“My duties as an aviation medical aidman are: first to be totally
dedicated to the preservation of life and limb of my fellow Soldier”
Summary of Changes Located at End of Document
INTRODUCTION

This current set of medical guidelines has gone through some significant improvements since the original release in 2014 and were developed through a collaboration of Emergency Medicine professionals, experienced Flight Medics, Aeromedical Physician Assistants, Critical Care Nurses, and Flight Surgeons. There has been close coordination in the development of these guidelines by the Joint Trauma System, Committee of En Route Combat Casualty Care and the Committee of Tactical Combat Casualty Care. Our shared goal is to ensure excellent en route care that is standard across all evacuation and emergency medical pre-hospital units. It is our vision that all of these enhancements and improvements will advance en route care across the services and the Department of Defense.

The CCFP Program Office facilitates appropriate training and medical education to the CCFP providers. The CCFP program of instruction ensures the appropriate skills and knowledge required for CCFPs to apply these medical guidelines during aeromedical evacuation. Unit medical trainers and medical directors should evaluate CCFPs ability to follow and execute the medical instructions herein. These medical guidelines are intended to guide Critical Care Flight Paramedics (CCFP) and prehospital professionals in the response and management of emergencies and the care and treatment of patients in both garrison and theater of war 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 should 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.

The medication section of this manual is provided for information purposes only. CCFPs may administer medications only as listed in the guidelines unless their medical director (supervising physician) orders a deviation. Other medications can 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 as 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 Medical Evacuation Proponency Division (MEPD), unless otherwise directed, will serve as the managing editor of the SMOG, responsible for content updates, manage the formal review process, and identify review committee members for the annual review.

The Standard Medical and Operating Guideline is 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.
# Table of Contents

## TREATMENT GUIDELINES AND PROCEDURES

<table>
<thead>
<tr>
<th>Section</th>
<th>Tab Number</th>
<th>Protocol</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal patient care</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Tactical Evacuation</td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>TRAUMA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Hemorrhage</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>II</td>
<td>Chest Trauma</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>III</td>
<td>Extremity Trauma</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>IV</td>
<td>Multiple Trauma</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>p.</td>
<td>Pediatric Multiple Trauma</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>V</td>
<td>Head Injury</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>VI</td>
<td>Burns</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>VII</td>
<td>Electrical Injury</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>VIII</td>
<td>Traumatic Cardiac Arrest</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>IX</td>
<td>Hypotension/Shock</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>X</td>
<td>Pediatric Hypotension/Shock</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>XI</td>
<td>Crush Syndrome</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>XII</td>
<td>Eye Injury/Pain</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>XIII</td>
<td>Bites/Envenomation</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>MEDICAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Abdominal Pain</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>II</td>
<td>Allergic Reaction</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>p.</td>
<td>Pediatric Allergic Reaction</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>III</td>
<td>Altered Mental Status</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>p.</td>
<td>Pediatric Altered Mental Status</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>IV</td>
<td>Altitude Sickness</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>V</td>
<td>Back and Neck Pain</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>VI</td>
<td>Epistaxis</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>VII</td>
<td>Fever/Infection</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>VIII</td>
<td>Hyperthermia</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>IX</td>
<td>Hypothermia</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>X</td>
<td>Respiratory Distress</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>p.</td>
<td>Pediatric Respiratory Distress</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>XI</td>
<td>Seizure</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>p.</td>
<td>Pediatric Seizure</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>XII</td>
<td>Stroke/TIA Suspected</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>XIII</td>
<td>Submersion Injury</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>XIV</td>
<td>Syncope</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>XV</td>
<td>Toxic Ingestions</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>p.</td>
<td>Pediatric Toxic Ingestions</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>XVI</td>
<td>Vomiting and Diarrhea</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>p.</td>
<td>Pediatric Vomiting and Diarrhea</td>
<td></td>
<td>48</td>
</tr>
</tbody>
</table>
### CARDIAC

<table>
<thead>
<tr>
<th>Section</th>
<th>Tab Number</th>
<th>Protocol</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>Chest Pain</td>
<td>49</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td>Cardiac Arrest</td>
<td>50</td>
</tr>
<tr>
<td>p.</td>
<td></td>
<td>Pediatric Cardiac Arrest</td>
<td>51</td>
</tr>
<tr>
<td>p2.</td>
<td></td>
<td>Pediatric ALS and BLS indicators</td>
<td>52</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>Bradycardia With Pulse</td>
<td>53</td>
</tr>
<tr>
<td>p.</td>
<td></td>
<td>Pediatric Bradycardia With Pulse and Poor Perfusion</td>
<td>54</td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>Tachycardia With Pulse</td>
<td>55</td>
</tr>
<tr>
<td>p.</td>
<td></td>
<td>Pediatric Tachycardia With Pulse and Adequate Perfusion</td>
<td>56</td>
</tr>
<tr>
<td>p2.</td>
<td></td>
<td>Pediatric Tachycardia With Pulse and Poor Perfusion</td>
<td>57</td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>Post Cardiac Arrest Care</td>
<td>58</td>
</tr>
<tr>
<td>VI</td>
<td></td>
<td>Hypertension</td>
<td>59</td>
</tr>
</tbody>
</table>

### SPECIAL POPULATIONS

<table>
<thead>
<tr>
<th>Section</th>
<th>Tab Number</th>
<th>Protocol</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>Childbirth</td>
<td>60</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td>Newborn Care and Distress</td>
<td>61</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>Obstetric Emergency</td>
<td>62</td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>Treatment of Minors</td>
<td>63</td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>Sexual Assault</td>
<td>64</td>
</tr>
<tr>
<td>VI</td>
<td></td>
<td>Patient Refusal</td>
<td>66</td>
</tr>
<tr>
<td>VII</td>
<td></td>
<td>Combative Patient</td>
<td>67</td>
</tr>
<tr>
<td>MWD</td>
<td></td>
<td>MWD Normal Clinical Parameters</td>
<td>68</td>
</tr>
<tr>
<td>MWD I</td>
<td></td>
<td>MWD Airway Management</td>
<td>71</td>
</tr>
<tr>
<td>MWD II</td>
<td></td>
<td>MWD Heat Injury</td>
<td>73</td>
</tr>
<tr>
<td>MWD III</td>
<td></td>
<td>MWD CPR w/ Drug Chart</td>
<td>74</td>
</tr>
<tr>
<td>MWD IV</td>
<td></td>
<td>MWD Analgesia and Sedation</td>
<td>75</td>
</tr>
<tr>
<td>MWD V</td>
<td></td>
<td>MWD Gastric Dilatation-Volvulus</td>
<td>76</td>
</tr>
<tr>
<td>MWD VI</td>
<td></td>
<td>MWD Shock Fluid Therapy</td>
<td>77</td>
</tr>
</tbody>
</table>
## APPENDIX

### DRUGS

| Drug Chart, Personal Foldable Deployable | 78 |
| Fluid Volume Drawn/Drug Dilution Charts | 79 |
| IV Y-site Compatibility Chart | 81 |
| Pressor Priority Chart | 82 |
| Oxygen | 83 |
| Normal Saline 0.9% Sodium Chloride | 84 |
| 3% Hypertonic Saline | 84 |
| Lactated Ringers (Ringer’s) | 85 |
| Lactate/Hartman's | 85 |
| Dextrose 5% in Water (DSW) Plasmalyte | 85 |
| Acetaminophen | 86 |
| Acetazolamide | 87 |
| Acetylsalicylic Acid | 88 |
| Activated Charcoal | 89 |
| Adenosine | 90 |
| Albuterol | 91 |
| Amiodarone | 92 |
| Atropine | 93 |
| Calcium Chloride | 95 |
| Calcium Gluconate | 96 |
| Dexamethasone | 97 |
| Dextrose | 98 |
| Diazepam | 99 |
| Diphenhydramine | 100 |
| Dobutamine | 101 |
| Dopamine | 102 |
| Epinephrine 1mg/1mL (1:1,000) | 103 |
| Epinephrine 1mg/10mL (1:10,000) | 105 |
| Etomidate | 107 |
| Fentanyl | 109 |
| Furosemide | 110 |
| Glucagon | 112 |
| Heparin | 113 |
| Hetastarch | 114 |
| Hydromorphone | 115 |
| Hydroxocobalamin | 116 |
| Ketamine | 118 |
| Ketorolac | 119 |
| Labetalol | 122 |
| Lidocaine | 123 |
| Lorazepam | 124 |
| Magnesium Sulfate | 125 |
| Mannitol | 126 |
| Methylprednisolone | 127 |
Midazolam 128
Morphine 129
Naloxone 130
Nifedipine 131
Nitroglycerin 132
Norepinephrine 133
Ondansetron 135
Phenylephrine 136
Pralidoxime Chloride 137
Promethazine 138
Propofol 139
Ranitidine 141
Rocuronium 142
Sodium Bicarbonate 143
Succinylcholine 144
Thiamine 145
Tranexamic Acid 146
Vecuronium 147

PROCEDURES
I. AIRWAY
I. Airway 148
II. Pediatric Airway 149
III. Airway Pearls 150
IV. Airway Confirmation 151
V. Blind Insertion Airway Device (BIAD) 152
V. Failed Airway 153
VI. Nasopharyngeal Airway 154
VII. Rapid Sequence Intubation (RSI) 155
VIII. Cricothyroidotomy 157
IX. Needle Cricothyroidotomy 159
X. Simple and Tube Thoracostomy Placement 160
XI. Needle Thoracostomy 161
XII. Ventilator Management 162

II. BLOOD
I. Hemorrhage Control Procedures 167
II. Tourniquet Application 169
III. Junctional Tourniquet Application 170
IV. Vascular Access Intravenous (IV) 171
V. Vascular Access Intraosseous (IO) 172
VI. IV/IO Protocol 173
VII. Blood Component/Fresh Whole Blood Use 174
VIII. Blood Transfusion Related Reactions 177
IX. Glucose Analysis from Blood 179
III. CARDIAC

I Cardiac Defibrillation 180
II ECG 12-Lead Electrocardiogram 181
III Synchronized Cardioversion 182
IV External Cardiac Pacing 183
V Withhold Resuscitation 184

IV. VARIOUS

I SALT Mass Casualty Triage Algorithms 185
II Burn Fluid Resuscitation 186
III Dental Problems 187
IV Spinal Evaluation and Immobilization 188
V Foley Catheter Placement 189
VI Naso/Orogastric Tube 190
VII Pain Management 191
p. PEDS Pain Management 192

PATIENT TRANSFERS

I Altitude Physiology and Patient Transfer 193
II Post-Operative and Critical Care Intrafacility Transfer 195
III Pre-Flight Checklist 201
IV Pre-Transport Checklist 202
V Patient Safety 203

REFERENCE CHARTS

Vital Functions 204
Common Laboratory Values 208
Useful Calculations 209
Oxygen Cylinder Life 210
Lund-Browder Burn Estimate Chart 211

DOCUMENTATION AND FORMS

Standard Order Set for Critical Care Transfers (2016) 213
ECC Guideline JTS Burn resuscitation Flow Sheet 215
DA Form 4700 (JTS TACEVAC AAR & PCR) 220
DD 1380, Tactical Combat Casualty Care Card TC3 (for POI) 229
US and NATO MEDEVAC Request Forms 231
MWD TC3 Card 234
Standing Orders 238
References and Guidelines 243
Blank Page for SOP / Guideline Updates and Changes at Local Level 244
Medical Director/Unit Commander Review and Approval 245
Summary of Changes 246
### SMOG LEGEND

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td>Critical information / important caution</td>
</tr>
<tr>
<td>BLUE</td>
<td>Clickable link to more information within the SMOG</td>
</tr>
<tr>
<td>GREEN</td>
<td>Medication information (clickable if BLUE or and border)</td>
</tr>
<tr>
<td>BEIGE</td>
<td>Informative standards</td>
</tr>
<tr>
<td>PURPLE</td>
<td>Clinical pearls</td>
</tr>
</tbody>
</table>

Standard Medical Operating Guidelines are found at the following website:


All comments and/or recommendations should be sent to:

usarmy.rucker.medcom-lahc.list.medevac-proponency1@mail.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
Guideline

Pearls:
• *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 and/or unit SOPs 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
  - 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)
  - PRE-TRANSPORT CHECKLIST
  - 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

- HEMORRHAGE CONTROL
  - Check / Add Tourniquet
  - Pack and Dress Wound
  - Pressure Dressing
  - Hemostatic Dressing

- AIRWAY / (Vent Management)
  - Reposition Airway
  - Nasopharyngeal Airway
  - RSI (Intubation / BIAD)
  - Cricothyroidotomy

- CHEST TRAUMA GUIDELINE
  - Vented Occlusive Dressing
  - Positive Press Ventilations
  - Needle Thoracostomy
  - Chest Tube

- Hypotensive?
  - S / S of Shock

- Hypotension / Shock Guideline

- Altered Mental Status?
  - (GCS <8 or Unequal / Dilated Pupils)

- Head Injury Guideline

- PAIN MANAGEMENT GUIDELINE prn

- Appropriate CARE GUIDELINE prn

- Document Patient Care

- Attempt / Contact Receiving Facility

- Continuous Monitoring

- Loss of Circulation at any time:
  - Start CPR - 30:2
  - Move to: TRAUMA ARREST GUIDELINE

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).
- Hypothermia prevention and management should be provided at all times.
- 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

---

Apply Direct Pressure and Indirect Pressure as able

Wound Location

- Extremity
- Trunk
  - Chest / Abdomen / Pelvis
- Head

---

Penetrating Chest?

YES

CHEST TRAUMA GUIDELINE

- Occlusive Dressing
- Hemostatic Dressing / Pack
- Pressure Dressing
- NEEDLE Thoracostomy
- FINGER Thoracostomy
- TUBE Thoracostomy
- Pos P Ventilations

NO

Penetrating Abdominal / Pelvic?

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

---

Consider Possibility of Intra-abdominal Bleeding from Penetrating Abdominal Injury

Hypotension / Shock Guideline

Return to: Tactical Evacuation Guideline

---

EXTREMITY GUIDELINE

HEAD INJURY GUIDELINE
**CHEST TRAUMA**

**Signs and Symptoms of Chest Trauma**
- Difficulty Breathing: Cyanosis / Pursing of lips / Accessory muscle involvement
- Rapid Respirations with $\text{SPO}_2$ decreasing or <93% (Trauma: In Flight and on $\text{O}_2$)
- Flail Chest
- Unequal Rise and Fall
- Open Wound / Impalement Over Thorax
- Penetrating Abdominal Wound
- Bruising Across Chest or Base of Neck
- Sub-Q Emphysema or Deviated Trachea

---

**Penetrating vs. Blunt Trauma**

**OPEN Chest Wound or IMPALEMENT?**

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

**NO**

**Signs of pneumo / hemothorax**

**YES**
- Needle Thoracostomy
  - Consider Controlled Descent
  - Assess response:
    - $\text{SPO}_2 >93%$
    - Improved RR
    - Equal Rise & Fall
  - REPEAT NEEDLE THORACOSTOMY as needed!
  - Failing to Improve
    - Controlled Descent as able
    - Consider: Finger / Tube Thoracostomy (Last resort and OUT of options)

**NO**

**Consider:**
- SPINAL IMMOBILIZATION

**Flail Chest?**

**YES**
- Pain Control
  - Consider: Endotracheal Intubation
  - Pos P Ventilation

**NO**

**Signs of pneumo / hemothorax**

---

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

**Signs and Symptoms:**
- Pain / Swelling
- Deformity
- Altered Sensation / Function
- Diminished Pulse / Cap Refill
- Decreased Temperature
- Bleeding

**Differential Diagnosis:**
- Abrasion
- Contusion
- Multi-trauma
- Fracture
- Dislocation
- Laceration
- Sprain / Strain
- Amputation

---

**HEMORRHAGE CONTROL**
- Check / Add Tourniquet
- Pack and Dress Wound
- Pressure Dressing
- Hemostatic Dressing

**Fluid Resuscitation**
- Whole Blood (if available)
- pRBCs and plasma (if available)
- Platelets (If authorized)
- Hextend
- Crystalloid (LR/NS)

---

**Continued From:**

**Tactical Evacuation Guideline**

**Multiple Injury Sites**

**Multiple Trauma Guideline**

**Heavy Active Bleeding?**

**IV / IO Guideline**

**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
- Consider Pelvic Splint for Explosive Mechanisms

**Pearls:**
- In amputations – **time is critical**.
- 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.

---

**After Bleeding Controlled:**
If hypotensive or showing signs / symptoms of hypotension or shock

**Move immediately to:**
HYPOTENSION / SHOCK Guideline
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
- Hemotorax
- Intra-abdominal Injury / Bleeding
- Head Injury, HEENT injuries
- Extremity Fracture / Dislocation
- Hypothermia
- Burns
- Pelvis / Long-bone Fracture
- Spine / Spinal Cord Injury

**Trauma Pearls:**
- Severe extremity bleeding should be immediately addressed with a tourniquet.
- Optimize Hemostasis: Fluid resuscitation in:
  - Hemorrhagic trauma with NO significant head injury should follow permissive hypotensive resuscitation guidelines maintaining MAP >60, but not raising the BP into the “normal” range, which may increase bleeding. Only give minimal “bolus” of blood product, LR, and/or Hextend fluids, to maintain MAP >60, NIBP Systolic BP between 70-80, palpable FEMORAL pulse, and/or change in mental status.
  - Hemorrhagic trauma WITH significant head injury should NOT follow permissive hypotension guidelines. Maintain NIBP Systolic BP 110>160 and MAP 80>110.
- 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.

**Hypotension / Shock Guideline**
- Blood (if available) (Blood Guideline) Bolus MINIMUM NEEDED TO ATTAIN PALPABLE RADIAL PULSE, SBP 70-80 and MAP >60.

