pulseless.

CONTRAINDICATIONS:

- None

PROCEDURE:

- Ensure patient attached to monitor/defibrillator with synchronized cardioversion capability.
- Time-permitting, ensure adequate IV / IO access present. Ensure that unsynchronized cardioversion/defibrillation capabilities present in case patient degenerates into another dysrhythmia.
- Consider use of sedating medication (e.g., Midazolam 0.1mg/kg (5mg max dose) prior to delivery of shock. **Note:** This step is not mandatory and should not delay appropriate management of emergent condition.
- Set energy level to appropriate level. Usually starting at 50J-100J in adults or 0.5J/kg-1J/kg in children for atrial/ventricular arrhythmias, respectively.
- Select **Synchronized Cardioversion** option. This should result in machine displaying “SYNC” as well as tracking electrical activity (arrow or highlighted segment of EKG).
- Ensure all personnel clear of patient and pilots aware of cardioversion.
- Press and hold “Shock” button until energy delivered. (This may take several seconds for machine to synchronize with cardiac cycle. Shock is not immediately delivered as in defibrillation.)
- If rhythm converts – monitor and treat as appropriate.
- If fails to convert – repeat steps 4-7 above using escalating energy levels. If patient degenerates, treat as per appropriate protocol/CPR. **Note:** most machines require pushing the “SYNC” after each shock if synchronized cardioversion to be repeated, failure to do so will result in delivery of an unsynchronized shock.
- Document procedure, results, and vital signs on run sheet following mission.
TRANSCUTANEOUS (EXTERNAL) CARDIAC PACING

CLINICAL INDICATIONS:
- Patients with pulse rate <60 (or appropriate for age) and signs of inadequate cerebral or end-organ perfusion.

CONTRAINDICATIONS:
- None

PROCEDURE:
- Ensure patient attached to monitor and defibrillator with external cardiac pacing capabilities.
- Time-permitting, ensure adequate IV/IO access prior to pacing. Also, may administer sedative agent (midazolam) prior to beginning pacing.
- Turn selector switch to “Pace.”
- Set rate to twice the patients intrinsic rate (often 70-80 for adult, 100 for pediatric).
- Set energy level to lowest setting and gradually increase until capture is obtained (each pacer spike followed by QRS).
- Once capture obtained, ensure pulse and vital signs correspond with pacing. Evaluate patient for improvement. Monitor and continue sedation as needed.
- If fails to capture at maximal setting, discontinue pacer.
- At any time, if patient degenerates and needs CPR – begin compressions immediately. Pacer pads are insulated and it is okay to perform compressions with pacer running.
- Document procedure, results, and vital signs on run sheet following mission.
WITHHOLD RESUSCITATION

<table>
<thead>
<tr>
<th>Signs and Symptoms:</th>
<th>Differential Diagnosis:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unresponsive</td>
<td>Medical vs. Traumatic Arrest</td>
</tr>
<tr>
<td>Apneic</td>
<td>Dysrhythmia</td>
</tr>
<tr>
<td>Pulseless</td>
<td></td>
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</tbody>
</table>

**Criteria for Death / No Resuscitation:**
- Presence of decay / lividity / rigor mortis
- Decapitation
- Incineration
- Massively deforming head / chest trauma

**PROCEDURE GUIDELINE**

**CARDIAC ARREST**
- Unresponsive
- Apneic
- Pulseless

**BRADYCARDIA with PULSE**
- Medical vs. Traumatic Arrest
- Dysrhythmia

**TACHCARDIA with PULSE**
- Medical vs. Traumatic Arrest
- Dysrhythmia

**PEARLS:**
- As with all ALS protocols – **concentrate on adequate compressions.**
- Minimize interruptions in compressions, including if/when placing advanced airway.
- Early defibrillation associated with greatest success in early cardiac arrest.
- Survival rate for traumatic arrest approaches zero.
- Cardiac arrest in MASCAL situations requires frequent re-triage to apply care where it will be most effective.
- Lack of response alone does not equal death – always check for pulse / cardiac activity.
  - If available, cardiac US can be helpful in determining if continued efforts will be helpful. If there are no signs of cardiac movement on US and there is no other known reversible cause, the likelihood of ROSC and recovery with continued resuscitative efforts in the out-of-hospital setting is incredibly unlikely.
ALTITUDE PHYSIOLOGY AND PATIENT TRANSFER

ALTITUDE CONCERNS FOR AEROMEDICAL TRANSFERS:

- **Gas expansion** occurs as altitude above sea level increases. Gas volume doubles at 18,000’ mean sea level (½ sea level atmospheric pressure) and increases 25% from 5,000’-10,000’. This will typically not affect the operational ceiling for the UH-60 Blackhawk during Aeromedical Evacuation operations. Certain conditions and precautions to note:

  ✓ **Air embolism / Decompression illness** – This is the only absolute contraindication to transport of patients at altitude. These patients should be transferred at sea level or in an A/C capable of cabin pressurization to sea level.

  ✓ **Pneumothorax** – There is little risk of developing a tension PTX due to gas expansion from altitude during typical aeromedical evacuation flights in rotary-wing A/C. However, altitude should be limited when possible to <5,000’ MSL. If mission requirements mandate higher altitudes, the use of aeromedical evacuation platforms with pressurized cabins should be considered as applicable and tactically capable. Prophylactic chest tubes (for altitude-related concerns) are recommended for any flights above 10,000’ mean sea level.

  ✓ **Gastric distention** – Gas expansion does increase the risk of vomiting and, therefore, aspiration. Therefore, all patients with decreased LOC should have an NG / OG tube placed prior to transfer.

  ✓ **Head injury** – As with PTX, there is little concern of altitude related elevation of elevated ICP in head injured patients although penetrating intracranial or maxillofacial injuries may set conditions for an entrapped-gas phenomenon with adverse clinical consequences. Any evidence of elevated ICP should result in treatment per guideline. Altitude restrictions do not differ from those listed for PTX. Constant vigilance should be maintained for evidence of elevation of ICP.

  ✓ **Eye injury** – Penetrating eye injuries or surgeries may introduce air into the globe. Again, the altitudes obtained for rotary-wing A/C does not pose a risk of elevating the IOP during normal operations.

  ✓ **Gas filled equipment** – Medical equipment with gas filled bladders also may suffer from interference at high-altitudes. Primarily, endotracheal tube cuffs and pressure bags which should be evaluated at altitude by testing the pressure of the exterior bladder or filled with air. If able, utilize manometer to
verify tube pressure. A cuff pressure between 20-30 cmH2O is recommended to provide adequate seal and reduce the risk of complications or tissue damage. Verify with supervising physician or flight surgeon before filling endotracheal tube with saline. Routine filling of endotracheal tubes with saline is no longer recommended.

- **Flow Rates:** Decreased atmospheric pressure may interfere with IV flow rates and/or pump function. These must be monitored continuously.

- **Invasive Blood Pressure:** Adjust / re-calibrate monitor every 1000’ if required based upon monitoring device.

- **Hypothermia:** As altitude increases, the temperature will drop about 3.5° F per 1000 feet. This is further complicated in the H-60 due to rotor-wash, forward air speed, normal lapse rate. Therefore, patients must be protected from hypothermia at all times. This includes use of the Hypothermia Prevention and Management Kit (HPMK), blankets, heaters if available, and closing cabin doors / crew windows during transport.

- **Hypoxia:** Patients are at increased risk of hypoxia during transport at altitude. If transfers are taking place in high-altitude locations, pulse oxygenation should be monitored at all times and the medic / provider should maintain a low threshold for the use of supplemental O2. At no time should the patient’s O2 be allowed to go below 92 percent (commercial pulse oximeters read up to 3 percent off, therefore a sat of 91 percent may be seen in a patient who is really at 88 percent.). **Patients who smoke or have underlying cardiopulmonary disease are at increased risk even at low altitudes.**

- **Dysbarism:** Patients may experience discomfort due to gas expansion in air-filled body spaces (e.g., ears, sinuses, teeth) during ascent. Conversely, patients and aircrew may experience "squeeze" resulting from descent from altitude. These are typically mild during RW transport, however, if severe, altitude should be held and attempts made to alleviate pain and/or slow rate of ascent / descent.

  **Document procedure, results, and vital signs.**
CLINICAL INDICATIONS:

- Patient at outlying MTF requiring transfer to higher role of care for more definitive surgery/treatment

PRE-TRANSFER Patient Status Requirements:

a. JTS CPG – Intra-theater Transfer and Transport – recommends clinical parameters that should be met prior to transfer; if parameters are not met, they should be addressed and en-route mitigation plans formulated BEFORE departure / transfer:

1) Heart rate 50>120 bpm
2) SBP >90 mmHg, MAP >60mmHg
3) If elevated ICP or CPP, maintain MAP 80>110mmHg, SBP 110>160mmHg
4) Hematocrit >24% (or Hgb >8g/dL)
5) Platelet count >50/mm$^3$
6) INR <2.0
7) pH >7.3
8) Base deficit <5mEq/L
9) Temperature >35.5$^\circ$C or 96$^\circ$F
10) ETCO$_2$ 35<45, SPO$_2$ >92%, and/or PaCO$_2$ 35<45mmHg

If these criteria are not met, the transferring physician should continue resuscitation or provide documentation indicating limitations that compel urgent transfer. This can be documented in the comments section of the Standard Order Set for Critical Care Transfers document.

b. The four MINIMUM requirements which will be met prior to patient transfer are hemorrhage control, adequate shock resuscitation (SBP 90 mmHg, MAP >60 mmHg, UOP >0.5 mL/kg/hr, and/or BD <2, Temp >97$^\circ$F and <100$^\circ$F), stabilization of fractures, and initial post-operative recovery.

c. Attempt to keep patient packaging time at <25 minutes; use of warming devices in accordance with the JTS Hypothermia Prevention CPG.

d. Movement of Deceased Patients:

1) In general, patients who meet clinical criteria for death are not to be transported by MEDEVAC, with the exception of extreme extenuating circumstances, such as emergency exfiltration during CSAR.

2) If vital signs are absent prior to launch, make all reasonable attempts to resuscitate as clinical and tactical circumstances permit. If unsuccessful, consider basic cardiac ultrasound (as available) to determine whether any signs of cardiac activity are present. If absent, mission abort is warranted.
3) In such circumstances, contact and consultation with medical control or other available physician is suggested, in order to facilitate field determination of death and cessation of resuscitative efforts.

PROCEDURE:

a. Role 2/3 provider responsibilities:

It is the responsibility of the transferring physician to write enroute care orders appropriate for the transport environment and individualized for each patient in consultation with the Critical Care Flight Paramedic and/or the ECCN (or attending Flight Provider) prior to launch. The Flight Paramedic / Provider should be given a Standard Order Set for Critical Care Transfers or similar document with en route care orders signed by the transferring physician.

1) Provide a complete report to Flight Paramedic / Provider.
2) Provide all patient-specific related medical records.
3) Assist Flight Paramedic / Provider with packaging patient for transport as requested.
4) Complete specified areas on the appropriate patient care report
   i. Administrative data
   ii. Most current laboratory data
   iii. Mechanism of Injury (MOI)
   iv. Diagnosis
   v. Procedures
5) Place patient on ventilator at least 30 minutes prior to flight. Obtain pre-flight ABG to ensure patient tolerates ventilator settings.
6) It is strongly suggested that the transferring physician make every possible attempt to contact and discuss the case with the receiving physician or facility representative. Flight Paramedics and ECCNs should confirm or encourage this vital "physician-to-physician hand-off" if practicable.

b. FLIGHT PARAMEDIC / PROVIDER responsibilities prior to transfer:

1) Obtain orders for en route care from transferring physician; review orders and discuss potential en route problems with transferring physician, reconcile medications (ensure needed medications, specific to patient’s condition, are obtained and prepared), allergies and patient’s weight, confirm patient’s identification, and secure personal effects.
2) Perform primary & secondary assessment ensuring an understanding of the patient’s injuries / illness / procedures performed.
3) Spinal immobilization is indicated during transfer if ordered by transferring physician.
4) Assess placement and secure all tubes, lines, and drains & ensure proper functioning.
5) Ensure endotracheal tube is secure; secure pulse oximeter / ETCO₂ monitor.
6) Review ABG – ABG should be done within 30 minutes of flight; patient should be on transport ventilator with vent settings for transport; ABG obtained 15 minutes after being placed on transport ventilator.

7) Ensure vascular access X 2 - peripheral, central or IO and A-line as needed.

8) Check all bandages, splints, dressing, fixation devices and tourniquets for placement and ensure no evidence of ongoing hemorrhage.

9) If indicated, insert OG/NG tube for gastric decompression, especially in intubated patients; cap or place to suction.

10) Empty Foley catheter bag prior to flight; ensure UOP documentation by transferring facility.

11) For an intubated patient, provide adequate analgesia and sedation PRIOR to giving additional paralytic medications. Re-dose medications as needed prior to flight in accordance with transferring physician’s orders.

12) Continue administration of blood products if ordered by transferring physician. If anticipated administration of blood products enroute, Flight Paramedic/Provider should request orders for blood products and appropriate blood products from the transferring physician and use FDA approved fluid warming device as appropriate for warming fluids.

13) Collect all patient care documentation for transport with patient, i.e. pre-hospital, transport, labs, x-rays, transferring facility notes, etc.

14) Remove all air from IV fluid bags and place all free flowing bags in pressure bags.

15) Ensure patient is properly packaged in a warming device unless contraindicated prior to transfer. Follow directions specific to each warming device ensuring over heating or thermal burns do not occur. Hypothermia, acidosis and coagulopathy constitute the “triad of death” in trauma patients.

16) Securely affix all equipment, supplies, loose tubing and lines to NATO litter prior to moving the patient to the vehicle or aircraft.

17) Once patient is packaged, ensure all lines are leveled and monitors are zeroed.

18) Provide eye and ear protection to patient.

c. Special considerations:

1) Eye Trauma: Fox shields should be placed for any patient with a suspected or confirmed open globe, possible intraocular foreign body or eye injury. **DO NOT remove impaled or stubborn foreign bodies from the eyes.** (even contact lens) **SHIELD AND SHIP.** **DO NOT PLACE ANY DRESSINGS UNDER RIGID EYE SHIELD** or manipulate the injured eye. Both the injured and uninjured eye should be covered IOT avoid excessive movement of the injured eye which may result from involuntary convergence. Also want to avoid nausea/vomiting in these patients. Normal Saline may be used to rinse eyes in awake patient with no penetrating injury. (JTTS CPG - Initial Care of Ocular & Adnexal Injuries)

2) Compartment Syndrome: Patients with extremity injuries, abdominal injuries/surgery, burns, coagulopathy and those who have received massive transfusion are at risk for compartment syndrome. Ensure proper assessment prior
to flight. If compartment syndrome is suspected during flight, place extremity at the level of the heart. Pain out of proportion to the injury and paresthesia are symptoms of compartment syndrome, as well as pallor, paralysis, pulselessness, and poikilothermia. Patients who are sedated, paralyzed or have an epidural or block in place are at increased risk and require judicious hands on assessment of at risk abdomen and extremities. (JTTS CPG – Compartment Syndrome and Fasciotomy)

3) Burns: For patients with partial and/or full-thickness burns to > 20% TBSA, use of the Burn Patient Admission Orders and JTTS Burn Resuscitation Flow Sheet are REQUIRED and should be continued during transfer to another facility. (JTTS CPG – Burn)

4) Advanced pain management modalities: For patients with epidurals, continuous peripheral nerve blocks, PCA infusions, or other pain medicine infusions, a pain note should be completed prior to transport as it is a vital part of provider communication. (JTTS CPG – Management of Pain, Anxiety and Delirium in Injured Warfighters)

5) Sedation and pain management must be maintained at appropriate levels throughout transport. As appropriate and as directed by transferring physician, attempt to maintain sedation target as follows using the Riker Sedation-Agitation Scale (SAS)

Riker Sedation-Agitation Scale (SAS): Used as sedation target goal for Post Surgical / CC
- Non-intubated patients, provide sedation as needed to maintain a goal SAS Score of 3-4.
- Intubated patients, provided sedation as needed to maintain a goal SAS Score of 1-2.

<table>
<thead>
<tr>
<th>Definition</th>
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<tbody>
<tr>
<td>7 Dangerous agitation</td>
<td>Pulling at endotracheal tube, trying to remove catheters, climbing over bedrail, striking at staff, thrashing from side-to-side</td>
</tr>
<tr>
<td>6 Very agitated</td>
<td>Does not calm despite frequent verbal reminding of limits, requires physical restraints, biting endotracheal tube</td>
</tr>
<tr>
<td>5 Agitated</td>
<td>Anxious or physically agitated, attempting to sit up, calms down on verbal instructions</td>
</tr>
<tr>
<td>4 Calm, cooperative</td>
<td>Calm, arousals easily, follows commands</td>
</tr>
<tr>
<td>3 Sedated</td>
<td>Difficult to arouse, awakens to verbal stimuli or gentle shaking but drifts off again, follows simple commands</td>
</tr>
<tr>
<td>2 Very sedated</td>
<td>Aroused to physical stimuli but does not communicate or follow commands, may move spontaneously</td>
</tr>
<tr>
<td>1 Unarousable</td>
<td>Minimal or no response to noxious stimuli, does not communicate or follow commands</td>
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d. Patient Care Enroute to the Receiving Hospital

1) Patient vital signs will be monitored continuously enroute and documented at least every 5 – 15 minutes (q5min if on pressors) per transferring physician’s orders.

2) Reassess patient at least every 15 minutes and address events as necessary following transferring physician’s orders and protocols for the specific illness or injury.
3) Assess pain control, sedation and need for paralysis. Re-dose medications as needed in accordance with transferring physician’s orders. Ideally, paralytic medication should not be administered near the end of the flight. Significant, adjunctive analgesia may be required to compensate for initial lift, landing and in flight combat maneuvers, therefore Flight Paramedic/Provider should consider carrying higher volumes of analgesia that would be normally used in ground transport or fixed facilities.

4) All events will be addressed with appropriate interventions according to transferring physician’s orders and protocols. All interventions require reassessment for patient response to the intervention.

5) All enroute care, including ventilator changes, medications, events, interventions, and patient’s response will be documented on the appropriate patient care documentation.

e. Patient Report and Transfer of Care at the Receiving Hospital

1) A verbal and written patient report will be given to the receiving nurse or physician upon delivery of the patient.

2) Routinely, the responsibility of care will be transferred at the receiving ED. On rare occasions (i.e. mass casualty incidents, pending emergency flights, etc.), care may need to be transferred on the helipad rather than at the bedside.

3) For Tail-to-Tail transfers, the Flight Paramedic/Provider initiating transport will send all documentation from the transferring facility and the patient care documentation from the first leg of the flight with the Flight Paramedic/Provider completing the second leg of the transfer. The Flight Paramedic/Provider completing the second leg of the transfer will initiate their own patient care documentation, circling “2nd Leg” at the top of the form and ensure all documentation is turned over to the MTF upon arrival and hand off of patient care.

4) The patient care documentation will be completed and left with the patient at the receiving facility at the time of patient handover. If unable to complete documentation due to extensive mission requirements, the patient care documentation will be forwarded to the appropriate medical information receiving facility/person IAW local / theater policy.

Any in-flight problems should be addressed per appropriate protocol and per written instruction from transferring physician. Continued problems should prompt contacting medical control as soon as it is possible.

Document procedure, results, and vital signs.
**PRE-TRANSPORT CHECKLIST**

**MEDICATIONS:**
- Assure Appropriate Medications Given
- Necessary Medications Available For Transport?
- Note Meds Given (Name / Dosage / Time)

**INVASIVE Procedures / IV Access:**
- All Patients With At Least One Working Peripheral IV and/or IO Line
- Trauma / Emergent: At Least Two Working Peripheral IV / IO Line
- NG / OG On All Intubated Patients
- Chest Tube / Foley Catheter / etc., As Needed

**TUBES & TOURNIQUETS:**
- Note Size / Depth of ETT if Present
- Ensure Tubes Appropriately Secured (e.g., ETT, Chest, Foley, Wound)
- Evaluate Tubes for Displacement, Kinking, Clogging
- Ensure Heimlich Value or Working Suction To Chest Tube
- Note Location of Tourniquets and Time Placed
- Evaluate for Seepage From Tourniquet Areas and Augment PRN

**EVERY VITAL SIGN:**
- Document Full Set of Vitals (Including SPO2 and ETCO2, if applicable) and Monitor En Route
- Recheck As Appropriate

**SECURE For Transport / Spinal Immobilization:**
- Patient Status Adequate for Transfer?
- Hypothermia Precautions?
- At Least Two Litter Straps in place?
- Equipment Secured to SMEED and SMEED to Litter?
- Appropriate Spinal Precautions in Place?

**PEARLS:**
- Any patient with advanced airway and ventilator support should receive sedation and, if indicated, paralytic agent before flight. These should be available in the aircraft for use by qualified personnel for use if patient becomes conscious, agitated, combative, etc.
- Spinal immobilization should be ensured in all blunt trauma (e.g., MVA, fall, blast, combination trauma) where spinal instability may be suspected. The medic should document if spinal injuries are cleared and who cleared them.
- A minimum of two IV / IO sites in patients with emergent or emerging conditions. At least one should be present in all patients transported by MEDEVAC for any other causes. Rare exceptions may exist (e.g., minor musculoskeletal injury).
- All critical care patients should have continuous cardiac monitoring while in en route. This may also extend to non-intubated urgent / priority patients under other circumstances (e.g., acute MI, atypical chest pain).
- Tactical situation and emergent care should take priority over all other procedures / monitoring. If unable to perform checks and/or procedures during flight due to the Tactical / Environmental Conditions (e.g., enemy, weather) then this must be documented completely in the Patient Care Report and briefed-back to the receiving medical facility. Continue with monitoring and procedures as soon as situation allows.
## Facility Transfer Checklist

### Updated December 22

<table>
<thead>
<tr>
<th>DO NOW</th>
<th>TAKE WITH</th>
<th>INFLIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>M:</td>
<td>M:</td>
<td>M:</td>
</tr>
<tr>
<td>□ Check all bandages, splints, dressings and tourniquets for placement / evidence of ongoing hemorrhage.</td>
<td>□ Additional Blood products (1:1:1)</td>
<td>□ Blood products administration</td>
</tr>
<tr>
<td>□ Mark bleeding streakthrough</td>
<td>□ Tubing</td>
<td>□ Check all bandages, splints, dressings and tourniquets for placement / evidence of ongoing hemorrhage</td>
</tr>
<tr>
<td>□ Measurement of abdomen</td>
<td>□ Warmer</td>
<td>□ Measurement of abdomen</td>
</tr>
<tr>
<td>□ Request orders for type and cross-matched blood or O-negative blood from the transferring physician.</td>
<td>□ Golden Hour Container</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A:</td>
<td>A:</td>
<td>A:</td>
</tr>
<tr>
<td>□ Assess and document ET tube size, depth, security, cuff pressure, bite block</td>
<td>□ Extra ETT / King LT / IGEL</td>
<td>□ Confirm ETT is in appropriate position</td>
</tr>
<tr>
<td>□ Attach ETCO2 monitor</td>
<td>□ Suction soft-tip</td>
<td>□ Look/feel for symmetric chest wall rise</td>
</tr>
<tr>
<td>□ Insert/Assess and document NG/OG tube placement, size, depth, security</td>
<td>□ 10ml syringe</td>
<td>□ Verify tube position at teeth</td>
</tr>
<tr>
<td>□ Review chest radiograph for ET confirmation and NG/OG placement</td>
<td>□ Bite block</td>
<td>□ Check ETCO2</td>
</tr>
<tr>
<td>□ Apply C-collar for airway stability</td>
<td>□ Tape</td>
<td>□ DOPE</td>
</tr>
<tr>
<td></td>
<td>□ BVM</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R:</td>
<td>R:</td>
<td>R:</td>
</tr>
<tr>
<td>□ Setup Ventilator and confirm ventilator settings</td>
<td>□ O2 for transport</td>
<td>□ Look and feel for chest excursion</td>
</tr>
<tr>
<td>□ Check baseline lung compliance/resistance with BVM</td>
<td>□ Backup ventilator</td>
<td>□ Check Pulse Ox</td>
</tr>
<tr>
<td>□ Auscultate heart/lung sounds</td>
<td>□ Suction</td>
<td>□ Check patient's color</td>
</tr>
<tr>
<td>□ Check placement and function of chest tube/drainage system/Heimlich valve.</td>
<td>□ Needle for decompression</td>
<td></td>
</tr>
<tr>
<td>□ Request arterial blood gas after transport ventilator is attached to patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C:</td>
<td>C:</td>
<td>C:</td>
</tr>
<tr>
<td>□ Setup Monitor and zero all Pressure Lines</td>
<td>□ Vasoactive medications (dopamine, neo, norepinephrine)</td>
<td>□ Check temp, pulse BP, and cardiac rhythm</td>
</tr>
<tr>
<td>□ Assess distal pulses and neurovascular status</td>
<td>□ Pressure bags</td>
<td>□ Assess distal pulses and neurovascular status during transport.</td>
</tr>
<tr>
<td>□ Ensure IV access x 2 (Minimum).</td>
<td>□ IV fluids and tubing</td>
<td>□ Assess IV access</td>
</tr>
<tr>
<td>□ Remove air from IV bags and pressurize</td>
<td></td>
<td>□ LZC Pressure Lines</td>
</tr>
<tr>
<td>□ IV medications arranged for easy access (20ml, 10ml, 5ml, 3ml)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Review CBC/Chemistry results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Check Foley catheter placement, measure output amount, empty bag</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Other Considerations

<table>
<thead>
<tr>
<th>Altitude Considerations</th>
<th>Medications</th>
<th>Patient Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required waiting time before transport</td>
<td>Type and number of patients</td>
<td>Additional Medical support/non-medical attendant</td>
</tr>
<tr>
<td>Respiratory Support</td>
<td>Monitoring (body systems, medical interventions, etc.)</td>
<td>Telephonic consultation</td>
</tr>
<tr>
<td>Equipment</td>
<td>Thermal considerations</td>
<td>Transport time and Route of transfer</td>
</tr>
</tbody>
</table>
Universal Patient Care Protocol

Utilize Broselow® Pediatric Emergency Tape for all weight-based drug administration. Verify correct drug and dose prior to administration.

Prior to flight day, verify presence and operational condition of all equipment, medications, and supplies required for operational readiness.

Following each flight – recheck and verify all supplies stocked and ready. If unable due to operation tempo – attempt to call ahead and have supplies delivered on arrival.

If class VIII items or patient movement items are depleted, advise commander and adjust as necessary to accommodate mission requirements.

All medication errors, clinical errors, or adverse outcomes should be reported to the medical director ASAP.

Assume patient’s condition is worse than what is presented. Anticipate deterioration and address aggressively.

Follow appropriate SMOG for patient treatment. Real-time treatment of the patient is the responsibility of the flight medic with the patient.

For any patient that does not fit into a guideline (SMOG), Contact and Consult medical control. If this is not possible, provide standard care within the education, training and scope of the provider, until MTF is reached.

Pearls:

- Supportive care for all patients includes routine monitoring, IV guideline, O₂ / airway support, and fluid resuscitation (as required) to maintain or approach “normal” vital signs.
- Always check and double-check medications, dosage, condition, indication, potential adverse reactions, and control measures prior to administration. Record any patient allergies prior to administration of drugs.
- Check medical supplies and equipment prior to accepting / flying mission. Arrival on scene without proper equipment will result in inability to provide optimal care, and may result in adverse outcomes.
- Any medication / clinical errors or other care-associated concerns should be brought to the attention of the medical officer / director ASAP following the mission or at earliest possible time.
SALT Mass Casualty Triage Algorithm (Sort, Assess, Lifesaving Interventions, Treatment/Transport)

Step 1: Sort: Global Sorting
- Walk
  - Assess 3rd
- Wave / Purposeful Movement
  - Assess 2nd
- Still / Obvious Life Threat
  - Assess 1st

Step 2 - Assess: Individual Assessment

Lifesaving Interventions:
- Control major hemorrhage
- Open airway (if child consider 2 rescue breaths)
- Chest decompression
- Auto injector antidotes

Breathing?
- Yes
- All Yes
  - Minor injuries only?
    - Yes
      - Minimal
    - No
      - Delayed
- No
  - Dead

Likely to survive given current resources?
- Yes
  - Immediate
- No
  - Expectant

Obeys commands or makes purposeful movements?
- Yes
  - All Yes
- No
  - Any No
BURN Fluid Resuscitation

Rules of 9 - Burn % Estimation Chart

Rule of Tens – Fluid Resuscitation Calculations
TBSA > 20%, may require acute fluid resuscitation in prehospital
LR(best)>NS(2nd best)>Hextend(only to 1L)

Adults (>40kg) - 10mL/hr x %TBSA (estimate to nearest 10%); patients weighing more than 80kg, add 100 ml/hr to IV fluid rate for each 10 kg > 80 kg. Re-evaluate every 1-2 hours. Adjust IV rate to UOP goal 30-50mL (0.5-1 mL/kg in Peds). Adjust IV rate up or down by 20-25%.

Pediatrics (<40kg) - 3 x %TBSA x body weight (kg) gives the volume for initial 24 hrs. One half is given in first 8 hours. Monitor urine output with goal of 0.5 to 1 mL/kg/hr in children.

Example: Pediatric 30kg patient with 50% TBSA 2nd/3rd degree (Chemical or Thermal burn)3mL LR x 50(%TBSA) x 30(kg) = 4,500mL LR in 1st 24hrs
2,250mL (⅓ of 4,500) is given over 1st 8hrs
2,250mL/8hrs = 281mL/hr for 1st hr, then titrate by 20-25% to UOP goal

High Voltage Injury: ADULT (>40kg) - 10mL/hr x %TBSA (estimate to nearest 10%); patients weighing more than 80kg, add 100 ml/hr to IV fluid rate for each 10 kg > 80 kg. Re-evaluate every 1-2 hours. Adjust IV rate to UOP goal 75-100mL (1-2 mL/kg in Peds). Adjust IV rate up or down by 20-25%.

Pearls: Both under-resuscitation and over-resuscitation with fluids can precipitate significant adverse clinical events for the burn patient. Thus, it is both worthwhile and imperative that medical aircrew calculate and administer burn resuscitation fluids as accurately and fastidiously as possible. Put another way, it is worth your time and effort to accurately estimate burn surface area, ideal body weight, then calculate and administer appropriate fluids while the patient is under your care.

• Burns with airway involvement require immediate airway protection with Endotracheal Intubation / surgical airway.
• Burns covering >40% TBSA, will likely require RSI due to airway edema from inflammation/fluid resuscitation.
• Infants and Young Children should also receive LR with 5% Dextrose at a maintenance rate and monitor for hypoglycemia.
• Burn patients are prone to hypothermia – must protect from environment. Also, never use ice to cool large burn areas.
• All burns require 100% O2 via NRB unless intubated.
• Never use nitrates for suspected cyanide toxicity in enclosed space fires – can worsen hypoxia. Creates methemoglobinemia. If cyanide toxicity is a tangible threat, consider IV Hydroxycobalmin (CYANOKIT®).
### DENTAL PROBLEMS

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Differential Diagnosis</th>
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</thead>
<tbody>
<tr>
<td>Bleeding</td>
<td>Dental Caries</td>
</tr>
<tr>
<td>Pain</td>
<td>Infection</td>
</tr>
<tr>
<td>Fever</td>
<td>Fracture</td>
</tr>
<tr>
<td>Swelling</td>
<td>Avulsion</td>
</tr>
<tr>
<td>Missing / Fractured Tooth</td>
<td>Abscess / Cellulitis</td>
</tr>
<tr>
<td></td>
<td>Gingivitis</td>
</tr>
</tbody>
</table>

**Pearls:**
- Significant soft tissue swelling to face / mouth can represent cellulitis or an abscess.
- **Avulsion** (Complete Avulsion Only)
  - Gently rinse (do not scrub) tooth with NS and attempt to re-implant with firm pressure into the socket. **Never perform this in children with primary teeth.**
  - As able and without obstructing airway, place bulky dressing over tooth and use as a soft bite block to stabilize tooth. Instruct to bite down gently, do not move jaw.
- **Subluxation** (tooth displaced in socket)
  - Treatment not always required.
  - For obviously loose or displaced tooth consider placing bulky dressing over tooth and use as a soft bite block to stabilize tooth. Instruct to bite down gently, do not move jaw.
- Occasionally, cardiac chest pain can radiate to the jaw.
- Patient with dental abscess may experience significant pain at altitude due to gas volume expansion at lower atmospheric pressure. Consider flying at lower altitude and refer to pain management guideline.
SPINAL EVALUATION & IMMobilization/CAnadian C-Spine Rule (CCR)

**CONTRAINDICATIONS:**
- Patients with isolated penetrating cervical injury who are conscious and have no neurologic signs should not have a cervical collar placed in the pre-hospital environment.

**PROCEDURE:**
- Evaluation should take place after the primary survey and all emergent procedures completed. However, during the primary survey, the spine should be protected by manual inline stabilization / limited movement prior to completion of spinal examination. This does not apply to situations in which imminent danger exists and immediate movement is necessary.

  Document procedure, results, and vital signs.

  - On the battlefield, safety of patient and medical personnel are paramount. In hostile situations, evacuation to a more secure area takes precedence over spine immobilization.
FOLEY CATHETER PLACEMENT

CLINICAL INDICATIONS:
- Bladder distention in an unconscious person, or for blockage / inability to urinate in conscious person.
- Allows for accurate monitoring of output for fluid management.

CONTRAINDICATIONS:
- Known or suspected urethral disruption resulting from pelvic trauma.
- Combative or uncooperative patient.

PROCEDURE:
- Choose appropriate catheter (16-18 for adults) and ready equipment.
- Position patient. Females in supine position with legs abducted. Cleanse urethra and surrounding area with antiseptic solution. Isolate area with drapes provided.
- Insert xylocaine jelly provided into urethra with the syringe provided.
- Insert catheter into urethra. For females advance the catheter approx. 3 inches. For males, pass catheter into the bladder the full length to the junction of the catheter and inflation port for balloon.
- Once urine is obtained, inflate balloon with 5cc NS, then pull catheter outward until balloon against bladder neck. If no urine return is given and procedures to induce urine return (bladder palpation) do not work, DO NOT inflate the balloon.
- Secure catheter to leg with tape to prevent trauma to urethra. Document procedure.