**Emergency Management**
- Rapid assessment with GCS Concentration on C, A, B
- Minimize On-scene Time
- Check and Redress:
  - Hemorrhage control (MOST IMPORTANT)
  - Airway: Respiratory 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

**Respirations <8 or >30**
- Reposition Airway / OPA
- **Airway Guideline**
  - Nasopharyngeal Airway
  - Intubation
  - Cricothyroidotomy

**Chest Injury (Impacts Breathing)**
- Needle Thoracostomy
- Finger Thoracostomy
- Tube Thoracostomy
- Positive Pressure Ventilation

**Hypotension / Shock Guideline**
- Vital signs / perfusion?
  - Normal
  - Abnormal

**Hypotension / Shock Guideline**
- Vital signs / perfusion?
  - Normal
  - Abnormal

**Pain Management Guideline**
- Return to: Tactical Evacuation Guideline

**Trauma Arrest Guideline**
- Loss of Circulation at any time: Start CPR - 30:2 Move to: Trauma Arrest Guideline

---

**MULTIPLE TRAUMA**

**Vital signs / perfusion?**
- Normal
- Abnormal

**Head Injury Guideline**
- Vital signs / perfusion
- Normal

**Restart Guideline**
- Vital signs / perfusion
- Abnormal

**Ensuring Fractures are Stable:**
- Reduction / Compression of pelvic fractures
- Reduction of long bone (Femur) fractures
- Re-assess Control of External Hemorrhage

**Trauma Pearls:**
- Severe extremity bleeding should be immediately addressed with a tourniquet.
- Optimize Hemostasis: Fluid resuscitation in:
  - Hemorrhagic trauma with NO significant head injury should follow permissive hypotensive resuscitation guidelines maintaining MAP >60, but not raising the BP into the “normal” range, which may increase bleeding. Only give minimal “bolus” of blood product, LR, and/or Hextend fluids, to maintain MAP >60, NIBP Systolic BP between 70-80, palpable FEMORAL pulse, and/or change in mental status.
  - Hemorrhagic trauma WITH significant head injury should NOT follow permissive hypotension guidelines. Maintain NIBP Systolic BP 110>160 and MAP 80>110.
- 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
- Hemorrhax
- Intra-abdominal Injury / Bleeding
- Pelvis / Long-bone Fracture
- Spine / Spinal Cord Injury
- Head Injury
- Extremity Fracture / Dislocation
- HEENT Injuries
- Hypothermia
- Burns

---

**Pediatric HYPOTENSION / SHOCK GUIDELINE**
- LR Bolus in <20 min x 2 attempts.
- pRBC's (if available): 10mL/kg (Blood Guideline)
- Bolus ALL FLUIDS following principle of PERMISSIVE HYPOTENSION (*See Pearls)

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

**Consider early airway management per Airway and Chest Trauma Guidelines**
- Spinal Immobilization PRN
- IV / IO GUIDELINE
- Vital Signs / Perfusion?

**Pediatric PAIN MANAGEMENT GUIDELINE**
- Resubmit: Continue on Permissive Hypotension
- Head Injury: Guideline
- Vital Signs / Perfusion?

**Restart Guideline**
- Hemorrhage control
- Airway: Respiration rate, O2, and Sats
- 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

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

**Return to: Tactical Evacuation Guideline**

---

**Pearls:**
- Resuscitation: Maintain, SBP to at least \([70 + 2 \times \text{age (yr)}]\) or to mental status change.
- 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.
HEA 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

KETAMINE (See Pearls): Consider use, especially in sedation of head injury patients with ICP

Pediatric Multiple Trauma

Multiple Trauma Guidelines

Isolated head Trauma?

YES

Assess GCS / Responsiveness

Altered Mental Status?

(GCS <8 or Unequal / Blown Pupils)

GCS <8

GCS >8

Gag reflex?

NO

YES

Spinal Immobilization Guideline

Assess:

SPO2 >90% (goal 95%)  
SBP 90-180 mmHg (goal 110)  
ETCO2 at 30-35mmHg (goal 35-40)

Maintain:

Continuous Monitoring

Reassess q5-10min

Seizure develops

Return once Stable Airway established

IV/IO Guideline

NS Bolus PRN – SBP >110mmHg

Return to:

Tactical Evacuation Guideline

(When appropriate)

Continued from:

Tactical Evacuation Guideline

Pediatric Airway

AIRWAY GUIDELINE

Pediatric Airway Guidelines

NO

YES

Elevate head of bed to 30° as able

Continuous Monitoring

Reassess q5-10min

Seizure develops

Go to:

SEIZURE GUIDELINE

Pediatric SEIZURE

Return here once resolved

Sedation following Intubation:

Ketamine: 1-2mg/kg q10-20min

Fentanyl 1mcg/kg q30-60min

Propofol 10-50mcg/kg/min IV

Paralytic following Intubation:

Vecuronium 0.1mg/kg q30-60min

Rocuronium 1mg/kg q30-45min

• Assist with jaw thrust / OPA as able

• Nasopharyngeal airway

• Supplemental O2

• Consider: RSI Protocol (ONLY IF treating single Urgent Casualty)

• 3% Hypertonic saline 250ml IV bolus: Infusion: 50-100ml/hr or

• MANNITOL 1gram/kg bolus IV followed by 0.25g/kg IV push every 4 hours.

• HYPERVentilation: Goal of ETCO2 of 35-40 mmHg

Pediatric Multiple Trauma

Pediatric Airway

AIRWAY GUIDELINE

Pediatric Airway Guidelines

NO

YES

Elevate head of bed to 30° as able

Continuous Monitoring

Reassess q5-10min

Seizure develops

Return once Stable Airway established

IV/IO Guideline

NS Bolus PRN – SBP >110mmHg

Return to:

Tactical Evacuation Guideline

(When appropriate)

Continued from:

Tactical Evacuation Guideline

Pediatric Airway

AIRWAY GUIDELINE

Pediatric Airway Guidelines

NO

YES

Elevate head of bed to 30° as able

Continuous Monitoring

Reassess q5-10min

Seizure develops

Go to:

SEIZURE GUIDELINE

Pediatric SEIZURE

Return here once resolved

Sedation following Intubation:

Ketamine: 1-2mg/kg q10-20min

Fentanyl 1mcg/kg q30-60min

Propofol 10-50mcg/kg/min IV

Paralytic following Intubation:

Vecuronium 0.1mg/kg q30-60min

Rocuronium 1mg/kg q30-45min

• Assist with jaw thrust / OPA as able

• Nasopharyngeal airway

• Supplemental O2

• Consider: RSI Protocol (ONLY IF treating single Urgent Casualty)

• 3% Hypertonic saline 250ml IV bolus: Infusion: 50-100ml/hr or

• MANNITOL 1gram/kg bolus IV followed by 0.25g/kg IV push every 4 hours.

• HYPERVentilation: Goal of ETCO2 of 35-40 mmHg

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.
  o Target Vital Functions: SBP >110mm Hg, SPO2 >95%, ETCO2 at 35-40mmHg, MAP 80-110.
  o 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 hyperventilation with 100% O2 and capnography: titrate CO2 to 35-35mm Hg.

• Mannitol should be given as boluses – not a constant infusion. Do not use in hypotensive, dehydration, or under-resuscitated patients

• KETAMINE (Dissociative, Analgesic, Induction agent): Preserves respiratory drive, increases HR, contractility, MAP, cerebral blood flow, and bronchodilation.
  o Not an absolute contraindicated in ICP with hypertension and/or spontaneous cerebral hemorrhage.
**Universal Patient Care Guideline**

- Remove rings, bracelets, or other constricting items
- Position patient supine
- Immobilize area

**AIRWAY Guideline**

- Consider: Early establishment of Advanced Airway!

**Pediatric AIRWAY Guideline**

- Consider: Early establishment of Advanced Airway!

**THERMAL / ELECTRIC (See Pearl)**

- Remove burning / charred clothing
- Cool with sterile saline / gel pad
- Cover with Dry sheet / dry sterile dressings

**Burn Depth:**

- **Superficial / Partial Thickness Burns:**
  - 1st Degree: (limited to epidermis)
  - 2nd Degree: (epidermis and part of dermis)
- **Full Thickness Burns**
  - 3rd Degree: (destruction throughout dermis)
  - 4th Degree: (destruction through fat, fascia, muscle, and bone)

**CHEMICAL (See Pearl)**

- Brush off any dry chemical contamination
- Cut off contaminated clothing
- If Eye is involved: Flush with saline x 30min

**AIRWAY INVOLVEMENT?**

- YES
- NO

**Tactical Evacuation Guideline**

**Urinary Output**

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

**Pearl:**

- Hydrofluoric Acid: Arterial infusion over 4 hr (40mL of D5W with 10mL of 10% calcium gluconate).
- Tear Gas: rinse skin and eyes with NS.
- Alkali Burns to eye: 1-2 L of NS each eye for 30 minutes.

All symptomatic electric burn patients require an ECG regardless of the potential voltage.
**ELECTRICAL INJURY**

---

### Signs and Symptoms:
- Burns
- Pain
- Arrhythmia
- Loss of Consciousness
- Entry / Exit Wounds
- Shock / Hypotension
- Cardiac Arrest

### Differential Diagnosis:
- Cardiac Arrest
- Environmental Exposure
- Seizure
- Burns
- Multiple Trauma

---

**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

---

**Pearls:**
- **TRAUMA ARREST** requires movement to nearest Surgical Facility ASAP!
- **Injuries obviously incompatible with life** include decapitation, massively deforming head / chest injury, traumatic hemi-corpectomy or total body disruption, incineration. Also, any evidence of lividity/rigor mortis should result in the withholding of resuscitative efforts.
- If unsure if arrest due to trauma or medical cause initiate ACLS guideline for any arrhythmias following optimization of hemostasis (in trauma patients, volume loss must be corrected 1st, consider blood admin above all else)
- *Spinal Immobilization should be considered after hemorrhage control and airway security.
- *Consider severe hypocalcemia if FDP or pRBCs have recently been transfused due to calcium chelation and evidence of poor cardiac activity/contractility.

---

**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)
HYPOTENSION / SHOCK

Signs and Symptoms:
- Restlessness / Confusion
- Weakness / Dizziness
- Tachycardia
- Pale, Cool, Clammy Skin
- Delayed Capillary Refill
- Hypotension
- Coffee-ground Emesis
- Vaginal Bleeding
- Black, Tarry Stools
- Nausea / Vomiting

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

Continuous Monitoring
Reassess q 5min
Return to:
Tactical Evacuation
Guideline

Trauma
Blood Product: 2 units
See Blood Component Therapy Guideline
TXA (and Plasma if available)
Optimize Hemostasis: (See Pearls!)
(try 250ml increments to attain / maintain PHRG targets noted in Pearls section below)
Maintain SBP 70-80, MAP 60

Non-trauma & Non-cardiac
2L IVF Bolus x 2 PRN
No Response / Losing BP Control?
Consider NOREPINEPHRINE
2-12 mcg/min IV
Maintain SBP >90, MAP >80
At Any Point, Once BP Controlled:
- Continuous Monitoring
Reassess q 5min
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
No Response / Losing BP Control?

Loss of Circulation at any time:
Start CPR - 30:2
Move to:
TRAUMA ARREST Guideline

Loss of Circulation at any time:
Start CPR - 30:2
Move to:
TRAUMA ARREST Guideline

Pearls:
- Optimize Hemostasis: Fluid resuscitation in;
  - Hemorrhagic trauma with NO significant head injury should follow Permissive Hypotensive Resuscitation Guidelines (PHRG) = maintaining MAP 60, but not raising the BP into the “normal” range, which may increase bleeding. Only give minimal “bolus” (try 250ml increments) of blood product and/or Hextend fluids, to maintain MAP >60, NIBP Systolic BP between 70-80, palpable FEMORAL pulse, (if NIRS device available, STO2 >70%) and/or change in mental status.
  - Hemorrhagic trauma WITH significant head injury should NOT follow permissive hypotension guidelines. Maintain NIBP Systolic BP 110>160 and MAP 80<110.
- All attempts to treat a patient prior to the onset of shock should be made if possible. Early signs of impending shock include tachycardia, orthostatic signs, and narrowing pulse pressure (systolic-diastolic BP).
- Consider all the causes of shock and treat per appropriate protocol.
- Avoid Pressors as able (use as LAST RESORT in TRAUMA) – Always continue IVFs: Optimize hemostasis and correct volume loss.
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

Pediatric Systolic Average NIBP
<table>
<thead>
<tr>
<th>AGE</th>
<th>Lower limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12mths</td>
<td>&gt;60mmHg</td>
</tr>
<tr>
<td>1-2years</td>
<td>&gt;70</td>
</tr>
<tr>
<td>3-5y</td>
<td>&gt;75</td>
</tr>
<tr>
<td>6-12y</td>
<td>&gt;80</td>
</tr>
<tr>
<td>&gt;13y</td>
<td>&gt;90</td>
</tr>
</tbody>
</table>

Pediatric Systolic Average NIBP
<table>
<thead>
<tr>
<th>AGE</th>
<th>Lower limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12mths</td>
<td>&gt;60mmHg</td>
</tr>
<tr>
<td>1-2years</td>
<td>&gt;70</td>
</tr>
<tr>
<td>3-5y</td>
<td>&gt;75</td>
</tr>
<tr>
<td>6-12y</td>
<td>&gt;80</td>
</tr>
<tr>
<td>&gt;13y</td>
<td>&gt;90</td>
</tr>
</tbody>
</table>

Pearls:
- Hypotension in pediatric patients is defined as a SBP less than 70 + [2 x age (yr)].
- Optimize Hemostasis: Fluid resuscitation in:
  - Pediatric hemorrhagic trauma with NO significant head injury should NOT follow permissive hypotension resuscitation guidelines (PHRG). Rapid infusion of crystalloid (20mL/kg of IVF), GOAL: Resuscitate as close to normal SBP as possible. Normal SBP calculated by: 90 + [2 x age (yr)].
  - Pediatric Hemorrhagic trauma WITH significant head injury: SBP > 70 + [2 x age (yr)].
- Decreasing heart rate may be a sign of impending collapse in pediatric patients
- Avoid Pressors as able (use as LAST RESORT in TRAUMA) – Always continue IVFs: Optimize hemostasis and correct volume loss.
CRUSH SYNDROME

Crush syndrome is a life and limb-threatening condition that can occur as a result of entrapment of the extremities accompanied by extensive damage of a large muscle mass. It can develop following as little as 1 hour of entrapment. Crush syndrome is a reperfusion injury that leads to traumatic rhabdomyolysis. Reperfusion results in the release of muscle cell components, including myoglobin and potassium that can be lethal. Myoglobin release results in rhabdomyolysis, with risk of kidney damage. Hyperkalemia can cause kidney damage and cardiac arrhythmias. Calcium is taken up by injured muscle cells and this can cause hypocalcemia, contributing to cardiac arrhythmias. The risks are increased with large areas of tissue crushed (one or both lower extremities) and the length of time the casualty is pinned prior to extrication.

The primary treatment is aggressive fluid administration.

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 loosening tourniquet, and then only if the patient meets criteria for tourniquet conversion or removal.

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.

Continued on next page
Treatment for HYPERKalemia due to Crush Syndrome: Calcium Gluconate; Insulin and 50% Dextrose (D50); Albuterol

- **Calcium gluconate (calcium replacement):** Administer 10 mL (10%) calcium gluconate or calcium chloride IV over 2–3 minutes. Onset of effect: immediate. Duration of action: 30–60 minutes. Increases serum calcium to overcome the effect of hyperkalemia on cardiac function. Alternate: may use calcium chloride, which is more irritating when administered via peripheral IV.

- **Insulin and glucose:** Give 10 units of regular insulin followed immediately by 50mL of D50. Onset of effect: 20 minutes. Duration of action: 4–6 hours. Insulin is given to lower the serum potassium level by driving it back into the cells; glucose is given to prevent hypoglycemia.

- **Albuterol:** Administer 12mL of albuterol sulfate inhalation solution, 0.083% (2.5mg/ 3mL) in nebulizer. Onset of effect: 30 minutes. Duration of action: 2 hours. Lowers serum potassium level by driving it back into the cells; effect is additive with insulin.

**Pearls:**
- In the setting of a crush injury associated with noncompressible hemorrhage, aggressive fluid resuscitation may result in increased hemorrhage. Balancing the risk of uncontrolled hemorrhage against the risk of cardiotoxic levels of potassium should ideally be guided by expert medical advice.
**EYE INJURY / PAIN**

**Signs and Symptoms:**
- Pain, Swelling, Blood
- Decreased Visual Acuity / Blindness
- Deformity / Contusion
- Foreign Body
- Excessive Tearing

**Differential Diagnosis:**
- Abrasion / Laceration
- Globe Rupture / Orbital fracture
- Retinal Detachment
- Chemical / Thermal Burn
- Infection / Iritis
- CNS Event
- Glaucoma
- Retinal Vessel Occlusion

---

**Universal Patient Care Guideline**

**WITHOUT KNOWN INJURY**

- Evaluate Pupils

**Previously unrecognized chemical exposure?**

- NO
  - Cover both eyes

- YES
  - NO
  - Move to: Appropriate Guideline, and Return

  - YES
    - Assess orbital stability / pupils

**WITH INJURY**

- **ISOLATED and without additional and more significant Injuries?**
  - NO
  - Move to: Appropriate Guideline, and Return

  - YES
    - **CHEMICAL**
      - Copious irrigation with NS for chemical exposure – 30min Minimum!

    - **TRAUMA**
      - Remove loose debris with NS irrigation. Do not attempt to remove impaled objects or contacts.

      - Cover w/ rigid eye shield DO NOT PLACE ANY DRESSINGS UNDER SHIELD.

**PAIN CONTROL Guideline**

- Give Ondansetron 4-8mg IV / IO / IM for nausea.
- Consider Diazepam 10mg PO 2mg IM for anxiety

---

**Pearls:**

- Normal visual acuity can be present even with severely injured eye. Pain is not always present.
- Antiemetics are essential to prevent increased IOP. Consider Benzo for anxiety.
- Covering both eyes prevents further injury/pain from consensual light reflex.
- 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 and protect from further injury.
- 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.
**Pearls:**

- Never attempt to capture / transport a live animal / insect.
- Amount of envenomation from snake bites can be variable – assume all are lethal.
- For snake envenomation – do not use ice / tourniquets as these can worsen the effects of toxins – a pressure bandage can be utilized over the bite wound and proximal to the injured area.
- Black Widow spider bites tend to be minimally painful, but then develop into severe pain in muscles / abdomen with muscular spasm over hours. The abdominal pain may mimic surgical abdomen.
- Brown recluse spider bites may be painless or result in burning sensation. A blister may form over hours – which later can turn into tissue necrosis. Abnormal vital signs in association with a brown recluse bite may symbolize systemic toxicity (loxoscelism) – which requires emergent treatment.
- Outside of the U.S. – there are few reliable types of anti-venom for poisonous snakes / insects.
- Scorpions are found throughout the U.S. and overseas, one species in the U.S. is capable of causing systemic toxicity. The black scorpion is located throughout Arizona, New Mexico, and parts of Texas. 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.
- Anaphylactic reactions should be treated as soon as recognized.
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, Myalgias, 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 promethazine dosage for patients likely to experience sedative effects (e.g., elderly).
- Promethazine contraindicated in any patient less than 2yo (see Pediatric Guidelines).
- Pain management can be used PRN.
**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)
- Shock (other than anaphylactic)
- Angioedema
- Aspiration / Airway Obstruction
- Asthma or COPD
- Pulmonary Edema / CHF

---

**Universal Patient Care Guideline**

**O₂**

**IV / IO Guideline**

**Cardiac Monitor (ASAP)**

**Epinephrine IV**

See “pearls” prior to use!