Document procedure, results, and vital signs.
NASO / OROGASTRIC TUBE

CLINICAL INDICATIONS:
- Enabling gastric decompression, decreasing risk of vomiting and aspiration, obtain sample of gastric contents.
- Allows for gastric lavage in drug overdose or poisoning.

CONTRAINDICATIONS:
- Nasogastric tubes contraindicated in the presence of massive facial trauma, burns, or suspicion of basilar skull fracture (CSF otorrhea, Battle’s sign, raccoon eyes, mechanism). May insert orogastric tube instead.

PROCEDURE:
- If possible, sit patient upright for optimal neck and stomach alignment.
- Measure tubing from bridge of nose to earlobe, then to the point halfway between the end of the sternum and the navel. Mark measured tube with marker.
- Select most patent nare (or the throat) and pass lubricated tube in a posterior – NOT SUPERIOR – direction. If resistance is met, attempt to corkscrew slightly or remove and attempt in other nare.
- Withdraw tube immediately if changes occur in patient’s respiratory status, if tube coils in mouth, if the patient begins to cough, or becomes cyanotic.
- Advance tube until mark is reached.
- Verify tube placement by listening over stomach while air is passed or examining aspirate when applied to suction. Secure tube. Watch vital sign for changes.

Document procedure, results, and vital signs.
PAIN MANAGEMENT

Signs and Symptoms:
- Tachycardia
- Diaphoresis
- Elevated Blood Pressure
- Vocalizes and/or Signals Pain

**Continued From:**
Tactical Evacuation Guideline

Patient care according to guideline based on specific complaint

Moderate to Severe Pain (>3/10) Vocalizes / Signals Pain and requests relief OR Indication for IV / IM medications?

Ensure:
- SPO2/ Monitors Attached

Administer Pain Medication
Best indicated for Patient Condition

Ondansetron 4-8mg IV / IM

Monitor and Reassess

Return To:
- Tactical Evacuation Guideline
- Appropriate Guideline per Complaint

Pearls:
- Document patient’s medications and all allergies prior to administration of medications.
- PO medications should not be used in any patient with altered mental status or anyone in whom surgery is anticipated, unless directed by transferring provider.
- **Narcotic pain medications can be reversed with Naloxone 0.4-2mg IV.**
- Start with low dosage of pain medications and titrate upward to desired effect.
- Fentanyl and Morphine will cause a decrease in BP through various drug effects. Fentanyl is preferred over Morphine for immediate pain control.
- **Treatment of “Ketamine Associated Psychiatric Distress” or “Ketamine induced agitation,”**
  - Midazolam 2-5mg IV x1 prn for agitation due to Ketamine administration
- Morphine and/or Ketamine auto-injectors may be used if available; however IV / IO route is preferred.
- Ketamine can cause slight decrease in blood pressure, especially with hypotensive shock patients, lower doses are recommended in this type of patient.
- Fentanyl OTFC 800mcg may be used if patient is conscious. **Do NOT CHEW**
Pediatric PAIN MANAGEMENT
Vital Functions and Pain Scale

**Signs and Symptoms:**
- Tachycardia, Diaphoresis, Elevated Blood Pressure, Cry, Grimace, Splinting, Guarding

---

**AVERAGE PEDIATRIC VITAL FUNCTIONS**

<table>
<thead>
<tr>
<th>BROSELOW cm (approx) weight</th>
<th>&lt;61cm</th>
<th>61cm-67cm</th>
<th>67cm-75cm</th>
<th>75cm-87cm</th>
<th>87cm-96cm</th>
<th>96cm-109cm</th>
<th>109cm-122cm</th>
<th>122cm-138cm</th>
<th>138cm-149+cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>MONTHS</td>
<td>YEARS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>HEART RATE</td>
<td>107-181</td>
<td>93-161</td>
<td>88-156</td>
<td>70-142</td>
<td>59-131</td>
<td>52-115</td>
<td>43-108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESP RATE</td>
<td>25-66</td>
<td>22-64</td>
<td>19-53</td>
<td>17-38</td>
<td>16-29</td>
<td>14-25</td>
<td>12-23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYSTOLIC BP</td>
<td>60</td>
<td>79-105</td>
<td>85-108</td>
<td>88-110</td>
<td>91-119</td>
<td>97-137</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIASTOLIC BP</td>
<td>34-81</td>
<td>40-69</td>
<td>45-68</td>
<td>51-89</td>
<td>59-86</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URINE (mL/kg/hr)</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient

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**Pediatric FLACC Pain Scale**
*(2 Months – 7 Years or Individuals Unable to Communicate)*

**Score of 5-10 = Moderate-Severe Pain, Consider Narcotic**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, uninterested</td>
<td>Frequent to constant quivering chin, clenched jaw</td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed</td>
<td>Uneasy, restless, tense</td>
<td>Kicking or legs drawn up</td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position, moves easily</td>
<td>Squirming, shifting, back and forth, tense</td>
<td>Arched, rigid or jerking</td>
</tr>
<tr>
<td>Cry</td>
<td>No cry (awake or asleep)</td>
<td>Moans or whimpers; occasional complaint</td>
<td>Crying steadily, screams or sobs, frequent complaints</td>
</tr>
<tr>
<td>Consolability</td>
<td>Content, relaxed</td>
<td>Reassured by occasional touching, hugging or being talked to, distractible</td>
<td>Difficult to console or comfort</td>
</tr>
</tbody>
</table>

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In hemodynamically unstable or inconsolable child, consider:

**Ketamine**
*(IV / IO Push over 1 min)*

- Analgesia:
  - IM / IN: 0.4 mg/kg
  - IV / IO: 0.3 mg/kg
- Induction / Dissociative:
  - IV / IO: 1-2 mg/kg

**FENTANYL 0.5-2mcg/kg SIVP**
q 20-30min (Max 4mcg/kg)

**MORPHINE 0.1mg/kg IV SIVP/IM**
q 120min (Max 0.4mg/kg)

Follow Procedural steps of:

**PAIN MANAGEMENT GUIDELINE**
Utilize Appropriate Medication in Pediatric Dose.

**Acetaminophen 10-15mg/kg PO / PR**

**ONDANSETRON** (for Nausea)
- ≤40kg 0.1mg/kg IV
- >40kg 4mg IV

---

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HYPOTHERMIA PREVENTION AND MANAGEMENT

CLINICAL BACKGROUND:

- Hypothermia, acidosis, and coagulopathy constitute the “triad of death” in trauma patients. The association of hypothermic coagulopathy with increased mortality has been well described. Over 80% of non-surviving patients have had a body temperature of less than 93.2°F(34°C). This degree of hypothermia causes dysfunction of coagulation proteins, thus exacerbating hemorrhage. The mortality in combat casualties with hypothermia is double that of normothermic casualties with similar injuries.

- Prevention of hypothermia must be emphasized in combat operations and casualty management at all levels of care. Take early and aggressive steps to prevent further body heat loss and add external heat when possible for both trauma and severely burned casualties.

- 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. This is optimally accomplished in a layered fashion with rugged, lightweight, durable products that are utilized at all subsequent levels of care, including ground and air evacuation, through all levels of care.

CONTRAINDICATIONS:

- Hyperthermia patients that require active cooling

PROCEDURE: Tactical Combat Casualty Care principles should be followed for preventing hypothermia.

- Primary Equipment
  - Hypothermia Prevention and Management Kits (HPMK). HPMK contains:
    - strong, flexible, lightweight Heat Reflective Shell that is impervious to wind & rain
    - Hood cover for Head
    - self-heating, oxygen-activated shell liner (ReadyHeat)
  - Blood Fluid Warmers
  - ReadyHeat Blankets
  - Wool or heat shield blankets

Take aggressive action to prevent hypothermia and maintain normothermic temperatures 97°-99° F (36°-38° C)

- Blood/Fluid Warmers: Utilize blood/fluid warmers for all IV/IO administration. Fluids should be warmed to 38° Celsius.

- Head Cover: Cover patients head with hood or Thermo-Lite Hypothermia Prevention System Cap. Greatest area of heat loss happens at the top of the patients head.
• **ReadyHeat Blankets:** Place the ReadyHeat Blanket on the torso and back of the casualty with a layer of clothing or a sheet or wool blanket between the casualty’s skin and the Ready-Heat Blanket.

• **Cover Patient:** Utilize Heat Reflective Shell, rescue or wool blankets to cover the patient. Use blankets to insulate patient from cold surfaces.

• **Remove Wet Clothing:** Remove wet clothing and attempt to dry patient.

• **Close doors and windows:** Reduce heat loss from convection over the patient and cooling of the environment.

• **Cabin Auxiliary Heater:** Even on mildly warm days, use cabin aux heat to maintain treatment area temperature of >85° – 90°F.

• **Limit Exposure:** Only expose areas necessary to visualize and work on the patient. Cover exposed areas as soon as able following procedures.

Continuously monitor patient and record temperature. A core temperature should be taken for best accuracy.

Document procedure, results, and vital signs.
### Vital Functions Assessment Reference Charts

#### Average Vital Functions by age

<table>
<thead>
<tr>
<th>BROSELOW cm (approx) weight</th>
<th>&lt;61cm 3-5kg</th>
<th>61cm 6-7kg</th>
<th>67cm 8-9kg</th>
<th>75cm 10-11kg</th>
<th>87cm 12-14kg</th>
<th>96cm 15-18kg</th>
<th>109cm 19-23kg</th>
<th>122cm 24-29kg</th>
<th>138cm 30-36kg</th>
<th>149+cm 37+kg</th>
</tr>
</thead>
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<td>1</td>
<td>2</td>
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</tr>
<tr>
<td>SYSTOLIC BP</td>
<td>60</td>
<td>79-105</td>
<td>85-108</td>
<td>88-110</td>
<td>91-119</td>
<td>97-137</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIASTOLIC BP</td>
<td>34-81</td>
<td>40-69</td>
<td>45-68</td>
<td>51-89</td>
<td>59-86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URINE (mL/kg/hr)</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient

#### Oxygen Saturation

<table>
<thead>
<tr>
<th></th>
<th>Sea Level</th>
<th>5,000 Feet MLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SpO₂ (Peripheral O₂ Sat)</td>
<td>&gt;94% for patient with Normal Hemoglobin level</td>
<td>&gt;92%</td>
</tr>
<tr>
<td>StO₂ (Tissue O₂ Sat)</td>
<td>&gt;75-95%</td>
<td>Same (&lt;75% = Poor Perfusion)</td>
</tr>
<tr>
<td>EtCO₂</td>
<td>35-45 mmHg</td>
<td></td>
</tr>
</tbody>
</table>
# Vital Functions
## Assessment Reference Charts

### GLASGOW COMA SCALE

<table>
<thead>
<tr>
<th>SCORE</th>
<th>ADULT</th>
<th>CHILD</th>
<th>INFANT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Eye Opening</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spontaneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>To Speech</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>To pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eye Opening Response Same as Adult</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Verbal Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Oriented</td>
<td>Oriented</td>
<td>Coos and babbles</td>
</tr>
<tr>
<td>4</td>
<td>Confused Conversation</td>
<td>Confused Conversation</td>
<td>Irritable, Cries</td>
</tr>
<tr>
<td>3</td>
<td>Inappropriate Words</td>
<td>Inappropriate Words</td>
<td>Cries in Response to pain</td>
</tr>
<tr>
<td>2</td>
<td>Incomprehensible Sounds</td>
<td>Incomprehensible Sounds/Roars</td>
<td>Moans in Response to Pain</td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td><strong>Best Motor Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Obeys Commands</td>
<td>Obeys Commands</td>
<td>Moves Spontaneously</td>
</tr>
<tr>
<td>5</td>
<td>Localizes Pain</td>
<td>Localizes Pain</td>
<td>Withdraws to Touch</td>
</tr>
<tr>
<td>4</td>
<td>Flexion Withdrawal to Pain</td>
<td>Flexion Withdrawal to Pain</td>
<td>Withdraws from Pain Stimulus</td>
</tr>
<tr>
<td>3</td>
<td>Abnormal Flexion (Decorticate)</td>
<td>Abnormal Flexion (Decorticate)</td>
<td>Abnormal Flexion (Decorticate)</td>
</tr>
<tr>
<td>2</td>
<td>Extension (Decerebrate)</td>
<td>Extension (Decerebrate)</td>
<td>Extension (Decerebrate)</td>
</tr>
<tr>
<td>1</td>
<td>None (Flaccid)</td>
<td>None (Flaccid)</td>
<td>None (Flaccid)</td>
</tr>
<tr>
<td></td>
<td>For Intubated Patient use Verbal “T”</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Example: Eyes open to pain, Intubated, and Localizes would be E2,V1,M5, or GCS 8T)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Vital Functions

## Assessment Reference Charts

### MUSCULOSKELETAL INJURY and PERIPHERAL NERVE ASSESSMENT

#### UPPER EXTREMITIES

<table>
<thead>
<tr>
<th>INJURY to Consider</th>
<th>MOTOR Testing</th>
<th>SENSATION Testing</th>
<th>NERVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elbow Injury</td>
<td>Index and Little Finger Abduction</td>
<td>Little Finger</td>
<td>Ulnar</td>
</tr>
<tr>
<td>Wrist Fracture or Dislocation</td>
<td>Thenar Contraction with Opposition</td>
<td>Index Finger</td>
<td>Median Distal</td>
</tr>
<tr>
<td>Supracondylar Fracture of Humerus</td>
<td>Index Tip Extension</td>
<td>None</td>
<td>Median, Anterior Interoseous</td>
</tr>
<tr>
<td>Anterior Shoulder Dislocation</td>
<td>Elbow Flexion</td>
<td>Radial Forearm</td>
<td>Musculocutaneous</td>
</tr>
<tr>
<td>Distal Humeral Shaft,</td>
<td>Thumb, Finger group Extension</td>
<td>First Dorsal Web Space</td>
<td>Radial</td>
</tr>
<tr>
<td>Anterior Shoulder Dislocation,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal Humerus Fracture</td>
<td>Deltoid</td>
<td>Lateral Shoulder</td>
<td>Axillary</td>
</tr>
</tbody>
</table>

#### LOWER EXTREMITIES

<table>
<thead>
<tr>
<th>INJURY to Consider</th>
<th>MOTOR Testing</th>
<th>SENSATION Testing</th>
<th>NERVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pubic Rami Fractures</td>
<td>Knee Extension</td>
<td>Anterior Knee</td>
<td>Femoral</td>
</tr>
<tr>
<td>Obturator Ring Fractures</td>
<td>Hip Adduction</td>
<td>Medial Thigh</td>
<td>Obturator</td>
</tr>
<tr>
<td>Posterior Tibial</td>
<td>Toe Flexion</td>
<td>Sole of Foot</td>
<td>Knee Dislocation</td>
</tr>
<tr>
<td>Fibular Neck Fracture,</td>
<td>Ankle Eversion</td>
<td>Lateral Dorsum of Foot</td>
<td>Superficial Peroneal</td>
</tr>
<tr>
<td>Knee Dislocation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibular Neck Fracture,</td>
<td>Ankle / Toe Dorsiflexion</td>
<td>Dorsal 1st-2nd Web Space</td>
<td>Deep Peroneal</td>
</tr>
<tr>
<td>Compartment Syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posterior Hip Dislocation</td>
<td>Plantar Flexion</td>
<td>Foot</td>
<td>Sciatic Nerve</td>
</tr>
<tr>
<td>Acetabular Fracture</td>
<td>Hip Abduction</td>
<td>Upper Buttocks</td>
<td>Superior Gluteal</td>
</tr>
<tr>
<td>Acetabular Fracture</td>
<td>Hip Extension</td>
<td>Lower Buttocks</td>
<td>Inferior Gluteal</td>
</tr>
</tbody>
</table>

### MUSCLE STRENGTH GRADING

<table>
<thead>
<tr>
<th>SCORE</th>
<th>EXAM RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Total Paralysis</td>
</tr>
<tr>
<td>1</td>
<td>Palpable or Visible Contraction</td>
</tr>
<tr>
<td>2</td>
<td>Full Range of Motion Without Gravity</td>
</tr>
<tr>
<td>3</td>
<td>Full Range of Motion Against Gravity</td>
</tr>
<tr>
<td>4</td>
<td>Full Range of Motion, but Less than Normal Strength</td>
</tr>
<tr>
<td>5</td>
<td>Normal Strength</td>
</tr>
<tr>
<td>NT</td>
<td>Not Testable</td>
</tr>
</tbody>
</table>
Vital Functions
Assessment Reference Charts

PEDIATRIC ALS EQUIPMENT
(Always use a Broselow® Pediatric Emergency Tape if available)

<table>
<thead>
<tr>
<th>BROSELOW cm (approx)</th>
<th>weight</th>
<th>&lt;61cm</th>
<th>61cm</th>
<th>67cm</th>
<th>75cm</th>
<th>87cm</th>
<th>96cm</th>
<th>109cm</th>
<th>122cm</th>
<th>138cm</th>
<th>149+cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td></td>
<td>3-5kg</td>
<td>6-7kg</td>
<td>8-9kg</td>
<td>10-11kg</td>
<td>12-14kg</td>
<td>15-18kg</td>
<td>19-23kg</td>
<td>24-29kg</td>
<td>30-36kg</td>
<td>37+kg</td>
</tr>
<tr>
<td>RESUSCITATION BAG</td>
<td>Infant</td>
<td>Child</td>
<td>Child/Adult</td>
<td>Adult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2 MASK</td>
<td>Newborn</td>
<td>Pediatric</td>
<td>Adult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORAL AIRWAY</td>
<td>Infant/Small Child</td>
<td>Child</td>
<td>Child</td>
<td>Child/S Adult</td>
<td>Med Adult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAG MASK</td>
<td>Infant</td>
<td>Pediatric</td>
<td>Peds/Adult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LARYNGOSCOPE</td>
<td>0-1</td>
<td>1 Straight</td>
<td>2 Straight</td>
<td>2Straight/Curved</td>
<td>2-3 St/Curv</td>
<td>3 St/Curved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET TUBE</td>
<td>2.5-3 Uncuffed</td>
<td>3.5 Uncuffed</td>
<td>4 Uncuffed</td>
<td>4.5 Un cuffed</td>
<td>5 Un cuffed</td>
<td>5.5 Un cuffed</td>
<td>6 Cuffed</td>
<td>6.5 Cuffed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STYLLET</td>
<td></td>
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<td>14</td>
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<td></td>
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<tr>
<td>SUCTION</td>
<td>6-8</td>
<td>8</td>
<td>8-10</td>
<td>10</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP CUFF</td>
<td>Newborn/Infant</td>
<td>Infant/Child</td>
<td>Child</td>
<td>Child/Adult</td>
<td>Adult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV CATHETER</td>
<td>22-24</td>
<td>20-24</td>
<td>18-22</td>
<td>18-20</td>
<td>16-20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OG/NG TUBE</td>
<td>5-8</td>
<td>8-10</td>
<td>10</td>
<td>10-12</td>
<td>12-14</td>
<td>14-18</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CHEST TUBE</td>
<td>10-12</td>
<td>16-20</td>
<td>20-24</td>
<td>24-32</td>
<td>28-32</td>
<td>32-40</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URINARY CATHETER</td>
<td>5-8</td>
<td>8-10</td>
<td>10</td>
<td>10-12</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CERVICAL COLLAR</td>
<td>N/A</td>
<td>Small</td>
<td>S/M</td>
<td>Medium</td>
<td>M/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient

<table>
<thead>
<tr>
<th>BROSELOW cm (approx)</th>
<th>weight</th>
<th>&lt;61cm</th>
<th>61cm</th>
<th>67cm</th>
<th>75cm</th>
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</tr>
</thead>
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<tr>
<td>AGE</td>
<td></td>
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<td>6-7kg</td>
<td>8-9kg</td>
<td>10-11kg</td>
<td>12-14kg</td>
<td>15-18kg</td>
<td>19-23kg</td>
<td>24-29kg</td>
<td>30-36kg</td>
<td>40kg</td>
</tr>
<tr>
<td>MONTHS</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>FLUID BOLUS</td>
<td>80ml</td>
<td>130l</td>
<td>170ml</td>
<td>210ml</td>
<td>260ml</td>
<td>340ml</td>
<td>420ml</td>
<td>500ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOLL DEFIB ENERGY 1st</td>
<td>8J</td>
<td>10J</td>
<td>15J</td>
<td>20J</td>
<td>30J</td>
<td>50J</td>
<td>75J</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>15J</td>
<td>20J</td>
<td>30J</td>
<td>50J</td>
<td>75J</td>
<td>100J</td>
<td>120J</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAXIMUM</td>
<td>30J</td>
<td>50J</td>
<td>75J</td>
<td>100J</td>
<td>120J</td>
<td>150J</td>
<td>200J</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient

ZOLL® Defibrillation Energy Settings for PEDIATRIC Patients
COMMON LABORATORY VALUES

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Chemistry Conventional</th>
<th>SI Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anion Gap</td>
<td>8-16 mEq/L</td>
<td>8-16 mmol/L</td>
</tr>
<tr>
<td>BUN</td>
<td>8-25 mg/100mL</td>
<td>2.9-8.9 mmol/L</td>
</tr>
<tr>
<td>Calcium</td>
<td>8.5-10.5 mg/100mL</td>
<td>2.1-2.6 mmol/L</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>24-30 mEq/L</td>
<td>24-30 mmol/L</td>
</tr>
<tr>
<td>Creatine</td>
<td>0.2-0.5 mg/dL</td>
<td>Female 0.3-0.9 mg/dL</td>
</tr>
<tr>
<td>Creatine Kinase</td>
<td>Male 17-40 U/L</td>
<td>Female 10-79 U/L</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.6-1.5 mg/100L</td>
<td>53-133</td>
</tr>
<tr>
<td>Glucose</td>
<td>70-110 mg/100mL</td>
<td>3.9-5.6 mmol/L</td>
</tr>
<tr>
<td>Sodium</td>
<td>135-145 mEq/L</td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>3.5-5.0 mEq/L</td>
<td>3.5-5.0 mmol/L</td>
</tr>
</tbody>
</table>

| Hematology      |                        |         |
| Hemoglobin      | Male 13-18 g/100 mL    | Female 12-16 g/100mL |
| Hematocrit      | Male 41-50%            | Female 36-44% |
| Platelets       | 140,000-450,000/ml     |         |

| Cardiac Markers |                        |         |
| Troponin I*     | Onset 4-6 hrs.         | Peak 12-24 hrs. |
| Troponin T*     | Onset 3-4 hrs.         | Peak 10-24 hrs. |
| Myoglobin       | Male 10-95 ng/ml       | Female 10-65 ng/ml |
|                 | Onset 1-3 hrs.         | Peak: 6-10 hrs. |
| INR             | only if Tx for DVT     | 0.8-1.2, 2.0-3.0 |

| Normal Blood Gasses |                        |         |
| pH                 | 7.35-7.45              |         |
| Pco2               | 35-45 mm Hg            |         |
| HCO3               | 22-26 mmol/L           |         |
| Base excess        | (-2)-(+2) mEq/L        |         |
| CO2                | 19-24 mEq/L            |         |
| SaO2               | 96-100%                |         |

*Troponin assays are becoming more analytically sensitive. Each device has different reference ranges associated. Correlate cTn with reference lab. Point of care readers are less sensitive.
USEFUL CALCULATIONS

PEDIATRIC FORMULAS:

- **ETT Size** = \((\text{Age}/4)+4\) (Age divided by 4 plus 4)
- **ETT Depth** = \(3 \times \text{ETT Size}\) (Endotracheal)
- **Weight in kg (>1 year)** = \((\text{Age (years)} \times 2) + 8\)
- **Systolic Blood Pressure minimum** = \(70 + [2 \times \text{Age (years)}]\)

MEDICATION FORMULAS:

- **Mcg/kg/min (micrograms/kilogram/minute)** = \([16.7 \times \text{Drug Concentration (mg/ml)} \times \text{infusion rate (ml/h)}]\) \text{Weight (kg)}.
- **INFUSION RATE (ml/h)** = \([\text{Desired mcg/kg/min} \times \text{Weight (kg)} \times 60]/\text{Drug concentration (mcg/mL)}\)

HEMODYNAMIC FORMULAS:

- **MAP**: Mean Arterial Pressure = \([(2 \times \text{DBP}) + \text{SBP}]/3\).
- **SBP** = (Systolic Blood Pressure)
- **DBP** = (Diastolic Blood pressure)
- / = (Divided by)
- **PULSE PRESSURE**: \(\text{SBP} – \text{DBP}\) or (Systolic Blood Pressure minus Diastolic Blood pressure).
- **Cerebral Profusion Pressure (CPP)**: MAP-ICP=CPP
- **ICP** = (Intracranial Pressure)
- **Ideal CPP=>65** While ICP cannot often be measured during flights; an assumption that patients with TBI have an ICP of 15-20 will allow hemodynamic optimization in these patients to ensure adequate CPP.

Common Conversions:

- lbs. = kg x 2.2 or kg = lbs. x 0.45
- Fahrenheit = (Celsius x 1.8) + 32 or Celsius = (Fahrenheit -32) x 5/9
- 1 tsp. = 5 ml
- 1 tbsp. = 15 ml
- 1 oz. = 30 ml
- 1g = 1,000 mg
- 1mg = 1,000 mcg
- 1 g = 10,000 mcg
## OXYGEN CYLINDER LIFE:

<table>
<thead>
<tr>
<th>Cylinder</th>
<th>D</th>
<th>E</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liters</td>
<td>356</td>
<td>622</td>
<td>5260</td>
<td>6900</td>
</tr>
<tr>
<td>Flow (LPM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of use (min)</td>
<td></td>
<td></td>
<td></td>
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NOTE: Current MEDEVAC Oxygen Cylinder is “D” type.

To estimate duration of use for Oxygen Cylinders:

- Duration of Flow = Contents of cylinder / Flow rate.

**Cylinder Factors for Calculation of Duration of Oxygen Flow:**

- Cylinder Size: D  E  G  H and K
  - Factor: 0.16  0.28  2.41  3.14

Once you have the cylinder factor and the amount of pressure remaining in the cylinder, the duration of flow can be calculated with the following equation.

**Duration of flow (min) = Pressure (psig) x Cylinder Factor/Flow (L/min)**
### Lund-Browder Burn Estimate Chart – Adult

<table>
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<tr>
<th>Total Area front/back (circumferential)</th>
<th>one side– anterior</th>
<th>one side– posterior</th>
<th>Do not include in total TBSA</th>
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| Age:                                   |                    |                     |                             |       |       |       |      |
| Sex:                                   |                    |                     |                             |       |       |       |      |
| Weight:                                |                    |                     |                             |       |       |       |      |

Patient Identification

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**Form V**
**Lund-Browder Burn Estimate Chart – Infant**

**Pediatric Lund Browder Burn Estimate & Diagram**

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<thead>
<tr>
<th>Total Area front/back (circumferential)</th>
<th>1 to 4 years</th>
<th>5 to 9 years</th>
<th>10 to 14 years</th>
<th>15 years</th>
<th>Do not include in total TBSA</th>
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<th>3rd o</th>
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![Diagram of Lund-Browder Burn Estimate Chart – Infant](image)
SNELLEN CHART

Find an optometrist at visionsource.com/find
EXAMPLE Standing Order Sheet for Critical Care Patient Transfers

PATIENT IDENTIFICATION
(Last, First, Middle Initial; SSN/Identification Number; grade; DOB; treatment facility)

Date:
Sending Facility:
Sending Physician:
Receiving Facility:
Diagnosis:
Condition:
Patient Category:
Allergies:
Height:

Weight (kg):

Fluids: [ ] LR mL/hr [ ] NS mL/hr [ ] 3% Saline mL/hr [ ] D5W [ ] Other_________________ [ ] PRBC [ ] FWB [ ] Plasma [ ] LTOWB

Monitoring: [ ] Vital Signs [ ] Every 5 min Vital Signs [ ] Every 15 min Vital Signs [ ] Every 30 min [ ] Continuous cardiac monitoring, document rhythm strips pre-flight and with any rhythm changes [ ] ICP/CPP [ ] CVP [ ] GCS [ ] ETCO2 [ ] UO_____mL hourly

Activity: [ ] Bed rest
[ ] Spine precautions: C-Collar/C-Spine TLS Spine

Nursing: [ ] Wound VAC dressing to ______mm Hg suction
[ ] NGT to low continuous suction OR [ ] Clamp NGT
[ ] OGT to low continuous suction OR [ ] Clamp OGT
[ ] Chest tube 1 to: water seal (circle: R L Both) OR ______cm H2O Suction (circle: R L Both) [ ] Chest tube 2 to: water seal (circle: R L Both) OR ______cm H2O Suction (circle: R L Both) [ ] Chest tube 3 to: water seal (circle: R L Both) OR ______cm H2O Suction (circle: R L Both) [ ] Chest tube 4 to: water seal (circle: R L Both) OR ______cm H2O Suction (circle: R L Both) [ ] Keep HOB elevated ________ degrees [ ] Keep HOB flat

Respiratory: [ ] Keep O2Sat >______ %

Oxygen: [ ] Nasal Cannula at _____LPM [ ] Non-rebreather at _____ LPM

Ventilator Settings: Mode: [ ] SIMV [ ] AC [ ] CPAP [ ] BiPAP
Rate: ______breaths per minute I:E ratio:_________

Tidal Volume: _____ mL FiO2:______ % PEEP: ______cm H2O PIP: ______
PATIENT IDENTIFICATION
(Last, First, Middle Initial; SSN/Identification Number; grade; DOB; treatment facility)

Vasoactive Medications:
[ ] Dopamine ___mg/___mL at____mcg/kg/min IV; titrate to MAP >_______mm Hg
[ ] Norepinephrine 4mg/___mL at____mcg/min IV; titrate to MAP >______ mm Hg
[ ] Phenylephrine 10mg/____mL at____mcg/min IV; titrate to MAP >______ mm Hg
[ ] Epinephrine __mg (1:10,000)/___mL at____mcg/min IV; titrate to MAP >______ mm Hg [ ] Other________________________________

Sedation and Analgesics:
[ ] Ketamine __mg/kg Q___minutes IVP PRN sedation to Riker Sedation-Agitation Scale of 1-2 [ ] Midazolam ___mg Q___minutes IVP PRN sedation to Riker Sedation-Agitation Scale of 1-2 [ ] Haloperidol ___mg Q___minutes IVP PRN sedation to Riker Sedation-Agitation Scale of 1-2
[ ] Lorazepam ___mg Q___minutes IVP PRN sedation to Riker Sedation-Agitation Scale of 1-2 [ ] Fentanyl ____mcg Q___minutes IVP PRN pain
[ ] Morphine ___mg Q___minutes IVP PRN pain [ ] Other________________________________

Paralytics:
[ ] Rocuronium ______mg IVP
[ ] Vecuronium ______mg IVP

Intracranial Hypertension:
[ ] 3% Hypertonic Saline 250 cc bolus for any signs of herniation
[ ] Mannitol Infusion Rate: ______

Labs:
[ ] ABG 15 minutes prior to departing sending facility
[ ] Other:

Additional critical information:

Physician Signature:
JTS BURN RESUSCITATION WORKSHEET

Initiate AFTER completion of trauma assessment and interventions
Adults only: Refer to Burn CPG for pediatric specific recommendations

1. Contact USAISR Burn Center (DSN 312-429-2876) or email: burntrauma.consult.army@mail.mil
   Date/Time contact: ___________ POC: ______________ by: ______________

2. Estimated Pre-burn Weight (wt): ________ kg (Average Service Members are 82 ± 15 kg)

3. Estimate Total Burn Surface Area (TBSA) using Rule of Nines (refine with Lund-Browder after wounds are cleansed)
   Partial thickness (2nd)_______% + Full thickness (3rd)_______% = TBSA_______%
   If TBSA >40%: intubate (use ET intubation to facilitate bronchoscopy)
   If TBSA <15%: formal resuscitation may not be required, provide maintenance and/or oral fluids

4. Standard Burn Resuscitation Fluid: Lactated Ringers (LR) or Plasmalyte

5. Calculate INITIAL Fluid Rate using Rule of 10 (adults):
   - If wt < 40kg: 2ml x %TBSA______ x wt(kg)_______ + 16 = _______ ml/hr
   - If wt ≥ 40kg: %TBSA______ x 10 = _______ ml/hr
     - If wt > 80kg: add 100ml/hr to initial rate for every 10 kg > 80: adjusted initial fluid rate = _______ ml/hr
     - Example: 100kg patient with 50% TBSA burn = 50% x 10 = 500 ml + 200 ml = 700 ml for first hour

6. If Inhalation Injury Present: administer aerosolized heparin in albuterol (5,000 units Q4 hours)

7. Titrate Resuscitation Fluid: maintain target UOP 30-50ml/hr (Q 1 hour)
   - If rhabdomyolysis present: use target UOP 75-100 ml/hr (Contact USAISR Burn Center DSN 312-429-2876)
   - Goals: UOP >30 but <50ml/hr; adequate tissue perfusion (normalized lactate/base deficit), MAP >55 mmHg
   - Minimum fluid rate 125ml/hr LR
   - * Avoid fluid boluses
   - ** Too much fluid as dangerous as too little

High risk for over resuscitation/abdominal compartment syndrome:
   - if hourly rate >1500ml/hr x 2 hrs OR
   - if total 24 hr volume exceeds: wt(kg) x 250ml = _______ ml (includes all infused fluids)
     - Contact USAISR Burn Center (DSN 312-429-2876)
     - Consider adjuncts (below)
     - Check bladder pressures Q4hrs (>20 mmHg notify physician)
     - Avoid surgical decompression (significant mortality risk in burns)

Adjuncts:
1. Colloids: 5% albumin/FFP (Hextrax only if others unavailable)
   - * Colloids not preferred until hour 8-12; can consider earlier in difficult resuscitation
   - Infuse at ml/hr according to chart below based on adult patient weight and burn size