(IV Push: 1-2cc every 2 min until status improving)

If unable to mix epinephrine, may consider repeat:

- Epinephrine-Pen OR
- Epinephrine 1:1000
  - 0.3-0.5mg IM

---

**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

---

**Universal Patient Care Guideline**

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

**Hives / Rash Only No Resp. Complaint**

- **Diphenhydramine 1mg/kg IV / IO / IM / PO**
- **Methylprednisolon 2mg/kg IV / IO**

*Reassess q 5 minutes*

**Pediatric Bradycardia with Pulse and Poor Perfusion**

**Pediatric Cardiac Arrest**

**Pediatric Tachycardia with Pulse and Poor Perfusion**

**Pediatric Tachycardia with Pulse and Adequate Perfusion**

**Pediatric Hypotension**

**Pediatric Resp. Distress**

**Arrhythmia?**

**NO**

**YES**

**Contact Medical Control**

**Pediatric Airway**

**Epinephrine**

IM: 0.01 mg/kg (0.01mL/kg of 1:1000) or EpiPen Jr.®

IF Infusion: 0.1-0.3 mcg/kg/min

**Shock / Unresponsive or Respiratory Distress / Failure**

**Emergency Airway Intervention Needed?**

**NO**

**Epinephrine-Pen (Jr for <60kg) OR Epinephrine 1:1,000 0.01mg/kg IM (max 0.3mg)**

**250-500mL IVF if not previously started**

**Albuterol 90mcg 2 puffs MDI or 2.5 mg via nebulizer**

**Worse or Unstable**

**Diphenhydramine 1mg/kg IV / IO / IM / PO**

**Methylprednisolon 2mg/kg IV**

**Reassess Patient**

**Improved**

**Continuous Monitoring**

**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.

---

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

*ASSESSMENT*

*Hives / Rash Only No Resp. Complaint*

- **Diphenhydramine 1mg/kg IV / IO / IM / PO**
- **Methylprednisolon 2mg/kg IV / IO**

*Reassess q 5 minutes*

**Pediatric Bradycardia with Pulse and Poor Perfusion**

**Pediatric Cardiac Arrest**

**Pediatric Tachycardia with Pulse and Poor Perfusion**

**Pediatric Tachycardia with Pulse and Adequate Perfusion**

**Pediatric Hypotension**

**Pediatric Resp. Distress**

**Arrhythmia?**

**NO**

**YES**

**Contact Medical Control**

**Pediatric Airway**

**Epinephrine**

IM: 0.01 mg/kg (0.01mL/kg of 1:1000) or EpiPen Jr.®

IF Infusion: 0.1-0.3 mcg/kg/min

**Shock / Unresponsive or Respiratory Distress / Failure**

**Emergency Airway Intervention Needed?**

**NO**

**Epinephrine-Pen (Jr for <60kg) OR Epinephrine 1:1,000 0.01mg/kg IM (max 0.3mg)**

**250-500mL IVF if not previously started**

**Albuterol 90mcg 2 puffs MDI or 2.5 mg via nebulizer**

**Worse or Unstable**

**Diphenhydramine 1mg/kg IV / IO / IM / PO**

**Methylprednisolon 2mg/kg IV**

**Reassess Patient**

**Improved**

**Continuous Monitoring**
ALTERED MENTAL STATUS

**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 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 Respirations
- 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.
**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)

---

**Pearls:**

- 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 Sulfa 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.*
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)

---

**Universal Patient Care Guideline**

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

**Have Patient Blow Nose to Evacuate Clots**

**Afrin Nasal Spray (see Pearls)**

**Compression (Pinch) and Tilt Head Forward x 10min**

**Assess BP and Pulse**

**Hypotension? Tachycardia?**

**Blood Product (as available) OR 500mL IVF IV prn**

**Normotensive**

**Consider:**
- **Zofran 4-8mg IV**
  - (nausea from swallowed blood)

**Hypertension?**

---

**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.
**FEVER / INFECTION**

### 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.

---

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

**Consider Droplet, Airborne, or Contact Precautions (*See Pearls)**

**Orthostatic BP / Tachycardia?**
- NO
  - Encourage PO Intake if Protecting Airway

**Temperature?**
- >38ºC (100.4ºF)
  - Consider: Hyperthermia Guideline
- <38ºC (100.4ºF)
  - Consider: Toxic Ingestion Guideline
  - Acetaminophen 1gram PO (if not provided in last 6 hours)

---

**Acetaminophen 1gram PO**

**1000mL IVF IV prn (repeat as needed)**

**2L IVF and still Hypotensive? Consider: Norepinephrine 2-12mcg/min IV**

---

**Return to: Tactical Evacuation Guideline**

Or Appropriate Guideline by Complaint
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)

Altered Mental Status and Temperature >40°C / 104°F

Consider Intubation: AIRWAY Guideline

Aggressive cooling:
- Tepid water to skin with fanning
- Ice packs to groin / axillae / neck
- Consider open doors (as mission permits)

D/C once temp ≤40°C / 104°F!!! (prevents rebound hypothermia)

Consider benzodiazepines to block/stop shivering of rebound Hypothermia:
Midazolam 0.05-0.1mg/kg

Monitor EKG for Arrhythmia (treat per appropriate guideline)

Be prepared for and consider: Seizure Guideline

Altered Mental Status?

Altered Mental Status Guideline

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.
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 <95°F (35°C).
- With temperatures <31°C (88°F) ventricular fibrillation is common. Cardiac muscle becomes very irritable as temperature drops and rough handling may induce a cardiac dysrhythmia.
- With temperatures below 30°C (86°F) 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 >30°C (86°F) treated similar to normo-thermic patients with the addition of active re-warming.
- At temperatures <30°C (86°F) one defibrillation can be attempted, but withhold further attempts / meds until temp >30°C (86°F).
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)

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.

Universal Patient Care Guideline

Indications of: Respiratory Insufficiency (*See Pearls)

Position to Patient Comfort

Monitor O₂ Sat

Rales / Signs of CHF

Wheezees

Stridor

AIRWAY Guideline
Consider: Early establishment of Advanced Airway!

Indications of: Respiratory Insufficiency (*See Pearls)

100% O₂ via NRB

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

Consider ALLERGIC REACTION

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

Albuterol 90mcg MDI 2puffs or 2.5mg neb

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

Solu-Medrol 125mg IV

Magnesium Sulfate 2gram IV over 20min

100% O₂ via NRB

Sweep & Suction prn

100% O₂ via NRB

Ketamine 1mg/kg IV Bolus (SLOW PUSH)

NTG SL 0.4mg q5min if SBP > 90

If Failing to Improve, Consider Furosemide 60-80mg IV (Place Foley if possible)

IV / IO Guideline

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

Fever / Cough

Tachycardia

Absent Breath Sounds (Emergent)

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

IV / IO Guideline

Emergency

If Failing to Improve, Consider Furosemide 60-80mg IV (Place Foley if possible)

IV / IO Guideline

If Failing to Improve, Consider Furosemide 60-80mg IV (Place Foley if possible)

IV / IO Guideline

If Failing to Improve, Consider Furosemide 60-80mg IV (Place Foley if possible)

IV / IO Guideline

If Failing to Improve, Consider Furosemide 60-80mg IV (Place Foley if possible)

IV / IO Guideline

If Failing to Improve, Consider Furosemide 60-80mg IV (Place Foley if possible)
**PEDs RESPIRATORY DISTRESS**

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

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

---

**Pears:**
- **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.
**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:**
- CNS Trauma
- Tumor / Mass / Infection
- Metabolic
- Hypoxia
- Electrolyte Abnormality
- Drugs / Toxins
- Alcohol / Benzodiazepine Withdrawal
- Stroke
- Eclampsia
- Hyperthermia
- Hypoglycemia

---

**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 attempted first line to abort seizures**. Midazolam should only be used if this fails (pregnancy class D).
- Adult Alcohol Withdrawal or Malnutrition (Thiamine 100mg IV).
**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

---

**Universal Patient Care Guideline**
- **O2** (if Hypoxemic)
- **IV / IO Guideline**
- **Cardiac Monitor**
- **Blood Glucose**
- **Patient Safety** (ensure secured to litter)

**Having Active Seizure?**

**Blood Glucose:**
- **Less than Month Old <40?**
- **More than 1 Month Old <65?**

**Evidence of Significant Trauma?**

**SPINAL IMMOBILIZATION PROCEDURE**

**Consider:**
- **Pediatric HEAD INJURY**
- **Pediatric AIRWAY**

**Glucose:**
- **0-1 Month Old >40?**
- **1 Month Old and Up >65?**

**Recurrence of Seizure?**

**Continuous Monitor and Reassess every 5min** (anticipate recurrence)

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

---

**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 airway control, treatment, and transport to nearest suitable medical treatment facility.
- **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
Continued from:
Tactical Evacuation Guideline

**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 TIAs should be transferred for evaluation, even if symptoms abated – these patients have 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/TIAs 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 >220 or Diastolic 121-140:** give Labetalol 10-20 mg IV for 1-2 mins. May repeat or double q10 mins for a maximum dose of 300mg. **Aim for no more than a 20% reduction in MAP.** MAP = \([2 \times \text{Diastolic}] + \text{Systolic}\) / 3
- **Systolic 180-220 or Diastolic 105-120:** give Labetalol 10 mg IV for 1-2 minutes. May repeat or double q10 mins to max dose of 300mg. **Aim for no more than a 20% reduction in MAP.** MAP = \([(2 \times \text{Diastolic}) + \text{Systolic}] / 3\) For additional info see: ACLS Acute Coronary Syndromes and Stroke.

**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 Hypoxic)**
- **IV / IO Guideline**
- **Cardiac Monitor**

- **Blood Glucose <70?**
- **YES**
- **50% Dextrose 25g IV**
- **OR**
- **Glucagon 1mg IV / IM**
- **NO**

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

- **Perform pre-hospital Stroke Scale as able.**

- **12-lead ECG**

- **Arrhythmia?**
  - **YES**
  - **Consider Alternate Guidelines**
  - **NO**

- **ALTED MENTAL STATUS**
- **HYPERTENSION**
- **SEIZURE**

**Differential Diagnosis:**
- Transient Ischemic Attack
- Stroke
- Seizure
- Hypoglycemia
- CNS Infection / Mass
- Trauma
- Metabolic

**Suspected Stroke / TIA**

<table>
<thead>
<tr>
<th>Signs and Symptoms:</th>
<th>Differential Diagnosis:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered Mental Status</td>
<td>Transient Ischemic Attack</td>
</tr>
<tr>
<td>Weakness / Paralysis</td>
<td>Stroke</td>
</tr>
<tr>
<td>Blindness or Other Sensory Loss</td>
<td>Seizure</td>
</tr>
<tr>
<td>Aphasia / Dysarthria</td>
<td>Hypoglycemia</td>
</tr>
<tr>
<td>Syncope</td>
<td>CNS Infection / Mass</td>
</tr>
<tr>
<td>Vertigo / Dizziness</td>
<td>Trauma</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Metabolic</td>
</tr>
<tr>
<td>Headache</td>
<td></td>
</tr>
<tr>
<td>Seizures</td>
<td></td>
</tr>
</tbody>
</table>

Committee on Prehospital Care
SUBMERSION INJURY

Signs and Symptoms:
- Unresponsive
- Mental Status Changes
- Hypoxia
- Cyanosis
- Hypothermia
- Vomiting
- Coughing

Differential Diagnosis:
- Trauma (esp. C-spine)
- Dysbarism
- Pressure Injury as in Self-contained under water breathing apparatus (SCUBA)

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.
**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?**

**Tachycardia / Hypotension?**

**Blood Glucose <70?**

**12-lead ECG**

**Continuous Monitoring OR Move to Appropriate Protocol as needed**

**Altered Mental Status Guideline**

**Stroke / TIA Guideline**

**Seizure Guideline**

**Hypotension Guideline**

---

**Evidence of Alcohol Abuse?**

**NO**

**YES**

**Thiamine 100mg IV / IM**

**50% Dextrose 25g IV OR Glucagon 1mg IV / IM**

**Glucose 70-250?**

---

**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 syncope 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)

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

Blood Sugar <60?
YES
IV Bolus PRN

NO

Blood Sugar <60?

Blood Sugar <60?

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

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

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

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

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)

---

**Tactical Evacuation Guideline**

**Universal Patient Care Guideline**

O₂ (if Hypoxemic)

IV / IO Guideline

Cardiac Monitor (ASAP)

---

**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 (Max 1mg)

---

**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

---

**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

---

**Other**

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

---

**Blood Glucose:**

Less than 1 Month Old <40? More than 1 Month Old <65?

YES

NO

**Continuous Monitoring, reassess q5 min**

---

**Pearls:**

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

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, Myalgias, 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

---

**Evidence of Malnourishment?**

**Universal Patient Care Guideline**

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

**Blood Glucose:**
- **0-1 Month Old <40?**
- **1 Month Old and Up <65?**

**Tachycardia / Hypotension?**

**Nausea and/or Vomiting?**

**Abdominal Pain?**

**Pediatric Pain Management**

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

---

**Age** | **HR Awake** | **HR Sleeping**
---|---|---
Newborn to 3mo | 85-205 | 80-160
3mo - 2y | 100-190 | 75-160
2 - 10y | 60-140 | 60-90
>10y | 60-100 | 50-90

<table>
<thead>
<tr>
<th>BP</th>
<th>Average</th>
<th>Lower Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10y</td>
<td>90+(years old x 2)mmHg</td>
<td>70+(years old x 2)mmHg</td>
</tr>
<tr>
<td>&gt;10y</td>
<td>90mmHg</td>
<td></td>
</tr>
</tbody>
</table>

**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:
- Aspirin
- Angina
- Acute MI
- Pericarditis
- Pulmonary Embolism
- Asthma / COPD
- Pneumothorax

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

Universal Patient Care Protocol
O2 if <90%SpO2
Monitor / Defibrillator
IV / IO access (IV Protocol)

Aspirin 324mg PO chewed (if no significant aspirin allergy - *See Pearls)

12 Lead ECG

**NTG 0.4mg SL q5min (hold if potential R side MI, pain free, SBP <100, or taken Viagra, Cialis, Levitra in last 48 hrs)

Dysrhythmia? / Pulse?
Move to appropriate protocol below

Bradycardia with Pulse

Tachycardia with Pulse

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

Normal Sinus Rhythm

BP >100

Continuous Monitoring:
Move to appropriate Protocol based changes in ECG and Pulse

Hypotension / Shock?

500 ml bolus IVF

Consider Treatable Causes: 5Hs / 5Ts

For continued pain after NTG and if NOT Hypotensive:
Morphine 2-5mg IV or Fentanyl 25-50mcg IV

Dysrhythmia? / Pulse?
Move to appropriate protocol below

ST Elevation MI or LBBB
ST Depression or Flipped T -Wave

Transport to nearest MTF ASAP

• Do not delay reperfusion: *See Pearls

STEMI or LBBB

• Do not delay reperfusion: *See Pearls.
• Move to appropriate Cardiac Protocol (opposite side of page) based on changes in Pulse and ECG.

Pearls:
- Aspirin should be held only for patients with known significant allergy: if rash alone give DIPHENHYDRAMINE then aspirin. If stomach ache, give H2 blocker (RANITIDINE) then aspirin.
- 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).
Signs and Symptoms:
- Unresponsive, apneic, pulseless
- Ventricular fibrillation or ventricular tachycardia on EKG

START CPR (100/min, Breath 30:2)
Universal Patient Care Guideline
O₂ Monitor / Defibrillator

VF / pulseless VT
Asystole / PEA

Rhythm shockable? Confirm in two leads

YES

Return of Spontaneous Circulation (ROSC)?

NO

CPR 2 min
IV / IO access (IV Guideline)

Rhythm shockable?

NO

Shock
200J biphasic, 360 monophasic

CPR 2 min
Epinephrine (every 3-5 min) IV / IO: 1:10,000 1mg
Consider advanced airway, capnography: 6-10 breaths/min (Airway Guideline)

Rhythm shockable?

NO

YES

Shock
200J biphasic, 360 monophasic

CPR 2 min
Amiodarone IV / IO
1st Dose: 300mg bolus
2nd Dose: 150mg
Treat Reversible Causes

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

YES

Return of Spontaneous Circulation (ROSC)?

NO

CPR 2 min
IV / IO access (IV Guideline)

Epinephrine (every 3-5 min) IV / IO: 1:10,000 1mg
Consider advanced airway, capnography: 6-10 breaths/min (Airway Guideline)

Rhythm shockable?

NO

YES

Move to VF / pulseless VT side of guideline

PEARLS:
- Reversible causes should be addressed as soon as possible.
- 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 1L fluid bolus, and ultimately bilateral needle decompression (especially in Trauma) before discontinuation of efforts.
  - Should take at least 1min to check for pulse in hypothermic patients.
**PEARLS:**
- Reversible causes should be addressed as soon as possible.
- 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**
  - Should take at least 1min to check for pulse in hypothermic patients
Pediatric Cardiac Arrest Results from Deterioration in Respiratory or Cardiac Function!

- Breathing
  - Irregular Respirations or >60 breaths/min
  - Labored Breathing (Retractions, Nasal Flaring, Grunting, Pursing of Lips, Tripod Positioning, ↓ Ability to Speak)
- Heart Rate Rages (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

**Universal Patient Care O₂ (100% FIO₂) Monitor / Defibrillator IV / IO access (IV Protocol)**

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate</th>
<th>Blood Pressure</th>
<th>Average</th>
<th>Lower Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>85-205</td>
<td>1-10y 90+(years old x 2)mmHg</td>
<td>70+(years old x 2)mmHg</td>
<td></td>
</tr>
<tr>
<td>3mo - 2y</td>
<td>100-190</td>
<td>10y 130 75-160</td>
<td>90mmHg</td>
<td></td>
</tr>
<tr>
<td>2 - 10y</td>
<td>60-140</td>
<td>15y 80 60-90</td>
<td>MAP 55+(years old x 1.5)mmHg</td>
<td></td>
</tr>
<tr>
<td>&gt;10y</td>
<td>60-100</td>
<td>20y 75 50-90</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rescue Breathing Ventilation Rate Without Advanced Airway:
- NEWBORN = 40-60/min when performed without compressions
- Infant / Child = 1 breath / 3 to 5 seconds
- Adult = 1 breath / 5 to 6 seconds

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)
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

---

**Universal Patient Care Guideline**

O₂ (if Hypoxemic)
IV / IO Guideline
Monitor and 12-Lead ECG (ASAP)

---

**Indicators of Instability:**
- Blood Pressure low (hypotension)
- Altered mental status
- Signs/Symptoms of shock
- Ischemic chest pain
- Congestive heart failure (acute)
- Heart block (Mobitz 2 and complete)

---

**“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)

---

**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).
**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

### 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**

### Rescue Breathing Ventilation Rate Without Advanced Airway:
- **NEWBORN**: 40-60/min when performed without compressions
- **Infant / Child**: 1 breath / 3 to 5 seconds
- **Adult**: 1 breath / 5 to 6 seconds

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

---

### Check Pulse every 2 minutes during CPR

- If Pulse is lost, GO TO: **PEDIATRIC CARDIAC ARREST**

---

### Check Pulse every 2 minutes during CPR

- If Pulse is lost, GO TO: **PEDIATRIC CARDIAC ARREST**

### CPR if HR <60/min with Poor Perfusion despite O₂ and Ventilation

- **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)

### Treatable causes:
- **Check & Treat compromise in ABCs**
- **Hypoglycemia**
  - D25 2mL/kg slow IV (max 25mL)
  - Glucagon 0.025mg/kg IM (max 1mg)
- **Tension Pneumothorax**
- **“OVERDOSE (Mothers Milk)”**:
  - 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 (diltilazem, verapamil, nifedipine)
    - Calcium chloride 10% 0.2ml/kg slow IV push
  - **Narcotic**
    - Naloxone 0.1mg/kg IV / IM (max 2mg)

### Pearls:
- Decompenation 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 >0.12sec:
  - 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)

*Synchronized Cardioversion

Narrow Irregular, A-Fib

Narrow Regular, SVT, Atrial Flutter

Consider Sedation:

Midazolam 2-5mg IV / IO

**Synchronized Cardioversion**: (Increase Js per manufacturer’s recommendation)

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

Observe

Reassess q 5 minutes

“Sinus Tach”

YES

“Sinus Tach”

NO

STABLE

UNSTABLE: Signs / Symptoms of:
- BP Low (hypotension)
- Altered mental status
- Signs/symptoms of shock
- Ischemic chest pain
- Congestive heart failure (acute)

QRS Width?