2. Vasopressors: Contact USAISR Burn Center (DSN 312-429-2876)

<table>
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<tr>
<th>5% Albumin Infusion (ml/hr)</th>
<th>30-49% TBSA</th>
<th>50-69% TBSA</th>
<th>70-100% TBSA</th>
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<tbody>
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<td>30</td>
<td>70</td>
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<tr>
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<td>140</td>
</tr>
<tr>
<td>&gt;90 kg</td>
<td>50</td>
<td>90</td>
<td>160</td>
</tr>
</tbody>
</table>

Ensure adequate volume (CVP trend 6-8 cm H2O); maintain MAP > 55 mmHg
JTS BURN RESUSCITATION WORKSHEET

- Maintain ionized Ca > 1.1 mmol/L
- Start with vasopressin 0.04mg/min. DO NOT TITRATE
- Second line pressor: norepinephrine 2-20mcg/min
- Refractory shock: consider epinephrine or phenylephrine infusion
- Refractory shock: consider adrenal insufficiency, give hydrocortisone 100mg IV Q8 hrs
- Manage acidemia (pH<7.2): use ventilator interventions first, then bicarbonate or THAM infusion
- Renal replacement therapy if available (Contact USAISR Burn Center DSN 312-429-2876)

Assessment/Interventions:

- Complete full secondary trauma exam
- Ensure thermoregulation; administer warmed fluids; cover with space blanket; elevate burned extremities
- Superficial burn (1st degree): Sunburn, no blister, blanch readily; NOT included in TBSA
- Partial thickness (2nd degree): Blanch, moist, blisters, sensate
- Full thickness (3rd degree): Leathery, white, non-blanching, dry, insensate, thrombosed vessels
- Protect eyes with moisture shields if corneas exposed or blink reflex slow; apply ophthalmic erythromycin ointment at least Q2hrs.
- Prompt intubation for facial burns, suspected inhalation injury, TBSA >40%
  - Anticipate induction-associated hypotension
  - Secure ETT with cloth tie, not adhesive tape
  - Reassess ETT position at teeth Q1 hr as edema develops and resolves
  - Intubated patients require oro/naso-gastric tube for decompression
  - Administer IV proton-pump inhibitor
- Monitor bladder pressure at least Q4hrs for large burns or high volume resuscitations
  - Abdominal compartment syndrome: decreased UOP, increased pulmonary pressures, difficulty ventilating, bladder pressure remains > 20 mmHg
  - Avoid decompressive laparotomy; consider percutaneous peritoneal drainage
  - Reduce crystalloid volume using colloid or vasopressors
- Monitor pulses hourly: palmar arch, dorsalis pedis, posterior tibial with Doppler
  - Consider escharotomy if signal diminished; refer to Burn CPG for technique (Call USAISR Burn Center DSN 312-429-2876)
- Monitor extremity compartment pressures as clinically indicated
  - Elevate burned extremities at all times
  - Extremity compartment syndrome: pain, paresthesia, pallor, paralysis, pulselessness (late sign)
  - Fasciotomy may be required
- Wound care
  - Thoroughly cleanse burn wounds, preferably in Operating Room
  - Select topical antimicrobial in consultation with Burn Surgeon (Call USAISR Burn Center DSN 312-429-2876) based on product availability, expected transport time, etc
  - Acceptable to cover burns with dry sheets or clean dressings for first 48 hours
- All definitive burn surgery done at USAISR Burn Center for US Service Members (DSN 312-429-2876)
# JTS Burn Resuscitation Flow Sheet – page 1 of 3

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<table>
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<th>Date</th>
<th>Date &amp; Time of Injury</th>
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<table>
<thead>
<tr>
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<th>HR from burn</th>
<th>Local Time</th>
<th>Crystallloid (LR)</th>
<th>Colloid</th>
<th>Total</th>
<th>UOP [Target 30-50ml/hr]</th>
<th>Base Deficit/Lactate</th>
<th>Heart Rate</th>
<th>MAP (&gt;55)</th>
<th>CVP (6-8mmHg)</th>
<th>Pressors (Vasopressin 0.04 u/min)</th>
<th>Bladder Pressure (Q4)</th>
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Total Fluids: *Titrate LR hourly to maintain adequate UOP (30-50ml/hr) and perfusion*
## JTS Burn Resuscitation Flow Sheet – page 2 of 3

<table>
<thead>
<tr>
<th>Date &amp; Time of Injury</th>
<th>BAMC/ISR Burn Team DSN 312-429-2876: Yes No</th>
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<tr>
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<td><strong>HR from burn</strong></td>
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<td>Total Fluids:</td>
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</table>

*Titrate LR hourly to maintain adequate UOP (30-50ml/hr) and perfusion*
### JTS Burn Resuscitation Flow Sheet – page 3 of 3

| Date & Time of Injury | TX Site/Team | HR from burn | Local Time | Crystalloid* (LR) | Colloid | Total | UOP (Target 30-50ml/hr) | Base Deficit/Lactate | Heart Rate | MAP (>55) | CVP (6-8mmHg) | Pressors (Vasopressin 0.04 u/min) | Bladder Pressure (Q4)|
|-----------------------|--------------|--------------|------------|-------------------|--------|-------|-------------------------|---------------------|------------|----------|-----------|---------------------------|----------------------|---------------------|
| 49^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 50^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 51^st                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 52^nd                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 53^rd                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 54^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 55^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 56^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 57^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 58^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 59^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 60^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 61^st                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 62^nd                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 63^rd                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 64^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 65^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 66^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 67^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 68^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 69^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 70^th                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 71^st                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| 72^nd                 |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |
| Total Fluids:         |              |              |            |                   |        |       |                         |                     |            |          |            |                          |                      |                     |

*Titrate LR hourly to maintain adequate UOP (30-50ml/hr) and perfusion*
DA Form 4700, Evacuation Patient Care Record (PCR)

1. BACKGROUND and PURPOSE
   a. Pre-Hospital, Pre-Medical Treatment Facility (pre-MTF), or inter-MTF evacuation documentation of medical interventions by ground vehicle and rotary-wing based medical personnel (CASEVAC/MEDEVAC) is critical to ensuring continuity of care and providing meaningful analyses of medical interventions, techniques, tactics, and procedures rendered during transport.
   b. As medical providers, it is critically important to document patient care for follow on providers in order to achieve the best patient outcomes. Additionally, well documented care can improve not only individual care, but as part of a Process Improvement system, good documentation can identify places where casualty care can be improved on a system-wide level.
   c. Use of the DA Form 4700, Evacuation Patient Care Record (PCR) will allow for individual care improvement as well as a method to enable appropriate patient care documentation. This will enable process improvement and quality assurance for medical providers rendering care during patient evacuations. It is designed specifically for documentation of care for all patients transported via ground or rotary-wing platforms in order to document all evaluation and care provided for casualties.

2. POLICY
   a. Commanders will ensure that all providers evacuating patients (to include both deployed and garrison operations, regardless of AOR) use the PCR to document enroute care. Such care relates to both battle and non-battle injuries.
   b. Once completed, the PCR will be entered into the patient’s medical record and the Department of Defense Trauma Registry (DoDTR). Evacuation unit commanders must establish a clear process to ensure transmission of the medical information recorded to the Joint Trauma System for data capture and entry into both the patients’ medical record and the DoDTR.
   c. Medical personnel providing care during evacuation will complete all entries as fully as possible.
   d. All abbreviations authorized for use in DoD health records or DoD trauma registries may also be used on the PCR.
   e. This PCR can be completed manually or electronically after care is provided and is designed to work equally well for either. Manual entries may be made using a non-smearing pen or marker.
   f. Free-text may be entered in any block despite appearance of drop-down menus.
   g. Blocks where information is not applicable should be left blank or can be marked “N/A”
   h. In an effort to accurately capture all patient care delivered, providers can document treatments relevant to their transport performed by personnel prior to their assumption of patient care. This care should be documented in the appropriate locations on the form with the time marked as “PTA” (Prior to arrival). (Ex: Ground medic places TQ on RUE prior to MEDEVAC arrival. TQ location, type, etc. should be annotated with time as “PTA”).
   i. This form should be completed within 72 hours upon completion of evacuation mission and submitted to JTS ASAP following Medical Director review. Forms can be submitted via NIPR e-mail to: DHA.JBSA.j-3.List.JTS-Prehospital@mail.mil
   j. Additionally JTS has the Military Enroute Care Registry (MERCuRY) (army.mil). Performance Improvement Events Data worksheet. See instructions on worksheet. Complete the MERCuRY worksheet in conjunction with the DA 4700 before submitting to the Joint Trauma System. (https://jts.amedd.army.mil/assets/docs/forms/MERCuRY_PI_28_Oct_2021.pdf)

3. The most current version of the form, along with instructions for use can be found on the JTS site under the documents tab, or at the following address: https://jts.amedd.army.mil/index.cfm/documents/forms_after_action
## Tactical Evacuation After Action Report & Patient Care Record

**Report Title**
**MEDICAL RECORD-SUPPLEMENTAL MEDICAL DATA**

For use of this form, see AR 40-66; the proponent agency is the Office of the Surgeon General.

### Event Information
- **Date:**
- **Time:**
- **Time Zone:**
- **MM:**
- **Pt #:**
- **Tail to Tail:**
- **Leg #:**

### 9-Line Information
- **Time:**
- **Platform:**
- **Dispatch Cat:**
- **Assessed Cat:**

### Trauma MIST Report
- **Mechanism of Injury:**
- **Injury:**
- **Signs & Symptoms:**
- **Treatments:**

### Disease Diagnosis
- **M:**
- **I:**
- **S:**
- **T:**

### Comments

### Pickup Information
- **Time:**
- **Role:**
- **Other:**
- **Region:**
- **Other:**
- **Location:**

### Dropoff Information
- **Time:**
- **Role:**
- **Other:**
- **Region:**
- **Other:**
- **Location:**

### Capability
- **EMT-B**
- **EMT-I**
- **EMT-P**
- **EMT-FPC**
- **RN**
- **CRNA**
- **PA**
- **MD/DO**

### Circulation-Hemorrhage Control
- **Direct Pressure**
- **Tourniquet**
- **Prior TQ:**
- **Reassess/tighten:**
- **Y**
- **N**
- **N/A**
- **Time On:**
- **CAT**
- **SOFTT**
- **Other**
- **RUE**
- **LUE**
- **RLE**
- **LLE**
- **#**

### Annotate Injuries
- **(AMP)utation**
- **(BL)eeding**
- **(B)urn **
- **% TBSA**
- **(C)repitus**
- **(D)eformity**
- **(DGI)Degloving**
- **(E)cchymosis**
- **(FX)Fracture**
- **(GSW)Gunshot Wound**
- **(H)ematoma**
- **(IM)Paired Object**
- **(LAC)eration**
- **(P)ain**
- **(PP)Peppering**
- **(PW)Puncture Wound**
- **(SQA)Subcutaneous Air**
- **(TBI)Suspect**
- **Other**

### Airway
- **Self**
- **NPA**
- **OPA**
- **Cric**
- **Trach**
- **ETT**
- **SGA Type**

### Needle Decompression
- **Time:**
- **R**
- **L**
- **Mid-ax**
- **Mid-clav**

### Chest Equal Rise and Fall
- **Y**
- **N**
- **N/A**

### Respiratory Effort
- **Unlabored**
- **Labored**
- **Agonal**
- **Assisted**

### Circulation - Assessment
- **Pulse:**
- **Transfusion Indication:**
- **Blood Infusion:**
- **Transfusion Type:**
- **Component:**
- **ABO/RH:**
- **Unit Number:**
- **Exp. Date:**
- **Blood Age:**

### Circulation - Resuscitation
- **IV Lines:**
- **Peripheral:**
- **Central Line:**
- **Arterial Line:**

### PREPARED BY

(Name, Rank & Title)

DEPARTMENT/SERVICE/CLINIC (Treating Unit)

DATE

PATIENT'S IDENTIFICATION

(Last name, first, middle; grade; date; hospital or medical facility)

Last Name

First Name

MI

BR#

Rank

Unit

Pt Cat

SSN

DOB

Gender

M

F

Allergy

Other

HISTORY/PHYSICAL

TREATMENT

DIAGNOSTIC STUDIES

FLOW CHART

OTHER EXAMINATION OR EVALUATION

OTHER, SPECIFY

DA FORM 4700, FEB 2003

EDITION OF MAY 78 IS OBSOLETE.

JTS TACEVAC AAR & PCR OP 05 (MCMR-SRJ) NOV 2014

APD PE v1.01ES
MEDICAL RECORD-SUPPLEMENTAL MEDICAL DATA

REPORT TITLE
Tactical Evacuation After Action Report & Patient Care Record, Page 2

Vital Signs

| Time | HR | BP | RR | SpO2 | ETCO2 | Temp | F | C | AVPU | GCS: Eyes 1-4 | Verbal 1-5 | Motor 1-6 | Total | Pain 0-10 |
|------|----|----|----|------|-------|------|---|---|------|-----------|------------|----------|-------|--------|---------|
|      |    |    |    |      |       |      |   |   |      |           |            |          |        |         |         |
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| Last  |    |    |    |      |       |      |   |   |      |           |            |          |        |         |         |

PERRLA  
R Size (mm)  
L Size (mm)  

Field Ultrasound Results

Additional Interventions

Foley

Protection

Immobilization

Warming

Other Interventions

Medications and Fluids

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<tr>
<th>Time</th>
<th>Drug / Fluid</th>
<th>Dose</th>
<th>Route</th>
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Documents Received

- TCCC Card
- Patient Chart
- None
- Other

Narrative Summary of Care

Enroute Care Provider

Last Name  
First Name  
Rank  
Capability  
Signature

Email PCR to:  
DHA.JBSA-J-3.List.JTS-Prehospital@mail.mil

DEPARTMENT/SERVICE/CLINIC (Treating Unit)  
DATE

PATIENT'S IDENTIFICATION  
(Name: last, first, middle; grade; date; hospital or medical facility)

Last Name  
First Name  
MI  

BR#  
Rank  
Unit  
Pt Cat  

SSN  
DOB  
Gender  
M  
F  
Allergy  
Other  

HISTORY/PHYSICAL  
TREATMENT  
DIAGNOSTIC STUDIES  
FLOW CHART  
OTHER EXAMINATION OR EVALUATION  
OTHER, Specify

DA FORM 4700, FEB 2003  
EDITION OF MAY 78 IS OBSOLETE.  
JTS TACEVAC AAR & PCR OP 05 (MCMR-SRJ) NOV 2014
## Casuality’s Protective Equipment
(Check all worn)

- [ ] Helmet, Ballistic
- [ ] Tactical Vest (IOTV)
- [ ] Eye Protection
- [ ] Ear Protection
- [ ] Plate Front
- [ ] Plate Back
- [ ] Plate Right Side
- [ ] Plate Left Side
- [ ] Neck Protector (Back)
- [ ] Throat Protector (Front)
- [ ] Deltoid Right
- [ ] Deltoid Left
- [ ] Groin Shield
- [ ] Pelvic Undergarment Tier 1
- [ ] Pelvic Undergarment Tier 2
- [ ] Blast Gauge
- [ ] Blast Sensor Helmet
- [ ] Blast Sensor Other

### AAR Discussion
- Event Date
- [ ] Tactical situation complicated care (Explain in discussion)

### Sustains

### Improves

---

**PATIENT'S IDENTIFICATION (Name: last, first, middle; grade; date; hospital or medical facility)**

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<th>Last Name</th>
<th>First Name</th>
<th>MI</th>
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<th>Unit</th>
<th>SSN</th>
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<th>Pt Cat</th>
<th>Date</th>
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The National Defense Authorization Act for fiscal year 1987 (Public Law (PL) No. 99-661), section 1102, Title 10, (10USC 1102) this document was created by or for the DOD in a medical QA program and is confidential and privileged. PL 99-661 and subsequent guidance predicated on this law (10 USC 1102) preclude disclosure of, or testimony about, any records or findings, recommendations, evaluations, opinions, or actions taken as part of a QA program except in limited situations. Under the provisions of 10 USC 1102, this information is exempt from release in accordance with Exemption 3 of the FOIA. Additional detailed information regarding the confidentiality of QA documents and records is contained in appendix B.
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<th>Mission #</th>
<th>Mission Leg #</th>
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**Documentation**
- Standard form not used
- Patient identification not completed
- Dispatched versus assessed category differ
- Dispatched category higher than assessed
- Dispatched category lower than assessed
- MIST report mechanism not correct
- MIST report injuries not correct
- Mission times not recorded
- Tourniquet indicated and successfully performed
- Tourniquet not placed when indicated
- Type of tourniquet

**Circulation /Hemorrhage Control**
- Tourniquet not placed when indicated
- Tourniquet not assessed
- Tourniquet conversion not attempted when indicated
- Tourniquet time not recorded
- Tourniquet indicated and successfully performed

**Airway**
- Deviation from airway management protocol
- Advanced non-surgical airway placement
- Indicated and successfully performed
- Performed when not indicated
- Not performed when not indicated
- Attempted unsuccessfully
- Indicated and successfully performed
- Performed when not indicated
- Not performed when indicated
- Attempted unsuccessfully
- Cricothyroidotomy
- Indicated and successfully performed
- Performed when not indicated
- Not performed when indicated
- Attempted unsuccessfully

**Breathing**
- Needle decompression
- Indicated and successfully performed
- Performed but respiratory distress not resolved
- Performed when not indicated
- Two or more on the same side
- Site not recorded
- Thoracostomy - finger or tube
- Indicated and successfully performed
- Performed when not indicated
- Not performed when not indicated
- Attempted unsuccessfully
- Two or more on the same side
- Ventilator management, no ETCO2 recorded
- Deviation from ventilator management protocol
- Vent setting changed but no outcome recorded
- Unplanned extubation enroute

**Vitals**
- Appropriate level of monitoring not utilized
- Vital signs not documented
- Blood pressure
- Heart rate
- Respiratory rate
- SaO2
- Temperature
- Hypoxia (SaO2<88%)
- Hypertension (SBP<90 mmHg)
- GCS or AVPU not documented
- GCS or AVPU changes not documented
- Pain assessment not completed

**Additional Interventions**
- Immobilization not performed when indicated
- C-collar
- Pelvic binder
- Spinal motion restriction
- SAM splint for extremity
- Rigid eye shield
- Hypothermia prevention not initiated when indicated

**Medications**
- Pain medication not given per protocol
- Pain medication given, outcome undocumented
- TXA not given <3 hrs after injury
- Antibiotic not given per protocol
- Other medication delay or complication (please specify)

**Performance Improvement Event(s) Data**

**Other**
- Documentation from sending provider did not accompany patient (TCCC card or patient chart)
- Absent documentation from ground team
- Diversion of flight or unplanned destination
- Incomplete hand off from ground team
- Equipment problem, unable to be resolved enroute
- Environmental issues affecting patient outcome
- Death or CPR enroute
- Missing needed gear or medications
- Events enroute precluding adequate patient monitoring/assessment/treatment
- Other (please specify in Notes)

**Notes & Comments**

**Instructions**
1. Complete the Mercury in conjunction with the 4700 before submitting to the Joint Trauma System.
2. Enroute care should be assessed for compliance with standard guidelines to include: Tactical Combat Casualty Care guidelines, Standard Medical Operating Guidelines, JTS Intratheter transport clinical practice guide.
3. At least two unique patient identifiers are needed for documenting patient identification.
4. One identifier must be last name, BR#, or SSN. The second identifier can be first name, BR#, SSN, DOB, or unit.
5. Hemorrhage control, Airway, Breathing, Circulation, Vitals, Additional Interventions, Medications: Evaluate enroute interventions only. Do not evaluate interventions performed prior to MEDEVAC.
6. Other: Incomplete handoff from ground team: Review narrative for comments relating to incomplete or inadequate handoff.
INSTRUCTIONS: DD Form 1380, Tactical Combat Casualty Care (TCCC) Card
[Formerly: U.S. Field Medical Card]

1. BACKGROUND and PURPOSE
   a. Pre-Hospital or Pre-Medical Treatment Facility (pre-MTF) documentation of medical interventions by first responders at the point of injury (POI) is critical to ensuring continuity of care and providing meaningful analyses of medical interventions, techniques, tactics, and procedures rendered at the POI.
   b. In a deployed, combat, or training setting, all personnel have the potential to be casualties and all personnel have the potential to be first responders.
   c. In accordance with Joint Publication 4-02, Health Service Support, dated 26 July 2012: "First responder care capability is also known as tactical combat casualty care. Tactical combat casualty care [or TCCC] occurs during a combat mission and is the military counterpart to pre-hospital trauma life support. Pre-hospital trauma care in the military is most commonly provided by enlisted personnel and includes self-aid and buddy aid and combat life savers.... Tactical combat casualty care focuses on the most likely threats, injuries, and conditions encountered in combat and on a strictly limited range of interventions directed at the most serious of these threats and conditions...."
   d. DD Form 1380 promotes Department of Defense goals of capturing documentation of pre-MTF medical interventions at the POI using a MIST format (Mechanisms of injury; Injuries; Signs & Symptoms; and Treatments). It is designed for use by all first responders, including non-medical personnel.

2. POLICY
   a. Commanders will ensure that all first responders carry and use DD Form 1380 to document pre-MTF care at the POI. Such care relates to both battle and non-battle injuries.
   b. Once completed, DD Form 1380 must be visibly attached to the patient. Upon arrival at a Role 2 or Role 3 MTF, DD Form 1380 will be included with the paper medical record, then scanned and entered into both the patient’s electronic health record and the trauma system’s trauma registry. Role 2 and Role 3 MTF commanders must establish a clear process to ensure entry of the medical information recorded on DD Form 1380 into both the electronic health record and the trauma registry.
   c. DD Form 1380 will be a component of the individual/improved first aid kit (IFAK), joint first aid kit (JFAK), and other first aid kits utilized. Corpsmen, combat medics, and tactical evacuation personnel should carry multiple blank versions of the form.
   d. First responders will complete all entries as fully as possible on the DD Form 1380 unless under extreme conditions whereby the casualty and/or provider’s safety may be at additional risk.
   e. Detailed instructions for preparing DD Form 1380 are provided in Table 1 and Table 2.
   f. All abbreviations authorized for use in DoD health records or DoD trauma registries may also be used on DD Form 1380.
   g. All entries on the DD Form 1380 will be made using a non-smearing pen or marker.
   h. All entries on the DD Form 1380 should be printed clearly, including the first responder’s name.

Table 1: Instructions for completing DD Form 1380 (Front of Card)

<table>
<thead>
<tr>
<th>Item</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battle Roster #</td>
<td>Write first letter of casualty’s first name, then first letter of casualty’s last name, then write the last four numbers of casualty’s Social Security number. For example, John Doe 123-12-1234 is Battle Roster # “JD1234”.</td>
</tr>
<tr>
<td>Evacuation</td>
<td>Mark an “X” on the casualty’s evacuation priority/precedence (Urgent; Priority; or Routine).</td>
</tr>
<tr>
<td>Name</td>
<td>Write casualty’s name (Last, First).</td>
</tr>
<tr>
<td>Last 4</td>
<td>Write last four numbers of casualty’s Social Security number.</td>
</tr>
<tr>
<td>Gender</td>
<td>Mark an “X” on the casualty’s gender (Male (M) or Female (F)).</td>
</tr>
<tr>
<td>Date</td>
<td>Write date of injury in DD-MMM-YY format. For example, “29-JUN-13”.</td>
</tr>
<tr>
<td>Time</td>
<td>Write 24 hour time of injury, and indicate whether local (L) or zulu (Z) time. For example, “1300Z”.</td>
</tr>
<tr>
<td>Service</td>
<td>Write casualty’s branch of service (USA, USAF, USCG, USN, USMC). For U.S. civilians, write “US CIV”. For non-U.S. personnel, write “NON US” or a standard abbreviation for casualty’s nationality.</td>
</tr>
<tr>
<td>Unit</td>
<td>Write casualty’s unit name.</td>
</tr>
<tr>
<td>Allergies</td>
<td>Write casualty’s known drug allergies. If no drug allergies, write “NKDA” (no known drug allergies).</td>
</tr>
<tr>
<td>Mechanism of Injury</td>
<td>Mark an “X” on the mechanism or cause of injury (artillery, blunt, burn, fall, grenade, gunshot wound (GSW), improvised explosive device (IED), landmine,</td>
</tr>
</tbody>
</table>
INSTRUCTIONS: DD Form 1380, Tactical Combat Casualty Care (TCCC) Card
[Formerly: U.S. Field Medical Card]

<table>
<thead>
<tr>
<th>Item</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury</td>
<td>Mark an “X” at the site of the injury(ies) on the body picture. For burn injuries, circle the burn percentage(s) on the figure. If multiple mechanisms of injury and multiple injuries, draw a line between the mechanism of injury and the anatomical site of the injury.</td>
</tr>
<tr>
<td>TQ: R Arm (tourniquet, right arm)</td>
<td>If a tourniquet is applied to the right arm, write type of tourniquet used and the time of tourniquet application.</td>
</tr>
<tr>
<td>TQ: L Arm (tourniquet, left arm)</td>
<td>If a tourniquet is applied to the left arm, write type of tourniquet used and the time of tourniquet application.</td>
</tr>
<tr>
<td>TQ: R Leg (tourniquet, right leg)</td>
<td>If a tourniquet is applied to the right leg, write type of tourniquet used and the time of tourniquet application.</td>
</tr>
<tr>
<td>TQ: L Leg (tourniquet, left leg)</td>
<td>If a tourniquet is applied to the left leg, write type of tourniquet used and the time of tourniquet application.</td>
</tr>
<tr>
<td>Time, Pulse (rate &amp; location), Blood Pressure, Respiratory Rate, Pulse Ox % O2 Sat, AVPU, Pain Scale (0-10)</td>
<td>Record vital signs (pulse rate and location, blood pressure, respiratory rate, oxygen saturation), level of consciousness (AVPU: Alert, responds to Verbal stimulus, responds to Pain stimulus, Unresponsive), and level of pain (on numeric rating scale of 0 to 10, with 0 being no pain and 10 being the worst pain) with time.</td>
</tr>
</tbody>
</table>

Table 2: Instructions for completing DD Form 1380 (Back of Card)

<table>
<thead>
<tr>
<th>Item</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battle Roster #</td>
<td>Write first letter of casualty’s first name, then first letter of casualty’s last name, and then write the last four numbers of casualty’s Social Security number. For example, John Doe 123-12-1234 is Battle Roster # “JD1234”.</td>
</tr>
<tr>
<td>Evacuation (EVAC)</td>
<td>Mark an “X” on the casualty’s evacuation priority/precedence (Urgent, Priority, or Routine).</td>
</tr>
<tr>
<td>C</td>
<td>Mark an “X” for all Circulation hemorrhage control interventions. For tourniquets (TQ), mark category (Extremity, Junctional and/or Truncal) and write name of TQ(s) used. For dressings, mark category (Hemostatic, Pressure, and/or Other) and write type of dressing(s) used.</td>
</tr>
<tr>
<td>A</td>
<td>Mark an “X” for all Airway interventions (Intact, NPA (nasopharyngeal airway), CRIC (cricothyroidotomy), ET Tube (endotracheal tube), SGA (supraglottic airway) and write type of device(s) used.</td>
</tr>
<tr>
<td>B</td>
<td>Mark an “X” for all Breathing interventions (O2 (oxygen), Needle-D (needle decompression), Chest-Tube, Chest-Seal) and write type of device(s) used.</td>
</tr>
<tr>
<td>C: Fluid</td>
<td>Circulation resuscitation interventions. Write name, volume, route, and time of any fluids given.</td>
</tr>
<tr>
<td>C: Blood Product</td>
<td>Circulation resuscitation interventions. Write name, volume, route, and time of any blood products given.</td>
</tr>
<tr>
<td>Meds: Analgesic</td>
<td>Medications. Write name, dose, route, and time of any analgesics given.</td>
</tr>
<tr>
<td>Meds: Antibiotic</td>
<td>Medications. Write name, dose, route, and time of any antibiotics given.</td>
</tr>
<tr>
<td>Meds: Other</td>
<td>Medications. Write name, dose, route, and time of any other administered medications.</td>
</tr>
<tr>
<td>Other</td>
<td>Mark an “X” for other treatments administered (combat pill pack, eye shield (mark right (R) or left (L)), splint, hypothermia prevention) and type of device(s) used.</td>
</tr>
<tr>
<td>Notes</td>
<td>Use this space to record any other pertinent information and/or clarifications.</td>
</tr>
<tr>
<td>First Responder Name</td>
<td>Print the first responder’s name (Last, First)</td>
</tr>
<tr>
<td>First Responder Last 4</td>
<td>Write last four numbers of first responder’s Social Security number.</td>
</tr>
</tbody>
</table>

3. ISSUANCES
a. DoDI 6490.02E, Comprehensive Health Surveillance
b. DoDI 6040.45, Service Treatment Record (ST) and Non-Service Treatment Records (NSTR)
c. DHB Memorandum Battlefield Trauma Care RDT&E Priorities 2011-01 (June 14, 2011)
d. AR 40-66, Medical Record Administration and Healthcare Documentation

Page 2 of 2
TACTICAL COMBAT CASUALTY CARE (TCCC) CARD

BATTLE ROSTER #: ______________________

EVAC: □ Urgent □ Priority □ Routine

NAME (Last, First): ____________ LAST 4: ____________

GENDER: □ M □ F DATE (DD-MMM-YY): ____________ TIME: ____________

SERVICE: ____________ UNIT: ____________ ALLERGIES: ____________

Mechanism of Injury: (X all that apply)
□ Artillery □ Blunt □ Burn □ Fall □ Grenade □ GSW □ IED
□ Landmine □ MVC □ RPG □ Other: ____________

Injury: (Mark injuries with an X)

<table>
<thead>
<tr>
<th>TQ: R Arm</th>
<th>TQ: L Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE: ____________</td>
<td>TYPE: ____________</td>
</tr>
<tr>
<td>TIME: ____________</td>
<td>TIME: ____________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TQ: R Leg</th>
<th>TQ: L Leg</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE: ____________</td>
<td>TYPE: ____________</td>
</tr>
<tr>
<td>TIME: ____________</td>
<td>TIME: ____________</td>
</tr>
</tbody>
</table>

Signs & Symptoms: (Fill in the blank)

<table>
<thead>
<tr>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse (Rate &amp; Location)</td>
</tr>
<tr>
<td>Blood Pressure</td>
</tr>
<tr>
<td>Respiratory Rate</td>
</tr>
<tr>
<td>Pulse Ox % O2 Sat</td>
</tr>
<tr>
<td>AVPU</td>
</tr>
<tr>
<td>Pain Scale (0-10)</td>
</tr>
</tbody>
</table>
**BATTLE ROSTER #:**

**EVAC:** [ ] Urgent  [ ] Priority  [ ] Routine

**Treatments:** (X all that apply, and fill in the blank)

C: TQ: [ ] Extremity  [ ] Junctional  [ ] Truncal

Dressing: [ ] Hemostatic  [ ] Pressure  [ ] Other

A: [ ] Intact  [ ] NPA  [ ] CRIC  [ ] ET-Tube  [ ] SGA

B: [ ] O2  [ ] Needle-D  [ ] Chest-Tube  [ ] Chest-Seal

**C:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Volume</th>
<th>Route</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Product</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MEDS:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Dose</th>
<th>Route</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesic (e.g., Ketamine, Fentanyl, Morphine)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotic (e.g., Moxifloxacin, Ertapenem)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (e.g., TXA)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OTHER:** [ ] Combat-Pill-Pack  [ ] Eye-Shield ( [ ] R  [ ] L)  [ ] Splint  [ ] Hypothermia-Prevention  Type: 

**NOTES:**

**FIRST RESPONDER**

**NAME (Last, First):**

**LAST 4:**

DD Form 1380, JUN 2014 (Back)  TCCC CARD
TACTICAL COMBAT CASUALTY CARE AFTER ACTION REPORT (TCCC AAR)

Complete within 72hrs after mission and submit to the Joint Trauma System via email: DHA.JBSA.j-3.List.JTS-Prehospital@mail.mil

Event Date: Time:

Injury

- Battle Injury (BI): WIA KIA DOW
- Non-Battle Injury (NBI): Alive Dead

Evacuation Category

- Litter
- Ground Vehicle
- Aircraft
- Watercraft

Casualty Demographics (mini. requirement: last name & last 4 SS#)

Annotate Injuries

- (A)mputation
- (B)leeding
- (Bu)rn, TBSA: %
- (C)repitus
- (D)eformity
- (DG)Degloving
- (E)chymosis
- (FX)Fracture
- (GSW) Gun Shot Wound
- (H)ematoma
- (LAC)eration
- (P)ain
- (PP)Pepperings
- (PW)Puncture Wound

M - Mechanism of Injury

- Airborne Operation
- Aircraft Crash
- Blast – Dismounted IED or Mine
- Blast – Mounted IED or Mine
- Blast – RPG or Grenade
- Blast – Indirect Fire (Mortar/Artillery/Missile)
- Blast – Other
- Collapse/Crush/Compartment from Structure
- Fire/Explosion
- Fall, Height: ft
- Fragmentation/Shrapnel
- GSW – Gunshot Wound
- Vehicle Accident/Collision
- Environmental:
- Other:

I - Injuries

- (A)mputation
- (B)leeding
- (Bu)rn, TBSA: %
- (C)repitus
- (D)eformity
- (DG)Degloving
- (E)chymosis
- (FX)Fracture
- (GSW) Gun Shot Wound
- (H)ematoma
- (LAC)eration
- (P)ain
- (PP)Pepperings
- (PW)Puncture Wound

S - Signs

Initial Check

- Time
- A / V / P / U
- GCS: 15 (E 6 4)
- V 6 / 5 / 6
- RR: HR: BP:
- pOx (%): Pain level (/10):
- EtCO2 (mmHG):

Last Check

- Time
- A / V / P / U
- GCS: 15 (E 6 4)
- V 6 / 5 / 6
- RR: HR: BP:
- pOx (%): Pain level (/10):
- EtCO2 (mmHG):

T - Treatments

Massive Hemorrhage Control (TQ/Hemostatic Adjunct)

Airway

- Time
- Type
- Size
- Depth

Respiration/Breathing

- Spontaneous
- Laboried
- Assisted
- Assisted with BVM

- NM M OP Chest Seal
- NM M OP Needle Decompression Location
- NM M OP Chest Tube

- 2ICS/MCL 5ICS/AAL
- # of attempts Cath/Needle size
- Output Air

Blood (ml)

DD Form XXXX, 25 Feb 2020 v2.0
General instruction for Canine Trauma Combat Casualty Care Card

PURPOSE: The Canine Tactical Combat Casualty Care (cTCCC) card is for documenting a trauma or disease non-battle injury (DNBI) at the point of injury anywhere a canine is deployed in support of DoD operations. The cTCCC card will be filled out by the handler or provider who attends to the canine’s trauma or DNBI. After medical treatment and resuscitation care is provided, the cTCCC card can be handed off to the nearest veterinary treatment facility or supporting veterinary unit to be scanned, uploaded and emailed to dog.consult@us.af.mil or the unit providing care can email directly. Once the MWD Trauma Registry is online, the first veterinary unit can input the information into the registry and scan the cTCCC card to upload into ROVR. The cTCCC card becomes part of the canine’s permanent DoD medical record. For US Special Operations Command (SOCOM) canines, the cTCCC card will be filled out and returned to the handler or operator. The handler or operator will route the card to their respective veterinarian to be inputted into the MWD Trauma Registry and the canine’s record.