No unstable signs / symptoms, No “Sinus Tach”

Wide QRS?

>0.12 Second

Irregular

Consider:

AMIODARONE

If refractory or becomes unstable at any time!

Regular

Consider:

DILTIAZEM METOPROLOL

Regular

Consider:

AMIODARONE Stable Wide-QRS Tachy

1st Dose: 150mg IV over 10min

Repeat pm if VT recurs

Maintenance infusion: 1mg/min for 1st 6 hrs

Vagal Maneuvers:
Blow through 18ga IV catheter, carotid massage, bear down.

ADENOSINE: use for Regular Rhythm ONLY!

DILTIAZEM METOPROLOL

Regular Irregular

Wide QRS?

>0.12 Second

Narrow QRS?

<0.12 Second

Metabolism

Observe

Reassess q 5 minutes

Chest Pain / SOB / Dizziness?

YES

NO

Chest Pain Guideline

Signs and Symptoms:

Ventricular Tachycardia on EKG (rate typically >150/min)

Conscious, Rapid Pulse

Chest Pain / Shortness of Breath

Palpitations

Dizziness

Anxiety

Regular

No unstable signs / symptoms, No “Sinus Tach”

Narrow QRS?

<0.12 Second

METOPROLOL

5mg IV q5min X 3 Hold if SBP <100, P <60

DILTIAZEM

20mg (0.25mg/kg) IV over 2min. If no hypotension, after 15 min repeat at 25mg (0.35mg/kg)

ADENOSINE

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

2nd Dose: 12mg

Differential Diagnosis (Wide Complex)

- Artfact / 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

All Pathways End with Continuous Monitoring
**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

**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

---

**Identify and Treat Underlying Cause!**

**Universal Patient Care Guideline**
- Maintain Airway / Assisted Breathing
- \(\text{O}_2\) (Titrate to 94-99% \(\text{SpO}_2\))
- IV / IO access (IV Guideline)
- Monitor and 12-Lead ECG (ASAP)
- Check Glucose

**Pearls:**
- **Vagal maneuvers:** blow through 18ga IV catheter, ice water immersion (facial), 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.
- **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.

---

**Consider Chemical Conversion:**
- **Amiodarone** 5mg/kg over 20-60 minutes IV / IO
  - If NOT Already Administered:
    - **Adenosine** IV / IO Rapid Push
      - 1\(\text{st}\) 0.1mg/kg (max 6mg)
      - 2\(\text{nd}\) 0.2mg/kg (max12mg)
    - Consider:
      - **Synchronized Cardioversion** 1\(\text{st}\) 0.5-1J/kg, if fails then 2J/kg
        - (Sedation before Cardioversion: Midazolam 0.05-0.1mg/kg IV / IO)
# 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

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

## Identify and Treat Underlying Cause!

**Universal Patient Care Guideline**
- Maintain Airway / Assisted Breathing
- \(\text{O}_2\) (Titrate to 94-99% \(\text{SpO}_2\))
- IV / IO access (IV Guideline)
- Monitor and 12-Lead ECG (ASAP)
- Check Glucose

**Pearls:**
- **Vagal maneuvers:** blow through 18ga IV catheter, ice water immersion (facial), 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.

## Treatable causes:
- 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 – pretreat 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 1st 0.1mg/kg (max 6mg)
  - 2nd 0.2mg/kg (max 12mg)

## Possible Cardiopulmonary Compromise?
- Amiodarone 5mg/kg over 20-60 minutes IV / IO
- Procainamide 15mg/kg over 30-60 minutes

## Narrow QRS? <0.09 Second
- Heart Rate?:
  - 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

## Wide QRS? >0.09 Second
- Heart Rate:
  - Infants: Typically >220/min
  - Child: Typically >180/min
  - Constant Rate w/o variability on 6 second strip
  - Abrupt Rate changes between tachy and normal

## Cardiopulmonary Compromise?
- If Regular Rhythm (R-R) and QRS Monomorphic:
  - **Adenosine IV / IO Rapid**
    - Push 1st 0.1mg/kg (max 6mg)
    - 2nd 0.2mg/kg (max 12mg)
  - If no IV / IO access or adenosine fails
  - **Synchronized Cardioversion**
    - 1st 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

**Pearls:**
- Hyperventilation may cause hypotension and/or recurrence of cardiac arrest in the post-resuscitation phase and must be avoided.
- Most patients will require ventilatory 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 or NOREPI-NEPHRINE 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.
HYPERTENSION

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 necessarily hypertensive emergency patients.
- Metoprolol is contraindicated for CHF, Acute PE, bronchospasms, bradycardia, hypotension, hx of asthma, and thyrotoxicosis.
**CHILDBIRTH**

**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 prolapsed cord seen (overlying fetal head) – use upward pressure on fetal presenting part to delay delivery. Place saline soaked (moist / wet) dressing over prolapsed 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.
NEWBORN CARE & DISTRESS

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

Maintain:
Universal Patient Care Guideline
(Mother and Newborn)

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

YES

NO

• 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

Meconium Staining of Amniotic Fluid?
• Suction Mouth then Nose until clear
• Consider Intubation for deep suctioning

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

HR <100?

NO

YES

Take Ventilation Corrective Steps
(Intubate if NO Chest Rise)

HR <60?

NO

YES

Chest Compressions with PPV
(120 events/min: 90 compressions interspersed with 30 ventilations)
• Consider Intubation

NO

HR <60?

YES

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)

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%

Post Resuscitation Care

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)

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

Score
Severely Depressed 0-3
Moderately Depressed 4-6
Excellent Condition 7-10

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

Post Resuscitation Care

APGAR SCORING

0 POINTS
1 POINT
2 POINTS

TOTAL
APGAR:
**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

**Seizure?**

- Hypertension with Headache and/or Vision Complaints?

**Magnesium Sulfate 4g IV Over 15min**

- (or 5g IM each buttocks)

**Glucose <70 or >250?**

- YES
- **ALTERNED MENTAL STATUS Guideline**

- NO
- **Seizure?**

**If in Status Epilepticus, Move to:**

- **SEIZURE Guideline**

- **MIDAZOLAM 2.5-5mg IV / IM**

- OR

- **LORAZEPAM 1-2mg IV / IM**

- Wait 60 seconds

- Seizure Stopped?

- NO
- Failed to resolve after 2nd dose

**Vaginal Bleeding?**

- **Blood Product**

- (as available) **OR**

- 1000mL IVF IV bolus

**Tachycardia / Orthostatic?**

- YES

**CHILDBIRTH Guideline**

**Monitor, Reassess, Address:**
- BP?
- Seizure?
- Glucose
- Vision Changes / Headache

**Continuous Monitoring**

Throughout transport to MTF, any Complaint of Labor, move to:

---

**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.
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 (PIC) 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 or parent.
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 conduct 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 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 SARCs 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 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 a SAFE 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 pre-hospital 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. Patients that prevent treatment of these injuries should be treated in accordance with the COMBATIVe PATIENT GUIDELINE and appropriate supporting guidelines.
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 (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.
   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.
**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

---

### Pearls:
- *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 combativeness 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, medications should be titrated to adequate dosage to control patient. Be prepared for airway interventions / vomiting if used.

---

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

### Cardiac Monitor
- (prn)

---

### IV / IO Guideline
- (prn)

---

### Safety of Helicopter/Crew/other patients is first priority

---

### HEAD INJURY Guideline
- (Spinal Immobilization once sedated with Advanced Airway)

---

### AIRWAY Guideline
- (Establish Advanced Airway)

---

### Consider: RSI PROCEDURE
- (Must Maintain and Manage Airway)

---

### When safe: obtain blood glucose:
- If <70 or >250 switch to:
  - (ALTERED MENTAL STATUS Guideline)

---

### Ketamine
- 4 mg/kg IM/IN or 1 mg/kg IV/IO
- May rpt half int dose q10min

---

### LORAZEPAM
- 1-2mg IV / IM
- (can be used alone)

---

### MIDAZOLAM
- 2.5-5mg IV / IM
- q3-5 minutes prn
- (Large Patient may require 10mg if using IM)

---

### Consider Need / Use Of:
- Security Escort
- Physical Restraints (*See Pearls)

---

### If Still Combative, Consider:
- RSI PROCEDURE
- (Must Maintain and Manage Airway)

---

### When appropriate, return to:
- Tactical Evacuation Guideline

---

### COMBATIVE PATIENT
- Signs and Symptoms:
- Differential Diagnosis:
  - Head Trauma / Psychiatric Disorders
  - Thyroid Dysfunction
  - Hyper/Hypoglycemia
  - Diabetic Ketoacidosis / Toxic Ingestion
  - Environment (Hyper / Hypothermia)
  - Hypoxia

---

### Pearls:
- *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 combativeness 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, medications should be titrated to adequate dosage to control patient. Be prepared for airway interventions / vomiting if used.
MWD Normal Clinical Parameters

Vital Signs
- Temperature (rectal) - 101° to 103° F
- Heart Rate/ Pulse - 60 to 80 bpm
- Respiratory Rate - 16 to 30 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 25-40 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)
- 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
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
  - 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.
- Assisted ventilation via an Ambu-bag® at a rate of 8-10 breaths per minute.

100% Oxygen Supplementation Examples

Conscious or fractious muzzled dogs (10-15 L/min)
Ootracheal intubation or Tracheostomy (2 L/min)
MWD Heat Injury Treatment

**MILD** heat injury (heat stress) - excessive thirst, discomfort associated with physical activity, mild dehydration, **but with controlled panting** (i.e., the patient can control or reduce panting when exposed to a noxious inhalant such as alcohol).

- Remove patient from source of heat, discontinue exercise, cool by fans or air condition, give cold water to drink.
- Monitor patient for
  - Body Temp
  - Mentation / LOC
  - Weakness / collapse
  - Anxiety/ restlessness
  - Shock

**MODERATE** heat injury (heat exhaustion) - heat stress present, as well as weakness, anxiety, and **uncontrolled panting** (i.e., the patient cannot reduce panting when exposed to a noxious inhalant), but central nervous system (CNS) abnormalities are not present.

- Same as MILD but more aggressive cooling required
- Remove patient from all heat and stop all activity.
- Cool by fans or air condition.
- Thoroughly soak the hair coat to the skin (room-temp) in order to reduce core body temperature.
- Give IV fluids 3-5 mL/kg/hr
- Monitor patient for
  - Body Temp
  - Mentation / LOC
  - Petechiae/ecchymoses
  - Weakness / collapse
  - Anxiety/ restlessness
  - Shock

**SEVERE** heat injury (heat stroke) – heat exhaustion are present, coupled with varying degrees of CNS abnormalities (changes in mentation and level of consciousness, seizures, abnormal pupil size, blindness, head tremors, and ataxia).

- Triage-
  - Establish airway
  - Provide oxygen
  - Establish IV for shock treatment
- Aggressively cool patient until rectal temp is less than 105°F.
  - Use only room temperature fluids.
  - Give IV fluids (shock protocol)
- Monitor patient for
  - Vitals, Blood Glucose
  - ECG arrhythmias
  - Mentation / LOC
  - Gait abnormalities
  - Vision changes
  - Seizure

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 low 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° CEASE all cooling efforts and monitor for rebound hypothermia, and prepare for rewarming measures.
MWD CPR Management

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
- 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
  • Vasopressin 0.8 U/kg IV/IO once
  • Lidocaine 2 mg/kg IV/IO
  • Amiodarone 5-10 mg/kg IV/IO
- Repeat counter-shock (2 x initial energy) if refractory

ASYSTOLE/ BRADYCARDIA/ PEA
- Drug therapy:
  • Atropine 0.04 mg/kg IV/IO and
  • Epinephrine 0.01 mg/kg IV/IO or
  • Vasopressin 0.8 U/kg IV/IO once

CPR EMERGENCY DRUG CACULATION (Quick Reference)

Caution: you must first validate the drug concentrations on the bottle is the same as on this quick reference chart.

<table>
<thead>
<tr>
<th>DRUG/ACTION</th>
<th>[CONC]</th>
<th>DOSE</th>
<th>ROUTE</th>
<th>ml</th>
<th>ml</th>
<th>ml</th>
<th>ml</th>
<th>ml</th>
<th>ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasopressin</td>
<td>20 units/ml</td>
<td>0.80 U/kg</td>
<td>IV/IO</td>
<td>0.91</td>
<td>1.09</td>
<td>1.28</td>
<td>1.45</td>
<td>1.64</td>
<td>1.82</td>
</tr>
<tr>
<td>Epinephrine (1:1,000)</td>
<td>1 mg/ml</td>
<td>0.01 mg/kg</td>
<td>IV/IO</td>
<td>0.23</td>
<td>0.27</td>
<td>0.32</td>
<td>0.36</td>
<td>0.41</td>
<td>0.46</td>
</tr>
<tr>
<td>Epinephrine (1:10,000)</td>
<td>0.1 mg/ml</td>
<td>0.01 mg/kg</td>
<td>IV/IO</td>
<td>2.27</td>
<td>2.73</td>
<td>3.20</td>
<td>3.63</td>
<td>4.10</td>
<td>4.55</td>
</tr>
<tr>
<td>Atropine</td>
<td>0.4 mg/ml</td>
<td>0.04 mg/kg</td>
<td>IV/IO</td>
<td>2.27</td>
<td>2.73</td>
<td>3.20</td>
<td>3.63</td>
<td>4.10</td>
<td>4.55</td>
</tr>
<tr>
<td>Lidocaine (1%)</td>
<td>10 mg/ml</td>
<td>2.00 mg/kg</td>
<td>IV/IO</td>
<td>4.54</td>
<td>5.46</td>
<td>6.40</td>
<td>7.26</td>
<td>8.20</td>
<td>9.11</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>50 mg/ml</td>
<td>5.00 mg/kg</td>
<td>IV/IO</td>
<td>2.27</td>
<td>2.73</td>
<td>3.20</td>
<td>3.63</td>
<td>4.10</td>
<td>4.55</td>
</tr>
<tr>
<td>Magnesium Sulfate (0.5 g/ml)</td>
<td>500 mg/ml</td>
<td>30.00 mg/kg</td>
<td>IV</td>
<td>1.36</td>
<td>1.64</td>
<td>1.92</td>
<td>2.18</td>
<td>2.46</td>
<td>2.73</td>
</tr>
<tr>
<td>Sodium Bicarbonate (8.4%)</td>
<td>1 mEq/ml</td>
<td>1.00 mEq/kg</td>
<td>IV</td>
<td>22.70</td>
<td>27.30</td>
<td>32.00</td>
<td>36.3</td>
<td>41.00</td>
<td>45.50</td>
</tr>
<tr>
<td>Defibrillate</td>
<td>2-5 J/kg</td>
<td>2.00 J/kg</td>
<td>External</td>
<td>45.40</td>
<td>54.60</td>
<td>64.00</td>
<td>72.60</td>
<td>82.00</td>
<td>91.00</td>
</tr>
</tbody>
</table>
MWD Analgesia and Sedation

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

**Mild Sedation**

- allow exam; relax MWD; reduce anxiety; no painful procedure anticipated

- IV catheter (discretionary)
- Give Midazolam 0.3 mg/kg IM & Hydromorphone 0.2 mg/kg IM q 2-4 hours

**Agitated Patient Sedation**

- use for MWDs that are too fragile to handle safely in order to allow further care to allow catheterization

- 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

**Clinical Pearls:**

- 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. 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

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

**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:**
- 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
- 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.

**Provide analgesia utilizing analgesia guideline**

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

- 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.
### Cardiac Management

**Cardiopulmonary Arrest (BLS)**

- **Asystole/PEA/Bradycardia**
  - **Resuscitation**
  - **Norepinephrine (NEO)**
  - **Adenosine**
  - **Naloxone**
  - **Atropine**

**Hypotension**

- **Epinephrine**
- **Phenylephrine (NEO)**
- **Calcium**
- **Etomidate**

**Hypertension**

- **Rocuronium**

**Hyperglycemia**

- **Insulin**

**Brain Death**

- **Ethanol**

**Intraoperative Cardiac Arrest**

- **Resuscitation**

**Hypothermia**

- **Rectal warming**

**Hyperthermia**

- **Cooling blanket**

**Seizures**

- **Valproic Acid**

**Arrhythmia**

- **Atropine**

**Bronchodilator**

- **Albuterol**

**Cardiac Arrest**

- **Defibrillation**

**Pain Management**

- **Opioids**

**Pulseless Electrical Activity (PEA)**

- **Defibrillation**

**Bradycardia**

- **Atropine**

**Tachycardia**

- **Beta-blockers**

**VF/VT**

- **Amiodarone**

**Malignant Hyperthermia**

- **Succinylcholine**

**Prolonged Cardiac Arrest**

- **Intubation**

**Airway and Ventilation**

- **Oral intubation**

**Respiratory Distress**

- **Ventilation**

**Resuscitative Management**

- **Code Blue**

**Sepsis**

- **Corticosteroids**

**Shock**

- **Hematocrit**

### Common Drugs and Doses

<table>
<thead>
<tr>
<th>Drug</th>
<th>Standard Dosing</th>
<th>Adult Dosing</th>
<th>Large Adult Dosing</th>
<th>Indications</th>
<th>Restrictions/Warnings</th>
<th>Duration</th>
<th>Repeatability/Max Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hemoglobin (Hgb)</strong></td>
<td>M:1:18 F:12:16</td>
<td>8-5.5 F:12:5</td>
<td>5.0 F:12:5</td>
<td>Increased oxygen carrying capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hematocrit (Hct)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

- **Hematocrit**
- **Hemoglobin**
- **Oxygen**
- **Pulse**
- **Respiration**
- **Blood Pressure**
- **Temperature**
- **Heart Rate**
- **Blood Glucose**
- **Blood Urea Nitrogen**
- **Creatinine**
- **Creatinine Clearance**
- **Serum Creatinine**
- **Serum Urea**
- **Serum Sodium**
- **Serum Chloride**
- **Serum Potassium**
- **Serum Phosphate**
- **Serum Calcium**
- **Serum Magnesium**
- **Serum Protein**
- **Serum Albumin**
- **Serum Bilirubin**
- **Serum Transaminases**
- **Serum Amylase**
- **Serum Lipase**
- **Serum Cholesterol**
- **Serum Triglycerides**
- **Glucose**
- **Blood Glucose**
- **Hematocrit**
- **Hemoglobin**
- **Oxygen**
- **Pulse**
- **Respiration**
- **Blood Pressure**
- **Temperature**
- **Heart Rate**
- **Blood Glucose**
- **Blood Urea Nitrogen**
- **Creatinine**
- **Creatinine Clearance**
- **Serum Creatinine**
- **Serum Urea**
- **Serum Sodium**
- **Serum Chloride**
- **Serum Potassium**
- **Serum Phosphate**
- **Serum Calcium**
- **Serum Magnesium**
- **Serum Protein**
- **Serum Albumin**
- **Serum Bilirubin**
- **Serum Transaminases**
- **Serum Amylase**
- **Serum Lipase**
- **Serum Cholesterol**
- **Serum Triglycerides**
- **Glucose**

**Quick Menu**

- **To Use This Card:**
  - **1 Card:** cut off all white edges to include the text block.
  - **2 Cards:** field in half 45-degree angle.