PAGE 1:

GENERAL INSTRUCTIONS

- To be completed by the handler, human medical provider, veterinary technician or veterinarian fulfilling the role at the point of injury.
- Time Zones: Record all time local 24 hour military format, hh:mm
- A+ (plus sign) means positive test result; a - (minus sign) means negative test result.

EVACUATION CATEGORY (mark as appropriate)

URGENT – Patient who should be evacuated as soon as possible and within two hours to save life, limb or eyesight

PRIORITY – Patient who should be moved within four hours or their condition will deteriorate to such a degree that will be urgent

ROUTINE – Patient whose condition is not expected to worsen significantly and who will require evacuation in the next 24 hours

EVACUATION MODE & TYPE (mark as appropriate)

PATIENT IDENTIFICATION

UNIT. Record the unit the canine is assigned

ANIMAL NAME. (self-explanatory)

TATTOO. (self-explanatory)

DATE. (DD-MM-YY)
TIME. Record all time local 24 hour military format, hh:mm

GENDER. (mark as appropriate)

MECHANISM OF INJURY (mark as appropriate – use other for DNBI or if unknown – describe)

INJURY (mark the diagram where the trauma/injury or disease is located – if there are more than one injury, identify each with the mechanism of injury)

VITAL SIGNS (input vital signs at least hourly)

Pain Score:

0 – Pain free
1 – Very minor annoyance-occasional minor twinges
2 – Minor annoyance-occasional
3 – Annoying enough to be distracting
4 – Can be ignored if you are really involved in your work, but still distracting,
5 – Can’t be ignored for more than 30 minutes.
6 – Can’t be ignored for any length of time, but you can still go to work and participate in social activities.
7 – Make it difficult to concentrate, interferes with sleep, you can still function with effort
8 – Physical activity severely limited. You can read and converse with effort. Nausea and dizziness may occur.
9 – Unable to speak, crying out or moaning uncontrollable- pain makes you pass out

FIRST RESPONDERS (self-explanatory)

PAGE 2:

TREATMENTS (mark as appropriate) and annotate location where appropriate
**M (Massive Hemorrhage):** (mark as appropriate)

**A (Airway Control):** self-explanatory

**R (Respiratory Support):** self-explanatory

**C (Circulation):** FLUIDS (fill out as appropriate and complete as possible)

**C (Fracture):** self-explanatory

**H (Hypo/hyperthermia):** self-explanatory

**H (Head Injury):** self-explanatory

**MEDICATIONS (MEDS)** (Circle the medication given and write the time given in the notes)

**NOTES** (Include any additional information (location/country, euthanized/KIA, treatment regiments that were used to the treat the patient etc.)

**DISPOSITION OF THE FORM –** (The form is to be kept with the patient until it can be put into the patient’s record.) Pass the card to the next treatment facility. 1) Scan and email the card to dog.consult@us.af.mil. 2) Put the card into the patient’s hard copy record. CAVEAT: For US Special Operations Command (SOCOM) canines, the cTCCC card will be filled out and returned to the handler or operator. The handler or operator will route the card to their respective veterinarian to be inputted into the MWD Trauma Registry and the canine’s record.

**DEFINITIONS**

IED – Improvised explosive device
GSW – Gunshot wound
TQ – Tourniquet
ET – Endotracheal tube
TXA – Tranexamic acid
**CANINE-TACTICAL COMBAT CASUALTY CARE CARD (cTCCC)**

**EVAC CAT:**  □ Urgent  □ Priority  □ Routine

**EVAC TYPE:**  □ Fixed  □ Rotary  □ Ground  □ MEDEVAC  □ CASEVAC

**UNIT:**  ________  **NAME:**  ________  **TATTOO:**  ________

**DATE:** (DD-MM-YY)  **TIME:**  ________  **GENDER:**  □ M  □ F

**Mechanism of Injury:** (Mark X all that apply)

□ IED  □ GSW  □ MINE  □ BURN  □ GRENADE  □ ARTILLERY  □ FALL

□ OTHER:  ________

**Injury:** (Mark all injuries that apply with an X)

![Dog with injuries]

**Signs and Symptoms:** (fill in the blank)

<table>
<thead>
<tr>
<th>Time</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Score (0-10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature (99-102.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse Rate/Location (60-80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiration (16-30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Pressure (120/80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse Ox% (&gt; 95%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capillary Refill (&lt; 2 sec)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**  

-  
-  
-  
-  

DD FORM 3073  OCTOBER 2019  (Send card to dog.consult@us.af.mil)  Page of 300
CANINE-TACTICAL COMBAT CASUALTY CARE CARD (cTCCC)

Treatments: (Mark X all that apply) and fill in the blank

M: Dressing - [ ] Hemostatic [ ] Pressure [ ] TQ [ ] Other: ___________

A: [ ] Intact [ ] ET-Tube [ ] Tracheostomy ___________

R: [ ] O2 [ ] Needle-D [ ] Chest-Tube [ ] Chest-Seal ___________

C: Total Crystalloid Shock Volume of fluids is 90 mls/kg; Administer 20ml/kg over 10-20 min. Reassess (as with human casualty); If lack of response after 2-3 boluses consider adjunct therapy (HES/HTS.)

<table>
<thead>
<tr>
<th>CRISTALLOID</th>
<th>Volume</th>
<th>Route</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROXYETHYL STARCH (HES):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYPERTONIC SALINE (HTS):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TXA: 10 mg/kg IV in 100ml NaCl or LRS given in first 3hrs. Followed by a 10-15 mg/kg CRI over 6 hours.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C: [ ] Splint [ ] Other Bandage ___________

H: [ ] Hypothermia-Prevention [ ] Hypothermia-External Cooling ___________

H: [ ] Head Injury

Pain Meds and Antibiotics (Circle if given and write the time in the notes.)

<table>
<thead>
<tr>
<th>DRUG (conc)</th>
<th>DOSE</th>
<th>RTE</th>
<th>60lb/27.3kg</th>
<th>70lb/32kg</th>
<th>80lb/36.4kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketamine (100mg/ml)</td>
<td>2-5mg/kg</td>
<td>IV/IM</td>
<td>1 ml</td>
<td>1.5 mls</td>
<td>2 mls</td>
</tr>
<tr>
<td>Midazolam (5mg/ml)</td>
<td>0.1-0.3mg/kg</td>
<td>IV/IM</td>
<td>3 mls</td>
<td>4 mls</td>
<td>5 mls</td>
</tr>
<tr>
<td>Morphine (10mg auto inj.)</td>
<td>0.2-0.5 mg/kg</td>
<td>IM</td>
<td>1 auto</td>
<td>1 auto</td>
<td>2 auto</td>
</tr>
<tr>
<td>Meloxicam</td>
<td>0.1-0.2mg/kg</td>
<td>IV/SQ/PO</td>
<td>5 mg</td>
<td>6 mg</td>
<td>7 mg</td>
</tr>
<tr>
<td>Cefazolin/Ceftriaxone</td>
<td>25 mg/kg</td>
<td>IV/IM</td>
<td>600 mg</td>
<td>800 mg</td>
<td>900 mg</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>25 mg/kg</td>
<td>IV/IM/SQ</td>
<td>600 mg</td>
<td>800 mg</td>
<td>900 mg</td>
</tr>
<tr>
<td>Ertapenem (100mg/ml)</td>
<td>15mg/kg</td>
<td>IV/SQ</td>
<td>4 mls</td>
<td>5 mls</td>
<td>6 mls</td>
</tr>
</tbody>
</table>

NOTES: ________________________________________________________________

FIRST RESPONDER:

Name (Last, First): _______________ AOC/MOS: _______________

DD FORM 3073 OCTOBER 2019 (Send card to dog.consult@us.af.mil) Page of 301
<table>
<thead>
<tr>
<th>Line</th>
<th>Item</th>
<th>EVACUATION REQUEST MESSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Location of Pickup Site.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Radio Freq., Call Sign, &amp; Suffix.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>No. of Patients by Precedence.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Special Equipment Required.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Number of Patients by Type.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Security of Pickup Site (Wartime).</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Number and Type of Wound, Injury, or Illness (Peacetime).</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Method of Marking Pickup Site.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Patient Nationality and Status.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>NBC Contamination (Wartime).</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Terrain Description (Peacetime).</td>
<td></td>
</tr>
</tbody>
</table>

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HEADQUARTERS, DEPARTMENT OF THE ARMY,
ATTN: ATIC-SAA, GTA Program, Fort Eustis, VA 23604-5166
<table>
<thead>
<tr>
<th>LINE ITEM</th>
<th>EXPLANATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Location of Pickup Site.</td>
<td>Encrypt grid coordinates. When using DRYAD Numeral Cipher, the same SET line will be used to encrypt grid zone letters and coordinates. To preclude misunderstanding, a statement is made that grid zone letters are included in the message (unless unit SOP specifies its use at all times).</td>
</tr>
<tr>
<td>2. Radio Frequency, Call Sign, Suffix.</td>
<td>Encrypt the frequency of the radio at the pickup site, not a relay frequency. The call sign (and suffix if used) of person to be contacted at the pickup site may be transmitted in the clear.</td>
</tr>
<tr>
<td>3. No. of Patients by Precedence.</td>
<td>Report only applicable info &amp; encrypt brevity codes. A = Urgent, B = Urgent-Surg, C = Priority, D = Routine, E = Convenience. (If 2 or more categories reported in same request, insert the word &quot;break&quot; b/t each category.)</td>
</tr>
<tr>
<td>5. No. of Patients by Type.</td>
<td>Report only applicable information and encrypt brevity code. If requesting MEDEVAC for both types, insert the word &quot;break&quot; between the litter entry and ambulatory entry; L + # of Pnt - Litter; A + # of Pnt - Ambul (sitting).</td>
</tr>
<tr>
<td>6. Security Pickup Site (Wartime).</td>
<td>N = No enemy troops in area, P = Possibly enemy troops in area (approach with caution), E = Enemy troops in area (armed escort required). Specific information regarding patient wounds by type (gunshot or shrapnel). Report serious bleeding, along with patient blood type, if known.</td>
</tr>
<tr>
<td>6. Number and type of Wound, Injury, Illness (Peacetime).</td>
<td>N = No enemy troops in area, P = Possibly enemy troops in area (approach with caution), E = Enemy troops in area (armed escort required). Specific information regarding patient wounds by type (gunshot or shrapnel). Report serious bleeding, along with patient blood type, if known.</td>
</tr>
<tr>
<td>9. NBC Contamination, (Wartime).</td>
<td>Include this line only when applicable. Encrypt the applicable brevity codes. N = nuclear, B = biological, C = chemical.</td>
</tr>
<tr>
<td>9. Terrain Description (Peacetime).</td>
<td>Include details of terrain features in and around proposed landing site. If possible, describe the relationship of site to a prominent terrain feature (lake, mountain, tower).</td>
</tr>
</tbody>
</table>

Reference: ATP 4-02.2, Medical Evacuation.
### NATO AEROMEDICAL EVACUATION 9 LINE

<table>
<thead>
<tr>
<th><strong>NATO MEDEVAC</strong> “9-Line” REQUEST</th>
<th><strong>DTG:</strong></th>
<th><strong>UNIT:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 LOCATION (GRID OF PICKUP ZONE)</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>2 CALL SIGN &amp; FREQ:</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>3 NUMBER OF PATIENTS/PRIORITY:</td>
<td>(3) P1 ... P2 ... P3 ...</td>
<td></td>
</tr>
<tr>
<td>PRIORITY 1 (P1) - URGENT; to be at hospital facility (R2/R3) within 60 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIORITY 2 (P2) - To be at hospital facility (R2/R3) within 4 hours of notification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIORITY 3 (P3) - To be at hospital facility R2/R3 within 24 hours of notification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 SPECIAL EQUIPMENT REQUIRED:</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>A - NONE    B - HOIST (Winch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C - EXTRICATION  D - VENTILATOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 PATIENTS BY TYPE:</td>
<td>(5) L ... A ... E ...</td>
<td></td>
</tr>
<tr>
<td>S - STRETCHER (On Litter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W - WALKING (Ambulatory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E - ESCORTS/O-Other (Give details)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 SECURITY AT PICKUP ZONE (PZ):</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td>N - NO ENEMY    E - ENEMY IN AREA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P - POSSIBLE ENEMY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X - HOT PICKUP ZONE - ARMED ESCORT REQUIRED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 PICKUP ZONE (PZ) MARKING METHOD</td>
<td>(7)</td>
<td></td>
</tr>
<tr>
<td>A - PANELS    B - PYRO    C - SMOKE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D - NONE    E - OTHER (explain)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 NUMBER OF PATIENTS BY NATIONALITY/STATUS</td>
<td>(8) A ... B ... C ...</td>
<td></td>
</tr>
<tr>
<td>D ... E ... F ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A - NATO MILITARY    B - NATO CIVILIAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C - NON-NATO SECURITY FORCES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D - NON-NATO CIVILIAN    E - POW/DETAINED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F - EMBEDDED INTERPRETER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G - CIV CAS (caused by friendly forces)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H - CHILD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 TACTICAL CONSIDERATIONS/OTHER INFORMATION</td>
<td>(9)</td>
<td></td>
</tr>
</tbody>
</table>

### DO NOT DELAY LAUNCH OF MEDEVAC SUPPLY FURTHER INFORMATION ONCE AVAILABLE:

<table>
<thead>
<tr>
<th><strong>M</strong></th>
<th>MECHANISM OF INJURY (and at what time if known)</th>
<th>(M) (Time: ...........)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>INJURY OR ILLNESS SUSTAINED</td>
<td>(I)</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>SYMPTOMS AND VITAL SIGNS</td>
<td>(C)</td>
</tr>
<tr>
<td></td>
<td>C - Catastrophic bleed</td>
<td>A ................... B ...................</td>
</tr>
<tr>
<td></td>
<td>A - Airway B - Breathing Rate</td>
<td>C ...................</td>
</tr>
<tr>
<td></td>
<td>C - Pulse D - Consciousness</td>
<td>D ...................</td>
</tr>
<tr>
<td></td>
<td>E - Other signs</td>
<td>E ...................</td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>TREATMENT GIVEN &amp; TIME (e.g. Tourniquet and time applied, Morphine)</td>
<td>(T)</td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>AGE OF CASUALTY</td>
<td></td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>TIME OF WOUNDING</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

Specify if critical medical supplies are needed to be brought in with MEDEVAC ‘9-liner’ is not used for requests to move casualties who are killed in action at the scene.