- **This card is designed to fit inside the cargo pocket of the ACU and should be carried while on MEDEVAC duty and referenced for guidance during medication administration.**
<table>
<thead>
<tr>
<th>VOLUME DRAWN/ADMINISTERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1ml</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>10mg/ml</td>
</tr>
<tr>
<td>1mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>25mg/ml</td>
</tr>
<tr>
<td>2.5mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>50mg/ml</td>
</tr>
<tr>
<td>5mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>100mg/ml</td>
</tr>
<tr>
<td>10mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>250mg/ml</td>
</tr>
<tr>
<td>25mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>500mg/ml</td>
</tr>
<tr>
<td>50mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>1mg/ml</td>
</tr>
<tr>
<td>1mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>2mg/ml</td>
</tr>
<tr>
<td>2mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>8mg/ml</td>
</tr>
<tr>
<td>8mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>10mg/ml</td>
</tr>
<tr>
<td>10mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>25mg/ml</td>
</tr>
<tr>
<td>25mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>50mg/ml</td>
</tr>
<tr>
<td>50mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>75mg/ml</td>
</tr>
<tr>
<td>75mg</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>1G/ml</td>
</tr>
<tr>
<td>1G</td>
</tr>
</tbody>
</table>

1G=1000mg 0.3G=500mg 0.1G=100mg 1mg=1000mcg 0.5mg=500mcg 0.1mg=100mcg micrograms milligrams Grams
<table>
<thead>
<tr>
<th>Drug Dose (mcg)</th>
<th>5cc</th>
<th>10cc</th>
<th>20cc</th>
<th>50cc</th>
<th>100cc</th>
<th>250cc</th>
<th>500cc</th>
<th>1000cc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mcg</td>
<td>0.20 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.02 mcg/ml</td>
<td>0.01 mcg/ml</td>
<td>0.004 mcg/ml</td>
<td>0.002 mcg/ml</td>
<td>0.001 mcg/ml</td>
</tr>
<tr>
<td>5 mcg</td>
<td>1 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.25 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.02 mcg/ml</td>
<td>0.01 mcg/ml</td>
<td>0.005 mcg/ml</td>
</tr>
<tr>
<td>10 mcg</td>
<td>2 mcg/ml</td>
<td>1 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.02 mcg/ml</td>
<td>0.01 mcg/ml</td>
</tr>
<tr>
<td>25 mcg</td>
<td>5 mcg/ml</td>
<td>2.5 mcg/ml</td>
<td>1.25 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.25 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.025 mcg/ml</td>
</tr>
<tr>
<td>50 mcg</td>
<td>10 mcg/ml</td>
<td>5 mcg/ml</td>
<td>2.5 mcg/ml</td>
<td>1 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
</tr>
<tr>
<td>100 mcg</td>
<td>20 mcg/ml</td>
<td>10 mcg/ml</td>
<td>5 mcg/ml</td>
<td>2 mcg/ml</td>
<td>1 mcg/ml</td>
<td>0.4 mcg/ml</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
</tr>
<tr>
<td>250 mcg</td>
<td>50 mcg/ml</td>
<td>25 mcg/ml</td>
<td>12.5 mcg/ml</td>
<td>5 mcg/ml</td>
<td>2.5 mcg/ml</td>
<td>1 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.25 mcg/ml</td>
</tr>
<tr>
<td>500 mcg</td>
<td>0.1 mcg/ml</td>
<td>50 mcg/ml</td>
<td>25 mcg/ml</td>
<td>10 mcg/ml</td>
<td>5 mcg/ml</td>
<td>2 mcg/ml</td>
<td>1 mcg/ml</td>
<td>0.5 mcg/ml</td>
</tr>
<tr>
<td>1 mg</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.02 mcg/ml</td>
<td>0.01 mcg/ml</td>
</tr>
<tr>
<td>2 mg</td>
<td>0.4 mcg/ml</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.02 mcg/ml</td>
<td>0.01 mcg/ml</td>
<td>0.005 mcg/ml</td>
<td>0.002 mcg/ml</td>
</tr>
<tr>
<td>3 mg</td>
<td>0.6 mcg/ml</td>
<td>0.3 mcg/ml</td>
<td>0.15 mcg/ml</td>
<td>0.075 mcg/ml</td>
<td>0.0375 mcg/ml</td>
<td>0.01875 mcg/ml</td>
<td>0.009375 mcg/ml</td>
<td>0.0046875 mcg/ml</td>
</tr>
<tr>
<td>4 mg</td>
<td>0.8 mcg/ml</td>
<td>0.4 mcg/ml</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.025 mcg/ml</td>
<td>0.0125 mcg/ml</td>
<td>0.00625 mcg/ml</td>
</tr>
<tr>
<td>5 mg</td>
<td>1 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.25 mcg/ml</td>
<td>0.125 mcg/ml</td>
<td>0.0625 mcg/ml</td>
<td>0.03125 mcg/ml</td>
<td>0.015625 mcg/ml</td>
<td>0.0078125 mcg/ml</td>
</tr>
<tr>
<td>6 mg</td>
<td>1.2 mcg/ml</td>
<td>0.6 mcg/ml</td>
<td>0.3 mcg/ml</td>
<td>0.15 mcg/ml</td>
<td>0.075 mcg/ml</td>
<td>0.0375 mcg/ml</td>
<td>0.01875 mcg/ml</td>
<td>0.009375 mcg/ml</td>
</tr>
<tr>
<td>7 mg</td>
<td>1.4 mcg/ml</td>
<td>0.7 mcg/ml</td>
<td>0.35 mcg/ml</td>
<td>0.175 mcg/ml</td>
<td>0.0875 mcg/ml</td>
<td>0.04375 mcg/ml</td>
<td>0.021875 mcg/ml</td>
<td>0.0109375 mcg/ml</td>
</tr>
<tr>
<td>8 mg</td>
<td>1.6 mcg/ml</td>
<td>0.8 mcg/ml</td>
<td>0.4 mcg/ml</td>
<td>0.2 mcg/ml</td>
<td>0.1 mcg/ml</td>
<td>0.05 mcg/ml</td>
<td>0.025 mcg/ml</td>
<td>0.0125 mcg/ml</td>
</tr>
<tr>
<td>9 mg</td>
<td>1.8 mcg/ml</td>
<td>0.9 mcg/ml</td>
<td>0.45 mcg/ml</td>
<td>0.225 mcg/ml</td>
<td>0.1125 mcg/ml</td>
<td>0.05625 mcg/ml</td>
<td>0.028125 mcg/ml</td>
<td>0.0140625 mcg/ml</td>
</tr>
<tr>
<td>10 mg</td>
<td>2 mcg/ml</td>
<td>1 mcg/ml</td>
<td>0.5 mcg/ml</td>
<td>0.25 mcg/ml</td>
<td>0.125 mcg/ml</td>
<td>0.0625 mcg/ml</td>
<td>0.03125 mcg/ml</td>
<td>0.015625 mcg/ml</td>
</tr>
<tr>
<td>15 mg</td>
<td>3 mcg/ml</td>
<td>1.5 mcg/ml</td>
<td>0.75 mcg/ml</td>
<td>0.375 mcg/ml</td>
<td>0.1875 mcg/ml</td>
<td>0.09375 mcg/ml</td>
<td>0.046875 mcg/ml</td>
<td>0.0234375 mcg/ml</td>
</tr>
<tr>
<td>25 mg</td>
<td>5 mcg/ml</td>
<td>2.5 mcg/ml</td>
<td>1.25 mcg/ml</td>
<td>0.625 mcg/ml</td>
<td>0.3125 mcg/ml</td>
<td>0.15625 mcg/ml</td>
<td>0.078125 mcg/ml</td>
<td>0.0390625 mcg/ml</td>
</tr>
<tr>
<td>50 mg</td>
<td>10 mcg/ml</td>
<td>5 mcg/ml</td>
<td>2.5 mcg/ml</td>
<td>1.25 mcg/ml</td>
<td>0.625 mcg/ml</td>
<td>0.3125 mcg/ml</td>
<td>0.15625 mcg/ml</td>
<td>0.078125 mcg/ml</td>
</tr>
<tr>
<td>75 mg</td>
<td>15 mg/ml</td>
<td>7.5 mg/ml</td>
<td>3.75 mg/ml</td>
<td>1.875 mg/ml</td>
<td>0.9375 mg/ml</td>
<td>0.46875 mg/ml</td>
<td>0.234375 mg/ml</td>
<td>0.1171875 mg/ml</td>
</tr>
<tr>
<td>100 mg</td>
<td>20 mg/ml</td>
<td>10 mg/ml</td>
<td>5 mg/ml</td>
<td>2.5 mg/ml</td>
<td>1.25 mg/ml</td>
<td>0.625 mg/ml</td>
<td>0.3125 mg/ml</td>
<td>0.15625 mg/ml</td>
</tr>
<tr>
<td>250 mg</td>
<td>50 mg/ml</td>
<td>25 mg/ml</td>
<td>12.5 mg/ml</td>
<td>6.25 mg/ml</td>
<td>3.125 mg/ml</td>
<td>1.5625 mg/ml</td>
<td>0.78125 mg/ml</td>
<td>0.390625 mg/ml</td>
</tr>
<tr>
<td>500 mg</td>
<td>100 mg/ml</td>
<td>50 mg/ml</td>
<td>25 mg/ml</td>
<td>12.5 mg/ml</td>
<td>6.25 mg/ml</td>
<td>3.125 mg/ml</td>
<td>1.5625 mg/ml</td>
<td>0.78125 mg/ml</td>
</tr>
<tr>
<td>750 mg</td>
<td>150 mg/ml</td>
<td>75 mg/ml</td>
<td>37.5 mg/ml</td>
<td>18.75 mg/ml</td>
<td>9.375 mg/ml</td>
<td>4.6875 mg/ml</td>
<td>2.34375 mg/ml</td>
<td>1.171875 mg/ml</td>
</tr>
<tr>
<td>1 Gram</td>
<td>200 mg/ml</td>
<td>100 mg/ml</td>
<td>50 mg/ml</td>
<td>25 mg/ml</td>
<td>12.5 mg/ml</td>
<td>6.25 mg/ml</td>
<td>3.125 mg/ml</td>
<td>1.5625 mg/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.

<table>
<thead>
<tr>
<th>Value</th>
<th>mcg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1mg</td>
<td>1000mcg</td>
</tr>
<tr>
<td>0.1mg</td>
<td>100mcg</td>
</tr>
<tr>
<td>0.01mg</td>
<td>10mcg</td>
</tr>
</tbody>
</table>

Dilution guidelines:

- Fluid volume for 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.
<table>
<thead>
<tr>
<th></th>
<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>
</tr>
</thead>
<tbody>
<tr>
<td>Amiodarone</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Etomidate</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Ketamine</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Midazolam</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Morphine</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Propofol</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Rocuronium</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Sodium bicarb</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Succinylcholine</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>NS</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
</tr>
<tr>
<td>NaCl 3%</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
</tr>
<tr>
<td>DSW</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
<td>C-solutn</td>
</tr>
</tbody>
</table>

C=compatible  
I=Incompatible  
Y=Y-site
Vasopressor Priority Chart

<table>
<thead>
<tr>
<th></th>
<th>HYPOVOLEMIC SHOCK</th>
<th>SEPTIC SHOCK</th>
<th>CARDIOGENIC SHOCK$_1$</th>
<th>NEUROGENIC SHOCK$_2,3$</th>
<th>BURN SHOCK$_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1°</strong></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><strong>2°</strong></td>
<td>Vasopressin</td>
<td>Dobutamine</td>
<td>Epinephrine</td>
<td>Norepinephrine</td>
<td>Norepinephrine</td>
</tr>
<tr>
<td><strong>3°</strong></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.
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: Oxygen cylinders (usually green and white) of 100% compressed oxygen gas.

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 oxygen saturation 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.


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):
  o Bolus: 250mL IV Bolus over 15 min.
  o Infusion: 50-100 cc/hr

• Dosing (Pediatrics):
  o Bolus: 5 cc/kg IV Bolus over 15 min.
  o 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  Lactation Yes (Caution)  Trade Name: Tylenol

Class / Mechanism of Action

Analgesic
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 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  PEDIATRIC

Pain/Fever/FNHT: (Limit total daily dose to <4 g/day)

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

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

Pain or fever: Children ≥12 years & Adolescents: Refer to adult dosing

PO:
- Infants and Children <12 years: 10-15 mg/kg/dose every 4-6 hours as needed; do not exceed 5 doses (2.6 g) in 24 hours

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:
- Children 2-12 years: 15 mg/kg every 6 hours or 12.5 mg/kg every 4 hours
  - Max single dose: 15 mg/kg/dose (≤750 mg/dose)
  - Max daily dose: 75 mg/kg/day (≤3.75 g daily)
ACETAZOLAMIDE  Lactation Yes (Caution)  Trade Name: Diamox

Class / Mechanism of Action
Diuretic, Carbonic Anhydrase Inhibitor; Anticonvulsant
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

Indications
Labeled Indications:
• Prevention or treatment of symptoms of acute mountain sickness
• Edema due to congestive heart failure

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

Dose and Administration:

<table>
<thead>
<tr>
<th>Altitude ILLNESS (Acute Mountain Sickness):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>125-250 mg twice daily.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Edema (Only with referring doctor or medical director instruction):
PO, IV:
• 250-375 mg once daily

Altitude Illness (Acute Mountain Sickness):
PO: (IM not recommended due to alkaline pH)
• 2.5 mg/kg/dose every 8-12 hours
  ○ 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.
**ACETYLSALICYLIC ACID**  
*Trade Name: Aspirin*  

Lactation Yes (Short Term or Low Dose OK)

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systemic Corticosteroid</strong></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 an antipyretic, analgesic, and anti-inflammatory property.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Treatment of acute coronary syndromes (ST-elevation MI, non-ST-elevation MI, unstable angina), acute ischemic stroke, and transient ischemic episodes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to salicylates, other NSAIDs, or any component of the formulation</td>
</tr>
<tr>
<td>• Asthma, Rhinitis</td>
</tr>
<tr>
<td>• Inherited or acquired bleeding disorders (including factor VII and factor IX deficiency)</td>
</tr>
<tr>
<td>• Do not use in children less than 16 years old (Reye's syndrome)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not for use on trauma patients in the combat environment.</td>
</tr>
<tr>
<td>• 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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration: ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute coronary syndrome (ST-segment elevation myocardial infarction [STEMI], unstable angina [UA]/non-ST-segment elevation myocardial infarction [NSTEMI]):</strong> (Not for use in trauma patients):</td>
<td></td>
</tr>
<tr>
<td>PO:</td>
<td></td>
</tr>
<tr>
<td>• <strong>324 mg</strong> (chew nonenteric-coated aspirin as a single 325 mg tablet or 4 X 81 mg tablets)</td>
<td><strong>N/A:</strong> No Appropriate need on evacuation platform</td>
</tr>
</tbody>
</table>

| Always Reference BROSELOW Tape |
### Activated Charcoal

**Safe, Lactation Safe**  
**Trade Name:** Actidose

#### Class / Mechanism of Action

**Antidote**<br>Non-absorbable agent that absorbs toxins within the GI tract inhibiting GI absorption.

#### Indications

**Labeled Indications:** Management of suspected or known poisonings when a gastrointestinal decontamination is an option.<br>- Decontamination within 1 hour of ingestion of toxic substance

#### Contraindications

- No absolute contraindications in severe poisoning

#### Adverse Reactions / Precautions

- If patient unconscious, must establish airway control and must utilize NG/OG tube.<br>- Be prepared for possible emesis. Consider use of antiemetic.<br>- Avoid use in patients at risk of GI hemorrhage or perforation

#### Dose and Administration:

<table>
<thead>
<tr>
<th>Acute Poisoning:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO, NG/OG:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Single dose: 50 grams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Multidose: Initial dose: 50 grams initially followed by 25 grams every 2 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Some products may contain sorbitol. Co-administration of a cathartic, including sorbitol, is no longer recommended.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Activated Charcoal has limited efficacy if not utilized within 1 hour of toxin ingestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Multidose charcoal is indicated if patient ingested the life-threatening amount of drug (carbamazepine, dapsone, phenobarbital, guanine, or theophylline)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Acute Poisoning:** Children >12 years: Refer to adult dosing.<br>PO, NG/OG:<br>- Single dose: 1 gram/kg<br>- Multidose: Initial dose: 1 Gram/kg initially, followed by multiple doses of 0.5 Gram/kg every 2 hours

**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**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antiarrhythmic Agent</strong></td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> 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.</td>
</tr>
</tbody>
</table>

| **Unlabeled:** ACLS/PALS Guidelines (2015): 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. |

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to adenosine or any component of the formulation</td>
</tr>
<tr>
<td>• Second- or third-degree AV block, sick sinus syndrome, or symptomatic bradycardia (except in patients with a functioning artificial pacemaker)</td>
</tr>
<tr>
<td>• Use in patients with atrial fibrillation/flutter with underlying Wolff-Parkinson-White (WPW) syndrome (Fuster, 2006); asthma (ACLS, 2015)</td>
</tr>
<tr>
<td>• Known or suspected bronchoconstrictive (Asthma) or bronchospastic lung disease.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• May cause transient asystole and new arrhythmia after cardioversion (PACs, AF, PVCs) chest discomfort</td>
</tr>
<tr>
<td>• Headache, Dizziness, Flushing, GI upset</td>
</tr>
<tr>
<td>• Dyspnea, Bronchospasm in asthmatics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paroxysmal supraventricular tachycardia:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.V. (rapid push, over 1-2 seconds, via proximal peripheral line (forearm or above, large bore).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initial: <strong>6 mg</strong>; if not effective within 1-2 minutes, <strong>12 mg</strong> may be given if needed (maximum single dose: 12 mg).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Notes:</strong> Follow each dose with <strong>20 mL</strong> normal saline flush.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> 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 (ACLS, 2015).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Adenosine effects are antagonized by caffeine and theophylline, and patients may require higher doses.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Paroxysmal supraventricular tachycardia:** | | |
| IV/IO (rapid push, over 1-2 seconds, via peripheral line; 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. | | |
**ALBUTEROL**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta₂ Agonist (Bronchodilator)</strong></td>
</tr>
<tr>
<td>Synthetic sympathomimetic that relaxes bronchial smooth muscle, causing bronchodilation, with little cardiac impact. Onset of action is 2-15 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications</strong>: Treatment or prevention of bronchospasm in patients with reversible obstructive airway disease; prevention of exercise-induced bronchospasm</td>
</tr>
<tr>
<td>- Asthma</td>
</tr>
<tr>
<td>- Reactive Airway / Bronchospasm</td>
</tr>
<tr>
<td>- COPD</td>
</tr>
<tr>
<td>- May also be used in Crush Syndrome (Hyperkalemia)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hypersensitivity to albuterol or any component of the formulation</td>
</tr>
<tr>
<td>- Symptomatic tachycardia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Risk of abortion during 1&lt;sup&gt;st&lt;/sup&gt; or 2&lt;sup&gt;nd&lt;/sup&gt; trimester</td>
</tr>
<tr>
<td>- Headache, Dizziness, Flushing, Diaphoresis, Tremor, Weakness</td>
</tr>
<tr>
<td>- Angina, A-Fib, Arrhythmia, Chest Pain, Palpitations</td>
</tr>
<tr>
<td>- Dyspnea, Bronchospasm in asthmatics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADULT</strong></td>
</tr>
</tbody>
</table>

**Bronchospasm:**
- **Metered-dose inhaler (90 mcg/puff):**
  - **2 puffs** every 4-6 hours as needed

**Solution for nebulization:**
- **2.5 mg** 3-4 times daily as needed

**Exacerbation of asthma (acute, severe):**
- **Metered-dose inhaler:**
  - **4-8 puffs** every 20 minutes for up to 4 hours, then every 1-4 hours as needed

**Solution for nebulization:**
- **2.5-10 mg** every 1-4 hours as needed

**Bronchospasm:**
- **Metered-dose inhaler (90 mcg/puff):**
  - **2 puffs** every 4-6 hours as needed

**Solution for nebulization:**
- **Children ≤4 years**: **0.63-2.5 mg** every 4-6 hours as needed
- **Children ≥5 years**: **1.25-5 mg** every 4-8 hours as needed
- **Children ≥12 years**: Refer to adult dosing.

**Exacerbation of asthma (acute, severe):**
- **Metered-dose inhaler (90 mcg/puff):**
  - **Children <12 years**: **4-8 puffs** every 20 minutes for 3 doses, then every 1-4 hours as needed
  - **Children ≥12 years**: Refer to adult dosing.

**Solution for nebulization:**
- **Children <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
- **Children ≥12 years**: Refer to adult dosing.
<table>
<thead>
<tr>
<th>AMIODARONE</th>
<th>Lactation: Yes, Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class / Mechanism of Action</strong></td>
<td>Antiarrhythmic Agent, Class III</td>
</tr>
<tr>
<td><strong>Inhibits</strong></td>
<td>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)</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td><strong>Labeled Indications:</strong> Management of life-threatening recurrent ventricular fibrillation (VF) or hemodynamically unstable ventricular tachycardia (VT) refractory to other antiarrhythmic agents</td>
</tr>
<tr>
<td></td>
<td><strong>Unlabeled:</strong></td>
</tr>
<tr>
<td></td>
<td>Recurrent, hemodynamically unstable VT. (after other drugs have failed)</td>
</tr>
<tr>
<td></td>
<td>Ventricular tachyarrhythmias (ACLS/PALS 2015): VF/VT Cardiac arrest unresponsive to CPR, Shock, and Vasopressor.</td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td>Hypersensitivity to amiodarone, iodine, or any component of the formulation</td>
</tr>
<tr>
<td></td>
<td>Severe sinus-node dysfunction</td>
</tr>
<tr>
<td></td>
<td>2nd and 3rd degree heart block (except in patients with a functioning artificial pacemaker)</td>
</tr>
<tr>
<td></td>
<td>Bradycardia causing syncope (except in patients with a functioning artificial pacemaker)</td>
</tr>
<tr>
<td></td>
<td>Cardiogenic shock</td>
</tr>
<tr>
<td><strong>Adverse Reactions / Precautions</strong></td>
<td>Complex drug with multiple complex drug reactions! (Do not administer with procainamide)</td>
</tr>
<tr>
<td></td>
<td>Hypotension</td>
</tr>
<tr>
<td></td>
<td>Dizziness, fatigue, Headache, Poor coordination, Neuropathy</td>
</tr>
<tr>
<td></td>
<td>Nausea, Vomiting</td>
</tr>
<tr>
<td></td>
<td>Dysrhythmias, Asystole, AF, Bradycardia, AV block, Conduction abnormalities, SA node dysfunction</td>
</tr>
<tr>
<td><strong>Dose and Administration:</strong></td>
<td>ADULT</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Pulseless VT or VF</strong> (ACLS, 2015):</td>
<td>IV/IO push</td>
</tr>
<tr>
<td></td>
<td>300 mg rapid bolus; should be diluted in 30 mL of NS, PlasmaLyte, or DSW; if pulseless VT or VF continues after subsequent defibrillation attempt or recurs, administer supplemenatal dose of 150 mg.</td>
</tr>
<tr>
<td><strong>Recurrent, Hemodynamically unstable VT</strong> (ACLS, 2015):</td>
<td>Initial Dose:</td>
</tr>
<tr>
<td></td>
<td>150mg IV over 1st 10 minutes (15mg per minute) dilute in 100 mL of NS, PlasmaLyte, or DSW (concentration 1.5mg/mL).</td>
</tr>
<tr>
<td></td>
<td>May repeat 150 mg every 10 minutes PRN if VT recurs</td>
</tr>
<tr>
<td></td>
<td>Maintenance Infusion following initial dosing:</td>
</tr>
<tr>
<td></td>
<td>360 mg over 6 hours (1 mg/min) dilute in 500mL of NS, PlasmaLyte, or DSW (concentration 0.72 mg/mL).</td>
</tr>
</tbody>
</table>
**AMIODARONE**

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

<table>
<thead>
<tr>
<th>Dose</th>
<th>Rate</th>
<th>Micro 60 gtt/mL</th>
<th>Macro 20 gtt/mL</th>
<th>15 gtt/mL</th>
<th>10 gtt/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/min</td>
<td>mL/min</td>
<td>gtt/min</td>
<td>gtt/min</td>
<td>gtt/min</td>
<td>gtt/min</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>600</td>
<td>200</td>
<td>150</td>
<td>100</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</th>
<th>Rate</th>
<th>Micro 60 gtt/mL</th>
<th>Macro 20 gtt/mL</th>
<th>15 gtt/mL</th>
<th>10 gtt/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/min</td>
<td>mL/min</td>
<td>gtt/min</td>
<td>gtt/min</td>
<td>gtt/min</td>
<td>gtt/min</td>
</tr>
<tr>
<td>1</td>
<td>1.4</td>
<td>84</td>
<td>28</td>
<td>21</td>
<td>14</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)  
- **Note:** No longer recommended for use in asystole or pulseless electrical activity (ACLS, 2015).

## 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:

### Symptomatic Bradycardia

**ADULT**  
- **IV/IO:** 0.5 mg every 3-5 minutes, not to exceed a total of 3 mg or 0.04 mg/kg (ACLS, 2015)

**PEDIATRIC**  
- Always Reference BROSELOW Tape

### 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, 2015)

**Organophosphate or carbamate insecticide or nerve agent poisoning:**  
- **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.
**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.

**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) [ACLS guidelines]; malignant arrhythmias (including cardiac arrest) associated with hypermagnesemia [ACLS 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 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>Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO, SLOW</td>
<td>500-1000 mg over 2-5 minutes; may repeat as necessary</td>
<td></td>
</tr>
</tbody>
</table>

**Beta-blocker overdose, refractory to glucagon and high-dose vasopressors (unlabeled use):** IV/IO

- 20 mg/kg over 5-10 minutes followed by an infusion of 20 mg/kg/hour titrated to adequate hemodynamic response

**Calcium channel blocker overdose (unlabeled use):** (CaCl preferred over Calcium Gluconate for this use): IV/IO

- 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

**Hypocalcemia prophylaxis from massive transfusion**

- 1 Gram 10% solution over 5 minutes

**Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:** IV/IO

- 20 mg/kg (maximum: 2000 mg/dose); may repeat as necessary

**Calcium channel blocker overdose (unlabeled use):** IV/IO

- Initial: 20 mg/kg (0.2ml/kg) (maximum: 1000 mg/dose) over 10-15 minutes; may repeat every 10-15 minutes

### 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 action potential excitation threshold regulation

## Indications

### Labeled Indications:
- Treatment of hypocalcemia and conditions secondary to hypocalcemia (e.g., tetany, seizures, arrhythmias); cardiac disturbances secondary to hyperkalemia; magnesium sulfate overdose;
- Calcium channel blocker overdose; treatment of hydrofluoric acid exposure

### 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.
- Use small IV / Large Vein, flush prior and after, **AVOID extravasation** (will cause tissue necrosis)

## Dose and Administration:

<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>1500-3000mg over 2-5 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calcium channel blocker overdose (unlabeled use): Hypotension/conduction disturbances:</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>

**Note: Adult and Pediatric** Dosages are expressed regarding the calcium gluconate salt based on a solution concentration of 100 mg/mL (10%) containing 0.465 mEq (9.3 mg)/mL elemental calcium. (1gram = 10cc of a 10% solution)

**Note:** Calcium Chloride is 3X more potent than Calcium Gluconate and therefore higher doses of Calcium Gluconate must be used to reach similar therapeutic doses.

<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>60-100 mg/kg/dose (maximum: 3000 mg/dose)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calcium channel blocker overdose (unlabeled use): Hypotension/conduction disturbances:</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>

**Hypocalcemia prophylaxis from massive transfusion**

- 1 Gram 10% solution over 5 minutes

**Note:** Calcium chloride may provide a more rapid increase of ionized calcium in critically ill children.
**DEXAMETHASONE**  
Lactation *(Not Recommended)*  
Trade Name: **Decadron**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systemic Corticosteroid</strong></td>
</tr>
<tr>
<td>Anti-inflammatory, Immunosuppressant Onset of action, IV: Prompt; Duration IV: 72 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong></td>
</tr>
<tr>
<td>- Anti-inflammatory or immunosuppressant in treatment of a variety of diseases: allergic, dermatologic, endocrine, hematologic, inflammatory, neoplastic, renal, respiratory, rheumatic, and autoimmune</td>
</tr>
<tr>
<td>- Management if cerebral edema</td>
</tr>
<tr>
<td><strong>Unlabeled:</strong></td>
</tr>
<tr>
<td>- Treatment of acute mountain sickness (AMS) and high altitude cerebral edema.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hypersensitivity to dexamethasone or any component of the formulation</td>
</tr>
<tr>
<td>- Systemic fungal infection, cerebral malaria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADULT</strong></td>
</tr>
<tr>
<td>Acute mountain sickness (AMS)/high altitude cerebral edema (HACE) (unlabeled use):</td>
</tr>
<tr>
<td>- <strong>AMS:</strong> 4 mg every 6 hours</td>
</tr>
<tr>
<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>PEDIATRIC</strong> Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute mountain sickness (AMS)/high altitude cerebral edema (HACE) (unlabeled use):</td>
</tr>
<tr>
<td>- 0.15 mg/kg/dose every 6 hours</td>
</tr>
<tr>
<td>- consider use in high altitude pulmonary edema because of associated HACE with pulmonary edema</td>
</tr>
</tbody>
</table>
DEXTROSE 50%  Lactation?  Trade Name: Glucose / B-D Glucose

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Antidote, Hypoglycemia</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled Indications: Treatment of:</td>
<td></td>
</tr>
<tr>
<td>• Hypoglycemia: Doses may be repeated in severe cases</td>
<td></td>
</tr>
<tr>
<td>• Hyperkalemia: (Must be used in combination WITH Insulin)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Known Hyperglycemia, otherwise None in the Pre-hospital setting</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Most adverse effects associated with excessive dose or infusion rate</td>
<td></td>
</tr>
<tr>
<td>• If evidence of malnutrition or alcohol abuse, thiamine should be given 1st</td>
<td></td>
</tr>
<tr>
<td>• <strong>Tissue Necrosis if Extravasation occurs</strong>; immediately D/C and change IV site</td>
<td></td>
</tr>
<tr>
<td>• Hyperglycemia</td>
<td></td>
</tr>
<tr>
<td>• Hypokalemia</td>
<td></td>
</tr>
<tr>
<td>• Hyponatremia</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoglycemia: Oral:</td>
<td>4-20 g as a single dose; may repeat if necessary</td>
<td></td>
</tr>
<tr>
<td>IV:</td>
<td>10-25 g (40-100 mL of 25% solution or 20-50 mL of 50% solution)</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>Society of Critical Care Medicine recommends: Treat blood glucose &lt;70 mg/dL (&lt;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.</td>
<td></td>
</tr>
</tbody>
</table>

| 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 |

<table>
<thead>
<tr>
<th>Note:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>D25</strong>= 25ml NS + 25ml D50 (12.5g in 50ml's solution)</td>
<td></td>
</tr>
<tr>
<td>• <strong>D10</strong>= 100ml NS + 25ml D50 (12.5g in 125ml's solution) or 40ml NS + 10ml D50 (5g in 50ml's solution)</td>
<td></td>
</tr>
</tbody>
</table>
**DIAZEPAM**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzodiazepine; Acts as an Anxiolytic/Hypnotic, anticonvulsant and sedative – Long Half Life (25-100hrs)</td>
</tr>
<tr>
<td>Onset of action: IV, Almost Immediate</td>
</tr>
<tr>
<td>Duration: IV, 20-30 minutes</td>
</tr>
</tbody>
</table>

**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:**

<table>
<thead>
<tr>
<th>Anxiety</th>
<th>ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral, IV, IM: (Oral and IV doses more reliable)</td>
<td>2-10 mg 2-4 times/day if needed</td>
<td>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</td>
</tr>
<tr>
<td>Status Epilepticus: IV: (SLOW)</td>
<td>5-10 mg every 5-10 minutes given over 3 minutes (maximum dose: 30 mg)</td>
<td>Children: 0.2-0.5 mg given slowly every 2-5 minutes (maximum total dose: 5 mg); repeat in 2-4 hours if needed</td>
</tr>
<tr>
<td>Sedation in ICU patient: IV:</td>
<td>Loading dose: 5-10 mg; Maintenance dose: 0.03-0.1 mg/kg every 30 minutes to 6 hours</td>
<td>Children ≥5 years: 1 mg given slowly every 2-5 minutes (maximum total dose: 10 mg); repeat in 2-4 hours if needed</td>
</tr>
<tr>
<td>Muscle Spasm: IV:</td>
<td>Initial: 5-10 mg; then 5-10 mg in 3-4 hours, if necessary. Larger doses may be required if associated with tetanus.</td>
<td>Muscle spasm associated with tetanus: IV, IM</td>
</tr>
<tr>
<td>Nerve Agent Exposure (CBRNE) IM:</td>
<td>10mg for seizures associated with Nerve Agent exposure; or if 3 MARK 1 kits were used on a casualty</td>
<td></td>
</tr>
<tr>
<td>Sedation / Muscle relaxation / Anxiety:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV, IM (IV doses more reliable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children: 1 mg/dose every 3-4 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children ≥5 years: 5-10 mg/dose every 3-4 hours as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Trade Name:** Valium
### DIPHENHYDRAMINE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Histamine H₁ Antagonist;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Competes with histamine for H₁-receptor sites within the gastrointestinal tract, blood vessels, and respiratory tract; Also produces anticholinergic and sedative effects</td>
</tr>
</tbody>
</table>

### Indications

**Labeled Indications:**
- Anaphylaxis and allergy disorders
- Motion Sickness
- Antitussive

### Contraindications

- Hypersensitivity to diphenhydramine or any component of the formulation
- Acute Asthma
- Use on Neonates, premature infants, Nursing mothers

### Adverse Reactions / Precautions

- Normally causes sedation, but may cause paradoxical excitation in children
- May have increased sedative effects when used with other sedatives or alcohol
- May cause hypotension (use with caution in patient with cardiovascular disease)
- Dry mouth

### Dose and Administration:

<table>
<thead>
<tr>
<th></th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anaphylaxis/Allergic Reactions and Motion Sickness:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anaphylaxis/Allergic Reactions and Motion Sickness:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral, IM, IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1 mg/kg every 6 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Max Doses:**

2 to <6 years:
- 6.25mg every 4-6hrs; max of 37.5mg/day

6 to <12 years:
- 12.5-25mg every 4-6hrs; max of 150mg/day

>12 years:
- See Adult dosing
### 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

**ADULT**

**PEDIATRIC** Always Reference BROSELOW Tape
# 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:

#### Hemodynamic Support:

**ADULT**
- IV (Use microdrip chamber only):
  - 2-20 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

**PEDIATRIC**
- Always Reference BROSELOW Tape

**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](https://www.mayoclinic.org/diseases-conditions/phenylephrine/symptoms-causes/syc-20372803), [norepinephrine](https://www.mayoclinic.org/diseases-conditions/norepinephrine/symptoms-causes/syc-20372802), [epinephrine](https://www.mayoclinic.org/diseases-conditions/epinephrine/symptoms-causes/syc-20372801)).

**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)

**MIX 800 mg/500 mL**

**CONCENTRATION 1600 mcg/mL**

<table>
<thead>
<tr>
<th>Pt. Weight</th>
<th>Dose (mcg/kg/min)</th>
<th>Rate (ml/hr)</th>
<th>Micro 60 gtt/ml</th>
<th>20 gtt/ml</th>
<th>15 gtt/ml</th>
<th>10 gtt/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
<td>19</td>
<td>19</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>28</td>
<td>28</td>
<td>9</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>38</td>
<td>38</td>
<td>13</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>55</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>21</td>
<td>21</td>
<td>7</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>31</td>
<td>31</td>
<td>10</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>41</td>
<td>41</td>
<td>14</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>60</td>
<td>5</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>23</td>
<td>23</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>34</td>
<td>34</td>
<td>11</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>45</td>
<td>45</td>
<td>15</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>65</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>24</td>
<td>24</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>37</td>
<td>37</td>
<td>12</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>49</td>
<td>49</td>
<td>16</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>70</td>
<td>5</td>
<td>13</td>
<td>13</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>26</td>
<td>26</td>
<td>9</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>39</td>
<td>39</td>
<td>13</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>53</td>
<td>53</td>
<td>18</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>75</td>
<td>5</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>28</td>
<td>28</td>
<td>9</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>42</td>
<td>42</td>
<td>14</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>56</td>
<td>56</td>
<td>19</td>
<td>14</td>
<td>9</td>
</tr>
</tbody>
</table>

**Micro-Drip is set of choice for this infusion**

Titrated to minimum effective dose. Allow 3-5 minutes between dosing changes to assess hemodynamic effects.