**APRV'S MSN** | **AVN AUTH'S LAUNCH**
---|---
W/U | W/D
W/D | W/U

034
Drug Box Layout, Drug Box Drug Cards and Drug Box Pocket Labels

**TOP**

1. 3mL Syringe x5
2. 5mL Syringe x4
3. 10mL Syringe x3
4. Saline Lock x6
5. IV Catheter 16GA x3
6. IV Catheter 18GA x3
7. Draw Needles x8
8. Alcohol Pads x10
9. 1 Inch Tape x1
10. 1 Inch Tape x1
11. Tegaderm Kit w/Constricting Band x4

**FRONT DIVIDER**

1. TXA x3
2. VASOPRESSIN x2
3. NOREPINEPHRINE x2
4. PHENYLEPHRINE x2
5. EPINEPHRINE x2
6. DOPAMINE x2
7. SOLU-MEDROL x2
8. DIPHENHYDRAMINE x3
9. ONDANSETRON x3
10. AMIODARONE x3
11. NARCAN x3
   FLUMAZENIL x1
Drug Box Layout, Drug Box Drug Cards and Drug Box Pocket Labels

1. Quick Drug Reference Card per SMOG
2. Fluid Volume for Dilution card per SMOG

1. ACLS Drugs
   - Epinephrine x4
   - Adenosine x2
   - Sodium Bicarb x2
   - Lidocaine x3
   - D50 x1
   - Atropine x2
   - Calcium Chloride x2

2. SHARPS SHUTTLE x1
   SALINE FLUSHES x10

3. IV TUBING x4
   BLOOD TUBING x2

4. NORMAL SALINE 100mL x3

5. NARCOTICS BOX
   Ketamine x2
   Midazolam x2
   Rocuronium x2
   Vecuronium x2
   Succinylcholine x1
   Fentanyl x3
   Etomidate x1

6. NORMAL SALINE 500mL x2
   LACTATED RINGERS x1
   3% HYPERTONIC SALINE x1
<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3mL SYRINGE</td>
<td>x5</td>
</tr>
<tr>
<td>5mL SYRINGE</td>
<td>x4</td>
</tr>
<tr>
<td>10mL SYRINGE</td>
<td>x3</td>
</tr>
<tr>
<td>SALINE LOCK</td>
<td>x6</td>
</tr>
<tr>
<td>IV CATHETER 16GA</td>
<td>x3</td>
</tr>
<tr>
<td>IV CATHETER 18GA</td>
<td>x3</td>
</tr>
<tr>
<td>DRAW NEEDLES</td>
<td>x8</td>
</tr>
<tr>
<td>ALCOHOL PAD</td>
<td>x10</td>
</tr>
<tr>
<td>TEGADERM</td>
<td>x4</td>
</tr>
<tr>
<td>1 inch TAPE</td>
<td></td>
</tr>
<tr>
<td>1 inch TAPE</td>
<td></td>
</tr>
<tr>
<td>TXA x3</td>
<td>VASOPRESSIN x2</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
</tr>
<tr>
<td>EPINEPHRINE x2</td>
<td>DOPAMINE x2</td>
</tr>
<tr>
<td>ONDANSETRAN x3</td>
<td>AMIODARONE x3</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACLS DRUG:
- EPINEPHRINE x4
- ADENOSINE x2
- SODIUM BICARB x2
- LIDOCAINE x3
- D50 x2
- ATROPINE x2
- CALCIUM CHLORIDE x2

SALINE FLUSHES x10

IV TUBING x4
BLOOD TUBING x2

NARCOTICS BOX:
- KETAMINE x2
- ROCURONIUM x2
- VECURONIUM x2
- FENTANYL x3
- MIDAZOLAM x2
- ETOMIDATE x1
- SUCCINYLCHOLINE x1

NORMAL SALINE 100ML x3
NORMAL SALINE 500ML x2
LACTATED RINGERS x1
3% HYPERTONIC SALINE x2
STANDING ORDERS - Air Ambulance, Emergency Medicine Tasks

PURPOSE

The intended purpose of these guidelines is to serve as a baseline for the Aviation Medical Company’s Aviation Medicine SOP (Standing Orders and Aeromedical Treatment Guidelines). Practices in Aviation Medicine undergo constant scrutiny and change. As such, this guide should not be considered an all-inclusive and always up-to-date source of the newest and most relevant policies, procedures, and practices in Aviation Medicine. It will require continued monitoring for relevant clinical and operational updates needed to reflect current aviation and clinical practice standards.

Primarily, this guide should serve as a resource for tactical and non-tactical prehospital, interfacility and post-surgical enroute medical care on an Army aeromedical platform. Initial patient evacuation and prehospital trauma guidelines are written in a manner to support the principles of Tactical Combat Casualty Care (TCCC). This assumes that a combat trauma patient will respond to care most effectively when the order of care addresses circulation (stopping and preventing hemorrhage) prior to addressing the patient’s airway and breathing. When these guidelines are adapted for use within US Army civilian missions (noncombat), unit medical directors should consider the necessity of writing and appending these guidelines, order of care, and standard operating procedures to address the differences in initial interventions of the civilian trauma patient verses the combat trauma patient.

SCOPE OF PRACTICE

This guide is intended for use by Aviation Medical Personnel to include: Critical Care Flight Paramedics, Flight Surgeons, Aeromedical Physician Assistants (APAs), Aeromedical Nurse Practitioners (ANPs), and En Route Critical Care Nurses performing MEDEVAC on an Army Aviation platform. Preferably, only medical personnel trained in and holding certifications in the National Registry of Paramedics (NRP), Emergency Medicine, or Critical Care should be eligible to use all treatment guidelines within this book. However, local training programs may be adopted that may enable individually trained physicians, Physician Assistants, and Non-NRP Flight Medics a knowledge base sufficient to satisfy use of these treatment guidelines in an austere/combat environment. Specific certifications of importance might include: TCMC, ATLS®, ACLS/ALS, PALS, PHTLS, ITLS, and PEPP, among others. Any individual who is not fully trained, has not demonstrated competency in each of these guidelines, or has not been approved (credentialed) to use these guidelines by the local Aviation Medicine Medical Director should not be authorized to perform the respective guideline(s) without direct (on-hand) oversight. All personnel using these guidelines should adhere to the steps and standards as outlined in each of the standard medical operating guidelines (SMOG) and procedures. Moreover, all unit medical personnel providing care aboard US Army Air Ambulances (including Unit Flight Surgeons and APAs) will, at a minimum, adhere to this standard of care unless superseded by theater and/or regional clinical practice guidelines under the authorization of an appropriate local command medical officer/surgeon.

Following the concept set forth in the National Emergency Medical Services (EMS) Scope of Practice Model, an individual may only perform a skill or role for which that person is:
• educated (has been trained to do the skill or role), AND
• certified (has demonstrated competence in the skill or role), AND
• licensed [has legal authority issued by the State (Army EMS is the 51st State) to perform the skill or role], AND
• credentialed (has been authorized by medical director to perform the skill or role).

Depending on the military environment (deployed or austere location), licensing and credentialing may be satisfied through a local training and standardization policy that demonstrates an individual medical provider’s capabilities and knowledge of the treatment guidelines within this handbook. Approval of each individual provider’s usage of these treatment guidelines must be provided by the unit medical director. This approval should be documented and maintained in the Soldiers training record.

It must be remembered that any use of these guidelines is prohibited outside of the individual’s military employment. Furthermore, any civilian based medical care provided by aviation medicine personnel must satisfy the National EMS Scope of Practice Model noted previously. It must also be realized that any usage of these guidelines within the civilian environment may be limited to support through a legitimate local EMS credentialing provider. This would normally be the local Medical Treatment Facility Emergency Medical Systems credentialing authority. The unit medical director may or may not satisfy this requirement in civilian medicine due to state laws, policies, or standards.

**USAGE INTENT**

This guide contains the specific Treatment Guidelines, Procedures, and Medications that will be used within Army Aeromedical Evacuation.

The Critical Care Flight Paramedic Standard Medical Operating Guideline will be reviewed at a minimum semi-annually or upon change of command or medical director. A single copy of the Review and Approval Page or a substitute document will be distributed to aforementioned individuals for review and approval signatures.

It is the responsibility of the Unit Commander, the Medical Director, the Training NCO, and the Standards NCO to ensure that all Flight Paramedics remain current in all required certifications needed to perform their duties as Flight Paramedics and/or those needed to perform the skills of a Nationally Registered Paramedic. This should include, at a minimum, certifications in NRP, ALS/ACLS, and BLS. However, it is highly recommended that paramedics maintain certifications in PALS/PEPP and PHTLS/ITLS. Copies or originals of all current certifications or a memo of training status/credentials will be maintained in the individual Soldier’s training record.

A medical practitioner’s clinical competence is at least equal in importance to the maintenance of formal certifications. Competence is the ability to actually perform required interventions and administer appropriate therapies. A competent practitioner has the knowledge base and critical-thinking skill required to determine when to perform an intervention and when it is best NOT to do so. Commanders and Unit Medical Directors/Flight Surgeons should ensure that clinical skill competency is maintained, demonstrated, and remediated (when required) to ensure the maintenance of skills and mandated certifications of medical aircrew members under their direction. It is recommended that all medical personnel conducting aeromedical evacuation
perform simulated critical care and POI training cases on a monthly basis in order to develop competency and retain critical care medical proficiency.

The Flight Paramedic Standard Medical Operating Guideline is not intended to be a comprehensive patient care manual. Rather, it specifies standard clinical treatment guidelines for discrete emergency conditions which should be used as a baseline practice standard for Flight Paramedics and other attached medical aircrew members providing enroute emergency care on a rotary wing platform in the prehospital environment while conducting intratheater, CONUS, or other tactical/operational contingency missions.

QUALITY MANAGEMENT PROGRAM Procedures

Physician Medical Direction

Prehospital emergency care constitutes the practice of medicine, either directly by a qualified physician or indirectly through delegation-of-authority under the physician’s medical direction. This practice is distinctly different from hospital-based medical, nursing, and paramedical practice in which practitioners conduct full-spectrum care within their respective scope-of practice, executing physician’s orders, or through autonomous practice in the case of Physician Assistants (PA), Nurse Practitioners (NP), and Clinical Nurse Specialists (CNS).

Medical direction of Flight Paramedics and other medical aircrew with regard to procedures, guidelines, medications, documentation (Patient Care Reports), testing, credentials, etc., is the primary responsibility of the qualified (as defined by AR 40-3) assigned Flight Surgeon (FS) (normally a Battallion Surgeon), with the assistance of the Aeromedical Physician Assistant (APA) and designated company Medical Training NCO. The Brigade Surgeon has responsibility for overall medical oversight. All medical aircrew should maintain currency on recent literature and equipment pertaining to pre-hospital aeromedical evacuation and enroute care.

Advanced-Care Provider Clinical Oversight

Although they cannot act as a medical director, the role of PAs, NPs and CNSs in the practice of prehospital emergency care is emerging and holds great promise as a means of extending the medical director’s capacity to ensure the best quality of care for patients or casualties. While Federal Regulations and most State Laws pertaining to EMS require physician medical direction for the prehospital conduct of advanced life support (ALS) scope-of-practice skills, many high performance domestic EMS systems have implemented mid-level “clinical director” programs, employing PAs and advanced practice nurses with emergency or critical care expertise, to provide initial quality management program (QMP) review, assist with on-line decision support for pre-hospital practitioners, oversee readiness training and continuing education, and to augment the medical aircrew when needed on ground and air critical care transport platforms. PAs, with the approval of the Brigade Surgeon, can provide the necessary clinical oversight in the absence of a unit level Flight Surgeon in order to ensure the CCFPs are trained and proficient for their deployed mission.

Quality Assurance
Published Standard Medical Operating Guidelines (SMOG) are written patient care guidance in algorithm format with discrete basic life support (BLS) and advanced life support (ALS) scopes of practice, respectively, based on each patient / casualty’s specific medical condition. Once endorsed by local commanders and unit medical directors, all medical aircrew are expected to use these guidelines in the care of patients they transport to the next higher level of care. Periodically, medical aircrew should undergo testing on information and procedures contained within these guidelines. After each patient that has been aero-medically evacuated to a Role 2 or Role 3 medical treatment facility, each medical aircrew member is responsible for documenting the care rendered during transport via the appropriate unit, theater, or DA / DD approved / mandated electronic or written patient care documentation form.

**Direct Supervision**

In addition to the written guidelines, designated unit medical directors are responsible for the direct supervision of medical aircrew members participating in en route care within the unit, his/her performance in situations in which the patient’s medical condition(s) does not meet standard-of-care as defined by these guidelines, or who experience adverse events en route, merit retrospective review and determination of root cause and corrective action, or endorsement of their decision, as appropriate.

**Quality Management/Process Improvement**

After each Aeromedical Evacuation mission, for each patient receiving enroute care, the medical aircrew team conducts an informal After Action Review (AAR). The initial formal control measure is the requirement for the FS or APA to review and co-sign each patient care report (PCR) (e.g., DD 1380, run sheet, Enroute Critical Care Transfer document, DD4700) before it is submitted as a part of the patient record. After both the lead medical aircrew member and unit medical director have signed the PCR, a copy will be kept and others will be distributed in accordance with current Army policy guidelines, local unit policy, and by the medical training NCO and/or medical director.

Additional quality control measures are encouraged and can foster a rich and open learning environment between local emergency medicine/trauma facilities and members of the air ambulance company. One such option might include a monthly aeromedical evacuation conference chaired by the local MTF Trauma Surgeon in which medical aircrew member’s present cases to a forum of providers and other medics with emphasis on best practices and lessons learned.

**UPDATE and APPROVAL PROCESS**

1. The Critical Care Flight Paramedic Standard Medical Operating Guidelines will be updated generally on an annual basis, or sooner in response to clinical or operational needs.

2. Based upon the above timeframes, the Director, Department of Aviation Medicine (DAM) should initiate an update by sending the SMOG for inputs from senior aeromedical clinicians (flight surgeons, aeromedical physician assistants, and aeromedical nurse practitioners), emergency medicine physicians, EMS trained physicians, and critical care flight paramedic end-users.
3. Suspense for submitting updates back to an identified editor will be a minimum of 30 calendar days. Extensions may be granted on a case by case basis.

4. The editor will consolidate all inputs and discuss with a designated physician (as identified by the Director, DAM).

5. After all accepted/applicable inputs have been updated; the SMOG will receive final approval from Director, DAM.

6. Once final approval is given, the SMOG will undergo OPSEC/PAO review prior to posting.

POINT OF INJURY CARE, TCCC Evacuation Phase Guideline

**INDICATIONS:** In combat, the period of care provided at the Point of Injury (POI) is the most critical period throughout a casualty's movement across the medical system. Timely, appropriate, and effective care at the POI will afford a casualty the greatest chance of surviving preventable causes of death regardless of necessary follow-on surgical interventions and specialty medical treatment.

**GUIDELINE (see TACTICAL EVACUATION Guideline).** This guideline serves as the starting point for initiation of care for all patients evacuated from the POI pick-up sight. All subsequent procedural steps of care will be determined by navigation through continued guideline flow charts. All care will be provided in accordance with these flow charts.

**POLICY NOTE:** In the event these guidelines are adapted for use within US Army civilian missions (non-combat), it is recommended that unit medical directors consider the necessity of writing and appending these guidelines, order of care, and standard operating procedures to address the differences in initial interventions of the civilian trauma patient verses the combat trauma patient.
It is the responsibility of the Unit Commander, the Medical Director, the Training NCO, and the Standards NCO to ensure that all Flight Paramedics remain current in all required certifications needed to perform their duties as Flight Paramedics and/or those needed to perform the skills of a Nationally Registered Paramedic. This includes, at a minimum, certifications in NRP, ACLS/ALS, and BLS. Copies or originals of all current certifications will be placed maintained in the individual Soldiers training record. It is recommended that all CCFP level providers maintain PALS certifications and Flight Paramedic- Certified (FP-C) certifications.

The Standard Medical Operating Guideline is not intended to be a comprehensive patient care manual. Rather, it specifies standard medical treatment guidelines to be used by all Flight Paramedics and Medical Providers performing medical care while serving in this unit in an austere, deployed, or garrison environment.

This document has been reviewed by the below noted individuals for correctness, and mission applicability.

Unit Standards Officer/NCO Signature___________________________ Date________________

Approval/Review Date______________ Initials_____________________

Unit Training NCO Signature______________________________ Date________________

Approval/Review Date______________ Initials_____________________

The Standard Medical Operating Guideline has been reviewed and approved for use by the undersigned.

Medical Director or designated physician

Signature of Approval_________________________ Date________________

Approval/Review Date______________ Initials_____________________

Approval/Review Date______________ Initials_____________________

Unit Commander Signature of Approval_________________________ Date________________

Approval/Review Date______________ Initials_____________________

Approval/Review Date______________ Medical Director's Initials_____________________

Additional Medical Director comments and addendums can be attached and should contain counter signature of unit commander for validity.
The Critical Care Flight Paramedic Standard Operating Guidelines are dedicated to our past, present and future DUSTOFF aircrews who unhesitantly go into harm’s way so that other may live. May you forever be protected by angel’s wings within the heaven’s on which men fly.

Closing the Flight Plan
(adapted from the Muster Poem by Dr. John Ashton)

In many lands and climes this day
Proud DUSTOFFers unite.
Our loyalty to God and country we pay
And seal a pact with the bond of common might.

We live again those happy days of yore,
On the flight line, in the air, and at drill.
Fond memory brings a sigh – but nothing more
Now we must move on, to live is still a thrill.

Their spirits hover round us; as if to bring us cheer!
Mark them “present” in our hearts, we’ll meet them some other day.
As we softly call the muster – let a comrade present answer “Here.”
There is no life but Life Eternal for Heroes such as they.
Summary of Changes

Page numbers added to all pages. **NOTE:** Clicking on page numbers sends the reader to the Table of Contents. Items listed on the Table of Contents link directly to the page described. All other previous hyperlinks are disabled.

Protocols Updated

- *Introduction and Table of contents*
- Head Injury/TBI
- Sepsis
- Stroke
- All Cardiac (adult and Ped) Protocols. Now reflect American Red Cross standards
- All Pediatric Protocols. Now reflect American Red Cross PALS standards
- Hypertension
- All MWD Protocols.
- Airway Pearls
- Rapid Sequence Intubation
- Ventilator Management
- Enroute Damage Control Resuscitation
- Pain Management
- Standing Orders
- CDR/Medical Director Approval

Drug Cards Updated

- SMOG Drug Card/Chart
- Atropine
- Calcium Chloride
- Epi 1:10,000 Drip Chart
- Ketamine
- Labetalol
- Midazolam
- Propofol
- Rocuronium
- Tranexamic Acid (TXA)
- Vecuronium

**NOTE:**

There are many changes throughout the SMOG. Individuals should not just rely on the summary of changes page alone to be up to date on all contents within the SMOG. It is strongly encouraged that individuals go through all the SMOG in its entirety.