---

**Doping Range:** 5-20mcg/kg/min (300-1200mcg/kg/hr)

**MIX 800 mg/500 mL**

**CONCENTRATION 1600 mcg/mL**

<table>
<thead>
<tr>
<th>Pt. Weight</th>
<th>Dose (mcg/kg/min)</th>
<th>Rate (ml/hr)</th>
<th>Micro 60 gtt/ml</th>
<th>20 gtt/ml</th>
<th>15 gtt/ml</th>
<th>10 gtt/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>9</td>
<td>15</td>
<td>15</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>80</td>
<td>10</td>
<td>30</td>
<td>30</td>
<td>10</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>45</td>
<td>45</td>
<td>15</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>60</td>
<td>60</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>85</td>
<td>5</td>
<td>16</td>
<td>16</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>32</td>
<td>32</td>
<td>11</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>48</td>
<td>48</td>
<td>16</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>64</td>
<td>64</td>
<td>21</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>90</td>
<td>5</td>
<td>17</td>
<td>17</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>34</td>
<td>34</td>
<td>11</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>51</td>
<td>51</td>
<td>17</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>68</td>
<td>68</td>
<td>23</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>95</td>
<td>5</td>
<td>18</td>
<td>18</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>36</td>
<td>36</td>
<td>12</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>53</td>
<td>53</td>
<td>18</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>71</td>
<td>71</td>
<td>24</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>19</td>
<td>19</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>38</td>
<td>38</td>
<td>13</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>56</td>
<td>56</td>
<td>19</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>75</td>
<td>75</td>
<td>25</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>105</td>
<td>5</td>
<td>20</td>
<td>20</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>39</td>
<td>39</td>
<td>13</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>59</td>
<td>59</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>79</td>
<td>79</td>
<td>26</td>
<td>20</td>
<td>13</td>
</tr>
</tbody>
</table>

**Micro-Drip is set of choice for this infusion**

Titrated to minimum effective dose. Allow 3-5 minutes between dosing changes to assess hemodynamic effects.
**EPINEPHRINE**  
1mg/mL (formerly 1:1000)  
*Trade Name: EpiPen / EpiPen Jr*  

**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

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bronchodilator:</strong></td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>SubQ, IM: 1mg/mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3-0.5 mg every 20 minutes for 3 doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nebulization:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 0.5 mL to nebulizer and dilute with 3 mL of NS; administer over 15 minutes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Anaphylaxis / Hypersensitivity reaction (ACLS,2015):**  
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

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bronchodilator:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SubQ: Infants and Children 1mg/mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.01 mg/kg (0.01 mL/kg) (maximum single dose: 0.5 mg) every 20 minutes for 3 doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nebulization:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children &lt;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</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children ≥4 years: Adult dosing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Anaphylaxis / Hypersensitivity reaction (PALS,2015): 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 15-29 kg:  
- 0.15 mg; if anaphylactic symptoms persist, dose may be repeated in 5-15 minutes using an additional EpiPen Jr  
EpiPen, Children ≥30 kg:  
- 0.3 mg; if anaphylactic symptoms persist, dose may be repeated in 5-15 minutes using an additional EpiPen
### Epinephrine 1mg/1ml (1:1,000)

**Anaphylaxis**

**Dosing Range:** 5-15mcg/min (150-450mcg/hr)

**MIX 1 mg/500 mL**

**CONCENTRATION 2 mcg/mL**

<table>
<thead>
<tr>
<th>Dose mcg/min</th>
<th>Rate mL/hr</th>
<th>Micro 60 gtt/mL gtt/min</th>
<th>Macro 20 gtt/mL gtt/min</th>
<th>15 gtt/mL gtt/min</th>
<th>10 gtt/mL gtt/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>150</td>
<td>150</td>
<td>50</td>
<td>38</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>180</td>
<td>180</td>
<td>60</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>210</td>
<td>210</td>
<td>70</td>
<td>53</td>
<td>35</td>
</tr>
<tr>
<td>8</td>
<td>240</td>
<td>240</td>
<td>80</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>9</td>
<td>270</td>
<td>270</td>
<td>90</td>
<td>68</td>
<td>45</td>
</tr>
<tr>
<td>10</td>
<td>300</td>
<td>300</td>
<td>100</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>330</td>
<td>330</td>
<td>110</td>
<td>83</td>
<td>55</td>
</tr>
<tr>
<td>12</td>
<td>360</td>
<td>360</td>
<td>120</td>
<td>90</td>
<td>60</td>
</tr>
<tr>
<td>13</td>
<td>390</td>
<td>390</td>
<td>130</td>
<td>98</td>
<td>65</td>
</tr>
<tr>
<td>14</td>
<td>420</td>
<td>420</td>
<td>140</td>
<td>105</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>450</td>
<td>450</td>
<td>150</td>
<td>113</td>
<td>75</td>
</tr>
</tbody>
</table>

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

Start at lowest dose and titrate to desired effect
# EPINEPHRINE

**Trade Name:** Adrenalin

<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>

## Indications
- Cardiac Arrest (VF, pulseless VT, asystole, PEA)
- Symptomatic Bradycardia unresponsive to atropine or pacing
- Anaphylaxis and severe allergic reaction
- Hypotension (Shock) unresponsive to volume resuscitation, hypotension with bradycardia

## Contraindications
- Uncontrolled hypertension is a relative contraindication, otherwise none

## 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:

<table>
<thead>
<tr>
<th><strong>Asystole/pulseless arrest, pulseless VT/VF</strong> (ACLS, 2015):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADULT</strong></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>
<tr>
<td>Endotracheal:</td>
</tr>
<tr>
<td>2-2.5 mg every 3-5 minutes until IV/IO access or ROSC; dilute in 5-10 mL NS or sterile water.</td>
</tr>
</tbody>
</table>

**Infant and children IV:** 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

<table>
<thead>
<tr>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Always Reference BROSELOW Tape</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Severe Hypotension/shock, fluid resistant and/or dopamine dose &gt;20mcg/kg/min</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADULT</strong></td>
</tr>
<tr>
<td>2-10 mcg/minute; titrate to desired effect (See Infusion chart next page)</td>
</tr>
<tr>
<td><strong>PEDIATRIC</strong></td>
</tr>
<tr>
<td>0.1 - 1 mcg/kg/minute titrated to desired effect</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Bradycardia (symptomatic; unresponsive to atropine or pacing)</strong> (ACLS, 2015):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADULT</strong></td>
</tr>
<tr>
<td>IV Continuous Infusion:</td>
</tr>
<tr>
<td>2-10 mcg/minute titrate to desired effect</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Brady Cardia (symptomatic; unresponsive to atropine or pacing)</strong> (ACLS, 2015):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PEDIATRIC</strong></td>
</tr>
<tr>
<td>0.01 mcg/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>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Severe Hypotension/shock and fluid resistant (unlabeled use):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: Continuous Infusion</td>
</tr>
<tr>
<td>0.1 - 1 mcg/kg/minute titrated to desired effect</td>
</tr>
</tbody>
</table>

**Asystole/pulseless arrest, pulseless VT/VF after failed DEFIB (PALS, 2015):**

**Bradycardia (symptomatic; unresponsive to atropine or pacing):** Infant and children

**Severe Hypotension/shock and fluid resistant (unlabeled use):**
### Epinephrine 1mg/10ml (1:10,000)

**Pressor for Hypotension**

**Dosing Range:** 2-10mcg/min (120-300mcg/hr)

**MIX 1 mg/500 mL**

**CONCENTRATION 2 mcg/mL**

<table>
<thead>
<tr>
<th>Dose (mcg/min)</th>
<th>Rate (mL/hr)</th>
<th>Micro 60 gtt/mL</th>
<th>Macro 20 gtt/mL</th>
<th>Macro 15 gtt/mL</th>
<th>Macro 10 gtt/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>60</td>
<td>60 gtt/min</td>
<td>20.00 gtt/min</td>
<td>15.00 gtt/min</td>
<td>10.00 gtt/min</td>
</tr>
<tr>
<td>3</td>
<td>90</td>
<td>90 gtt/min</td>
<td>30 gtt/min</td>
<td>23 gtt/min</td>
<td>15 gtt/min</td>
</tr>
<tr>
<td>4</td>
<td>120</td>
<td>120 gtt/min</td>
<td>40 gtt/min</td>
<td>30 gtt/min</td>
<td>20 gtt/min</td>
</tr>
<tr>
<td>5</td>
<td>150</td>
<td>150 gtt/min</td>
<td>50 gtt/min</td>
<td>38 gtt/min</td>
<td>25 gtt/min</td>
</tr>
<tr>
<td>6</td>
<td>180</td>
<td>180 gtt/min</td>
<td>60 gtt/min</td>
<td>45 gtt/min</td>
<td>30 gtt/min</td>
</tr>
<tr>
<td>7</td>
<td>210</td>
<td>210 gtt/min</td>
<td>70 gtt/min</td>
<td>53 gtt/min</td>
<td>35 gtt/min</td>
</tr>
<tr>
<td>8</td>
<td>240</td>
<td>240 gtt/min</td>
<td>80 gtt/min</td>
<td>60 gtt/min</td>
<td>40 gtt/min</td>
</tr>
<tr>
<td>9</td>
<td>270</td>
<td>270 gtt/min</td>
<td>90 gtt/min</td>
<td>68 gtt/min</td>
<td>45 gtt/min</td>
</tr>
<tr>
<td>10</td>
<td>300</td>
<td>300 gtt/min</td>
<td>100 gtt/min</td>
<td>75 gtt/min</td>
<td>50 gtt/min</td>
</tr>
</tbody>
</table>

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

Start at lowest dose and titrate to desired effect
# ETOMIDATE

**Class / Mechanism of Action**

**General Anesthetic**

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.

## Indications

**Labeled Indications:**
- Induction and maintenance of general anesthesia

## 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:

### ADULT

**RSI:**

- IV:
  - 0.3-0.5 mg/kg over 30-60 seconds for induction of anesthesia;

**Note:** 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.

### PEDIATRIC

**RSI:**

- IV:
  - Children <10
    - Despite dosing on Broselow tape, not the preferred induction agent for this group due to limited safety information
  - Children >10:
    - 0.2-0.4 mg/kg over 30-60 seconds will produce rapid sedation lasting 10-15 minutes.
      - Max dose: 20 mg

**Note:** 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.
## 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:

#### Pain Management:

- **ADULT**
  - IV: Slow (Unlabeled)
  - **0.5-1mcg/kg** PRN for breakout pain q 30-60 min
  - **Note:** Patients with prior opioid exposure may have increased tolerance and require higher dosing

- **PEDIATRIC**
  - IV: Slow (Unlabeled)
  - **0.5-1mcg/kg** PRN for breakout pain q 30-60 min

#### Sedation during mechanical ventilation:

- **ADULT**
  - IV:
    - **Initial Bolus:** **1-2mcg/kg**
    - Continued Sedation:
      - **0.5-1mcg/kg/hr** infusion (See Infusion chart next page)
        (Combine with 0.05-0.1mg/kg Midazolam for best effect)
        - Or
      - **0.5-2mcg/kg** IVP q 30-60min
  - **Note:** Titrate doses and intervals to pain relief/prevention. Monitor vital signs.

- **PEDIATRIC**
  - IV:
    - Initial Bolus: **1-2mcg/kg**
    - Continued Sedation: **0.5-2mcg/kg** q 30-60min or **0.5-1mcg/kg/hr** infusion
      (Combine with 0.05-0.1mg/kg Midazolam for best effect)

#### Pretreatment for RSI:

- 3-5 min prior to RSI in pt's with Increased ICP or Cardiac Ischemia (if situation allows):
  - **3mcg/kg** slow IV push

#### Non-Traumatic Chest Pain (Cardiac)

- **25-50mcg IV**
## 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>Macro (15 gtt/mL)</th>
<th>Macro (10 gtt/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>35</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>45</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>55</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>60</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>65</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>70</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>75</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>80</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>85</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>90</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>95</td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>105</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>110</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>115</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>120</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>125</td>
<td>13</td>
<td>13</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>130</td>
<td>13</td>
<td>13</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>135</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>140</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>145</td>
<td>15</td>
<td>15</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>150</td>
<td>15</td>
<td>15</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>155</td>
<td>16</td>
<td>16</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>160</td>
<td>16</td>
<td>16</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>165</td>
<td>17</td>
<td>17</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>170</td>
<td>17</td>
<td>17</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>175</td>
<td>18</td>
<td>18</td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>180</td>
<td>18</td>
<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**

**Trade Name:** Lasix

**Class / Mechanism of Action**

**Loop Diuretic**

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.

**Indications**

**Labeled Indications:** Management of edema associated with heart failure and hepatic or renal disease;
- Acute Pulmonary Edema
- Hypertension (alone or in combination with other antihypertensives)

**Contraindications**

- Hypersensitivity to furosemide or any component of the formulation
- Anuria (No pre-hospital utility in hypovolemic shock)

**Adverse Reactions / Precautions**

- Can cause profound diuresis with resulting shock and electrolyte depletion. Monitor closely
  - May cause: Hypovolemia, Hypotension, hyponatremia, hypokalemia
- May potentiate effect of additional antihypertensives

**Dose and Administration:**

### Acute pulmonary edema:

**IV**
- **40 mg** over 1-2 minutes. If response not adequate within 1 hour, may increase dose to 80 mg

### Edema, heart failure:

**IV, IM:**
- **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).

**Continuous IV Infusion:**
- **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 <1 mL/kg/hour, double as necessary to a maximum of 80-160 mg/hour.

**Edema, heart failure: Infants and Children**

**IV, IM:**
- **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
**GLUCAGON**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antidote, Hypoglycemia Antidote, Diagnostic agent</td>
</tr>
<tr>
<td>Raises blood glucose levels by stimulating increased production of cyclic AMP, promoting hepatic glycogenolysis and gluconeogenesis</td>
</tr>
</tbody>
</table>

**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 sulfonyleurea 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>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM, SubQ:</td>
</tr>
<tr>
<td>- 1 mg; may repeat in 20 minutes as needed</td>
</tr>
</tbody>
</table>

**Note:** IV dextrose should be given ASAP; if patient fails to respond to glucagon, IV dextrose must be given.

**Beta-blocker / Calcium channel blocker overdose (myocardial depression) unresponsive to standard measures (unlabeled use):**

<table>
<thead>
<tr>
<th>IV: (ACLS, 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 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</td>
</tr>
</tbody>
</table>

**Hypoglycemia:**

<table>
<thead>
<tr>
<th>IV, IM, SubQ:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>Children &lt;20 kg:</strong> 0.5 mg or 20-30 mcg/kg/dose; repeated in 20 pm.</td>
</tr>
<tr>
<td>- <strong>Children ≥20 kg:</strong> Adult dosing.</td>
</tr>
</tbody>
</table>

**Note:** IV dextrose should be given ASAP; if patient fails to respond to glucagon, IV dextrose must be given.

**Beta-blocker / Calcium channel blocker overdose (myocardial depression) unresponsive to standard measures (unlabeled use):**

<table>
<thead>
<tr>
<th>IV:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>30-150 mcg/kg</strong> bolus. Can be repeated if no response in 15 min. Follow with an infusion of 20-70 mcg/kg/hr; titrate infusion rate to achieve adequate hemodynamic response</td>
</tr>
</tbody>
</table>
**HEPARIN**

**Class / Mechanism of Action**

**Anticoagulant**
Inactivates thrombin and activated coagulation factors (IX, X, XI, XII, and plasmin) and prevents conversion of fibrinogen to fibrin.

**Indications**

**Labeled Indications:** Treatment of thromboembolic disorders

**Unlabeled:** ST elevation MI (STEMI) as an adjunct to thrombolysis; unstable angina/non-STEMI

**Contraindications**

- Hypersensitivity to heparin or any component of the formulation
- Active Bleeding (Trauma Patient)

**Adverse Reactions / Precautions**

- Continuously monitor for bleeding: Stop immediately if any bleeding occurs
- Urticarial reactions and anaphylaxis can occur

**Dose and Administration:**

<table>
<thead>
<tr>
<th>Acute coronary syndromes: STEMI/Unstable Angina as an adjunct to fibrinolysis (full-dose alteplase):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV:</strong></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:**

- **IV:** (unlabeled dosing)
  - **>1 year**
    - **DVT/PE:** **75 units/kg** IV push followed by continuous infusion of 20 units/kg/hour

**Note:** Heparin is ONLY for use only under written direction of referring provider or direct consultation with medical director.
**HETASTARCH**

**Class / Mechanism of Action**

**Plasma Volume Expander, Colloid**
Colloidal starch producing plasma volume expansion. Onset of Action: approximately 30 minutes

**Indications**

**Labeled Indications:** Volume expander used in treatment of hypovolemic / hemorrhagic shock

**Contraindications**
- Hypersensitivity to hydroxyethyl starch or any component of the formulation
- Renal failure with oliguria and anuria (not related to Hypovolemia)
- Fluid overload conditions, (pulmonary edema, congestive heart failure)
- Pre-existing bleeding or coagulation disorders (eg, von Willebrand’s disease): Use caution in bleeding disorders; may increase risk of more bleeding

**Adverse Reactions / Precautions**
- Anaphylactoid reactions (allergies to corn)

**Dose and Administration:**

**Plasma volume expansion:**

**IV**
- **250-500ml** Bolus. May repeat PRN (up to 1500 mL/day). Titrate to individual hemodynamic needs (Sys BP >90).

**Notes:**
- May be administered via infusion pump or pressure infusion.
- Do not administer with blood through the same line / tubing
- Change tubing or flush extensively with NS before administering blood through the same line.
# HYDROMORPHONE

**Lactation:** Yes (Not Recommended)  
**Trade Name:** Dilaudid

## Class / Mechanism of Action

**Opioid Analgesic**

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 10-20 minutes. Duration 2-4 hours

## Indications

**Labeled Indications:** Moderate to severe pain.

## Contraindications

- Hypersensitivity to hydromorphone or any component of the formulation
- Severe respiratory depression (in absence of resuscitative equipment or ventilator support)
- Acute or severe asthma
- Paralytic ileus

## Adverse Reactions / Precautions

- Always be prepared for use of paralytic and intubation (maintain positive control of airway).
- **Head trauma:** Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur.
- May cause Hypotension, Use with caution in hypovolemic patients.
- May cause life-threatening Reparatory depression
- CNS depression: Impairs physical and mental abilities

## Dose and Administration:

### ADULT

**Acute pain (moderate-to-severe):**

- IV: (Slow)
  - 0.2-1 mg every 2-3 hours as needed; patients with prior opioid exposure may require higher initial doses.
  - Critically ill patients (unlabeled dosing): 0.2-0.6 mg every 1-2 hours as needed or 0.5 mg every 3 hours as needed
  - Continuous infusion: Usual dosage range: 0.5-3 mg/hour (See infusion chart next page)

### PEDIATRIC

**Always Reference BROSELOW Tape**

**Acute pain (moderate-to-severe):**

- IV: (Slow)
  - Children: 0.015mg/kg IV q 4-6 PRN
  - Adolescents >50kg: Refer to adult dosing

---

**Quick Menu**
### 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/mL</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 gtt/min</td>
<td>8 gtt/min</td>
<td>6 gtt/min</td>
<td>4 gtt/min</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
<td>50 gtt/min</td>
<td>17 gtt/min</td>
<td>13 gtt/min</td>
<td>8 gtt/min</td>
</tr>
<tr>
<td>1.5</td>
<td>75</td>
<td>75 gtt/min</td>
<td>25 gtt/min</td>
<td>19 gtt/min</td>
<td>13 gtt/min</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>100 gtt/min</td>
<td>33 gtt/min</td>
<td>25 gtt/min</td>
<td>17 gtt/min</td>
</tr>
<tr>
<td>2.5</td>
<td>125</td>
<td>125 gtt/min</td>
<td>42 gtt/min</td>
<td>31 gtt/min</td>
<td>21 gtt/min</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
<td>150 gtt/min</td>
<td>50 gtt/min</td>
<td>38 gtt/min</td>
<td>25 gtt/min</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>Class / Mechanism of Action</th>
<th>HYDROXOCOBALAMIN</th>
<th>Lactation? (Caution)</th>
<th>Trade Name: Cyanokit®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antidote; Vitamin</td>
<td></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>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
<th>Labeled Indications:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• IM: Treatment of pernicious anemia and B12 deficiencies</td>
</tr>
<tr>
<td></td>
<td>• IV: (Cyanokit®) Treatment of known or suspected cyanide poisoning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• No contraindications when treating for suspected or known cyanide poisoning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• May cause transient hypertension (≥180mmHG systolic, ≥110mmHG diastolic)</td>
</tr>
<tr>
<td></td>
<td>• Will cause red colored urine and skin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyanide Poisonings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</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: 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>
</tbody>
</table>

| Cyanide Poisonings:      |       |-----------|
| IV: (Unlabeled Use)      |       |           |
| • Initial: 70mg/kg (max 5 grams) as single infusion given over 15 min |       |           |
|   o Repeat a second dose of 35mg/kg based on severity and clinical response. |       |           |
| Smoke Inhalation / Fire victims: (Closed space exposure with evidence of airway injury: soot in mouth / nose / sputum) |       |           |
| • May present with both cyanide and carbon monoxide poisoning. Hydroxocobalamin is the agent of choice for treating cyanide toxicity in this setting. |       |           |

Always Reference BROSELOW Tape
## KETAMINE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Anesthetic</td>
</tr>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

### 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
  - Eg. Hypertensive, spontaneous cerebral hemorrhage. Use with extreme caution in patients with head injury, intracranial lesions, or elevated intracranial pressure (ICP)
  - Cushing’s Reflex: Hypertension & Bradycardia +/- Respiratory depression

### Adverse Reactions / Precautions

- Rapid IV dose or overdose may cause respiratory depression, always be prepared to manage airway
- Preferred general anesthetic / sedative for hypo/normotensive head injury patient without increased cerebral pressure.
  - May increase cerebrospinal fluid pressure. Use with caution in patients with suspected elevated CSF pressure.

### Dose and Administration:

<table>
<thead>
<tr>
<th>LOW DOSE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesia (unlabeled use):</td>
</tr>
<tr>
<td>IV/IO Push (over 1 min)</td>
</tr>
<tr>
<td>• 0.1 - 0.2 mg/kg, repeat q 10-30 prn</td>
</tr>
<tr>
<td>IM/IN Push (over 1 min)</td>
</tr>
<tr>
<td>• 0.5 mg/kg, repeat q 10-30 prn</td>
</tr>
<tr>
<td>CoTCCC recommendations for analgesia:</td>
</tr>
<tr>
<td>• 20 mg IV/IO, repeat q 20 min prn</td>
</tr>
<tr>
<td>• 50 mg IM/IN, repeat q 30 min prn</td>
</tr>
</tbody>
</table>

| HIGH DOSE: |
| RSI / Induction of anesthesia: |
| IV Push |
| • 1-2 mg/kg |
| IM |
| • 4-10 mg/kg |

| Maintenance of anesthesia: |
| IV Bolus: |
| • ½ to Full induction dose every 10-20 minutes |
| IV Continuous Infusion |
| • 1-3 mg/kg/hr. Titrate levels by 0.25mg/kg/hr PRN to achieve appropriate sedation. (See infusion chart next page) |

| Analgesia (unlabeled use): |
| IM: |
| • 0.4 mg/kg, repeat q 10-30 prn |
| IV: |
| • 0.3 mg/kg, repeat q 10-30 prn |

| Induction of anesthesia (unlabeled dosing): |
| IV: |
| • 1-2 mg/kg |

| Maintenance of anesthesia: |
| IV Bolus: |
| • ½ to Full induction dose every 20-30 minutes |
| IV Continuous Infusion: |
| • 1-2 mg/kg/hr. Titrate levels by 0.25mg/kg/hr PRN to achieve appropriate sedation. (See infusion chart next page) |

Children >15 years: Adult dosing

---

**Avoid sub-dissociative doses to prevent emergence phenomenon.**
<table>
<thead>
<tr>
<th>Pt. Weight</th>
<th>Dose Rate</th>
<th>Micro (60 gtt/mL)</th>
<th>Macro (60 gtt/mL)</th>
<th>Dose Rate</th>
<th>Micro (60 gtt/mL)</th>
<th>Macro (60 gtt/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>45 mcg/kg/min</td>
<td>45 gtt/mL</td>
<td>15 gtt/min</td>
<td>11 gtt/min</td>
<td>8 gtt/min</td>
<td>20 mcg/kg/min</td>
</tr>
<tr>
<td>20</td>
<td>45 mcg/kg/min</td>
<td>60 gtt/mL</td>
<td>20 gtt/min</td>
<td>15 gtt/min</td>
<td>10 gtt/min</td>
<td>20 mcg/kg/min</td>
</tr>
<tr>
<td>25</td>
<td>75 mcg/kg/min</td>
<td>75 gtt/mL</td>
<td>25 gtt/min</td>
<td>19 gtt/min</td>
<td>13 gtt/min</td>
<td>20 mcg/kg/min</td>
</tr>
<tr>
<td>30</td>
<td>90 mcg/kg/min</td>
<td>90 gtt/mL</td>
<td>30 gtt/min</td>
<td>23 gtt/min</td>
<td>15 gtt/min</td>
<td>25 mcg/kg/min</td>
</tr>
<tr>
<td>35</td>
<td>105 mcg/kg/min</td>
<td>105 gtt/mL</td>
<td>35 gtt/min</td>
<td>26 gtt/min</td>
<td>18 gtt/min</td>
<td>30 mcg/kg/min</td>
</tr>
<tr>
<td>40</td>
<td>120 mcg/kg/min</td>
<td>120 gtt/mL</td>
<td>40 gtt/min</td>
<td>30 gtt/min</td>
<td>20 gtt/min</td>
<td>35 mcg/kg/min</td>
</tr>
<tr>
<td>45</td>
<td>135 mcg/kg/min</td>
<td>135 gtt/mL</td>
<td>45 gtt/min</td>
<td>34 gtt/min</td>
<td>24 gtt/min</td>
<td>40 mcg/kg/min</td>
</tr>
<tr>
<td>50</td>
<td>150 mcg/kg/min</td>
<td>150 gtt/mL</td>
<td>50 gtt/min</td>
<td>38 gtt/min</td>
<td>28 gtt/min</td>
<td>45 mcg/kg/min</td>
</tr>
<tr>
<td>55</td>
<td>165 mcg/kg/min</td>
<td>165 gtt/mL</td>
<td>55 gtt/min</td>
<td>41 gtt/min</td>
<td>30 gtt/min</td>
<td>50 mcg/kg/min</td>
</tr>
<tr>
<td>60</td>
<td>180 mcg/kg/min</td>
<td>180 gtt/mL</td>
<td>60 gtt/min</td>
<td>45 gtt/min</td>
<td>33 gtt/min</td>
<td>55 mcg/kg/min</td>
</tr>
<tr>
<td>65</td>
<td>195 mcg/kg/min</td>
<td>195 gtt/mL</td>
<td>65 gtt/min</td>
<td>49 gtt/min</td>
<td>36 gtt/min</td>
<td>60 mcg/kg/min</td>
</tr>
<tr>
<td>70</td>
<td>210 mcg/kg/min</td>
<td>210 gtt/mL</td>
<td>70 gtt/min</td>
<td>53 gtt/min</td>
<td>39 gtt/min</td>
<td>65 mcg/kg/min</td>
</tr>
<tr>
<td>75</td>
<td>225 mcg/kg/min</td>
<td>225 gtt/mL</td>
<td>75 gtt/min</td>
<td>56 gtt/min</td>
<td>42 gtt/min</td>
<td>70 mcg/kg/min</td>
</tr>
<tr>
<td>80</td>
<td>240 mcg/kg/min</td>
<td>240 gtt/mL</td>
<td>80 gtt/min</td>
<td>60 gtt/min</td>
<td>45 gtt/min</td>
<td>75 mcg/kg/min</td>
</tr>
<tr>
<td>85</td>
<td>255 mcg/kg/min</td>
<td>255 gtt/mL</td>
<td>85 gtt/min</td>
<td>63 gtt/min</td>
<td>48 gtt/min</td>
<td>80 mcg/kg/min</td>
</tr>
<tr>
<td>90</td>
<td>270 mcg/kg/min</td>
<td>270 gtt/mL</td>
<td>90 gtt/min</td>
<td>68 gtt/min</td>
<td>51 gtt/min</td>
<td>85 mcg/kg/min</td>
</tr>
<tr>
<td>95</td>
<td>285 mcg/kg/min</td>
<td>285 gtt/mL</td>
<td>95 gtt/min</td>
<td>72 gtt/min</td>
<td>54 gtt/min</td>
<td>90 mcg/kg/min</td>
</tr>
<tr>
<td>100</td>
<td>300 mcg/kg/min</td>
<td>300 gtt/mL</td>
<td>100 gtt/min</td>
<td>76 gtt/min</td>
<td>57 gtt/min</td>
<td>95 mcg/kg/min</td>
</tr>
</tbody>
</table>

**Macro-Drip is set of choice for this infusion**

**Sample patient:** 80kg pt at 1-3mg/kg/hr (17-50mcg/kg/min)

---

**KETAMINE (KETALAR)**

**Dosing Range:** 1-3mg/kg/hr (17-50mcg/kg/min)

**MIX 500 mg/500 mL CONCENTRATION 1 mg/mL**

---

**Sample patient:** 80kg pt at 1-3mg/kg/hr (81-240mg/hr (81-240ml/hr)
**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><strong>Patients ≥50 kg</strong></td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>IM:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 30-60 mg as a single dose or 15-30 mg every 6 hours (maximum daily dose: 120 mg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 10-15 mg as a single dose or 15 mg every 6 hours (maximum daily dose: 120 mg)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Adults ≥65 years and/or adults ≤50 kg       |       |           |
| IM:                                         |       |           |
| • 30 mg as a single dose or 15 mg every 6 hours (maximum daily dose: 60 mg) |       |           |
| IV:                                         |       |           |
| • 15 mg as a single dose or 15 mg every 6 hours (maximum daily dose: 60 mg) |       |           |

<table>
<thead>
<tr>
<th>Pain management (acute; moderately severe):</th>
<th>Adolescents &gt;17 years only:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adolescents &gt;17 years only:</strong></td>
<td>Refer to adult dose</td>
</tr>
</tbody>
</table>
# 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  
- **Brady cardia <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:**

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute Hypertension (hypertensive emergency/urgency):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypertensive Crisis Urgency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sys: 180-220/Dia: 105-120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 10 mg IV for 1-2 minutes. May repeat or double q 10 min to max dose of 300mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypertensive Crisis Emergency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sys: &gt;220/Dia: 121-140)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 10-20 mg IV for 1-2 min; May repeat or double q 10 min to max dose of 300mg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Continuous Infusion:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If continued medication required, 2mg/min; titrate to desired response up to max 300mg dose.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Goal to lower MAP by no more than 20% within minutes to one hour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypertension emergencies:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Continuous Infusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Intermittent bolus doses of 0.3-1 mg/kg/dose have been reported</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trade Name: **Trandate**
## LIDOCAINE

<table>
<thead>
<tr>
<th>Lactation Yes (Caution)</th>
<th>Trade Name: Xylocaine(Cardiac)</th>
</tr>
</thead>
</table>

### Class / Mechanism of Action

Antiarrhythmic

Suppresses automaticity of cardiac conduction tissue.

### 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: ADULT

#### 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/IO

### PEDIATRIC

Always Reference BROSELOW Tape

#### 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).
<table>
<thead>
<tr>
<th><strong>LORAZEPAM</strong></th>
<th><strong>Trade Name:</strong> Ativan</th>
<th><strong>Lactation:</strong> Yes (not recommended)</th>
</tr>
</thead>
</table>

### Class / Mechanism of Action

**Benzodiazepine**
Acts as an Anxiolytic/Hypnotic, anticonvulsant and sedative.
Onset of action: IV Sedation 2-3 minutes; IM hypnotic, 15-30 minutes. Duration: IV, 8-12 hours.

### 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><strong>Acute Seizures:</strong></th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2mg over 2-5min.</td>
<td>Max dose 8mg in 12hr period.</td>
<td></td>
</tr>
<tr>
<td>Repeat in 10-15min.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Rapid tranquilization of agitated / combative patient</strong> (unlabeled use):</th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2mg every 30-60 minutes; may be used alone or administered with an antipsychotic (i.e. haloperidol)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Acute Seizures / Status epilepticus</strong> (unlabeled use):</th>
<th><strong>IV:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05-0.1 mg/kg; repeat doses every 10-15 minutes for clinical effect. Max 4mg</td>
<td></td>
</tr>
</tbody>
</table>

**Agitation:**

- 0.05 mg/kg/dose q 20-30 min PRN
# Magnesium Sulfate

**Lactation:** Yes (Caution)

## 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
- Torsade de Pointes: Cardiac arrhythmias (VT/VF) caused by low serum magnesium

## Contraindications

- Hypersensitivity to 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:

<table>
<thead>
<tr>
<th>Torsades de pointes or VF/pulseless VT associated with torsades de pointes (unlabeled use):</th>
<th>ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1-2 g over 15 minutes (ACLS, 2015)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Wheezing in Respiratory Distress (3rd line drug):**

- IV:
  - 2 Grams over 20 min

**Seizure (Refractory to Benzodiazepines):**

- IV:
  - 1-2 Grams over 30 min

**Eclampsia/pre-eclampsia, severe (unlabeled):**

- IV:
  - 4-6 g over 15-20 minutes followed by 2 g/hour continuous infusion

**Torsades de pointes: (PALS, 2015)**

- 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 dehydration: (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:

**ADULT**

**PEDIATRIC** Always Reference BROSELOW Tape

**Moderate to severe head injury, Patient continuing to deteriorate or showing signs of herniation despite adjustment to ventilation and starting hypertonic saline.**

- **IV**
  - 1 g/kg IV bolus over <20 minutes.
  - Follow with 0.25 g/kg IVP every 4 hours

**Increased intracranial pressure (unlabeled dosing):**

- **IV:**
  - 0.25-1 g/kg/dose;
  - Maintenance dose of 0.25-0.5 g/kg IV q 4-6hrs prn to maintain serum osmolality <300-320 mOsm/kg

**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.
### Methyprednisolone

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systemic Corticosteroid</td>
</tr>
<tr>
<td>Anti-inflammatory, Immunosuppressant, shock</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Treatment of a variety of diseases: allergic, inflammatory, hematologic, neoplastic, and autoimmune;</td>
</tr>
<tr>
<td><strong>Unlabeled:</strong> None identified unless added by medical direction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypersensitivity to methylprednisolone or any component of the formulation</td>
</tr>
<tr>
<td>No other in emergency setting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not for use in treatment of head injury; increased mortality has occurred in head injury patients treated with high dose IV methylprednisolone.</td>
</tr>
<tr>
<td>No immediate effect will be observed while treating in the pre-hospital environment. Onset of action may take several hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration: ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
</table>

#### Asthma exacerbations, including status asthmaticus

**IV:**
- **125mg** x 1 dose

**Allergic Reaction:**
- **125mg** x 1 dose

**Note:** Only methylprednisolone sodium succinate can be used for IV doses.

#### 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**
- **2 mg/ kg** x 1 dose

**Note:** Only methylprednisolone sodium succinate can be used for IV doses.
### MIDAZOLAM

**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, 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:

<table>
<thead>
<tr>
<th><strong>Induction for RSI; Continued sedation; Hyperthermia:</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>
<td></td>
<td><strong>0.1mg/kg IV/IO q 15-30 min PRN</strong></td>
</tr>
<tr>
<td><strong>Sedation for Transcutaneous Pacing; Cardioversion:</strong></td>
<td></td>
<td><strong>2.5-5mg q 15-30 PRN</strong></td>
</tr>
<tr>
<td><strong>Bites/envenomation’s; Seizures (all causes); Combative Pt’s:</strong></td>
<td></td>
<td><strong>0.05-0.1mg/kg q 15-30 PRN</strong></td>
</tr>
<tr>
<td><strong>IV</strong></td>
<td></td>
<td><strong>0.2-0.5 mg/kg (maximum total dose: 10 mg or</strong></td>
</tr>
<tr>
<td><strong>Status epilepticus, prehospital treatment</strong> (unlabeled use):</td>
<td></td>
<td><strong>5 mg per nare</strong></td>
</tr>
<tr>
<td><strong>IV:</strong></td>
<td></td>
<td><strong>10 mg once for seizures &gt;15min or two or</strong></td>
</tr>
<tr>
<td><strong>Seizure</strong></td>
<td></td>
<td><strong>more successive seizures without a period of</strong></td>
</tr>
<tr>
<td><strong>IV, IM:</strong></td>
<td></td>
<td><strong>consciousness / recovery.</strong></td>
</tr>
</tbody>
</table>

**Procedural sedation; Transcutaneous Pacing; Cardioversion:**
- **IV:**
  - **0.05-0.1mg/kg q 15-30 PRN**
  - **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**

**Status epilepticus, prehospital treatment** (unlabeled use):
- **IV:**
  - **13-40 kg: 5 mg once**
  - **>40 kg: Refer to adult dosing**

**Seizure**
- **IV, IM:**
  - **0.2 mg/kg Q 15-30 PRN**
### MORPHINE

#### Class / Mechanism of Action
**Opioid Analgesic**
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 variable but rapid, Duration variable, patient dependent.

#### Indications
**Labeled Indications:** Moderate to severe acute and chronic pain; pain of myocardial infarction; preanesthetic medication

#### Contraindications
- Hypersensitivity to morphine sulphate or any component of the formulation
- Severe respiratory depression
- Acute or severe asthma (in an unmonitored setting or without resuscitative equipment)
- Paralytic ileus

#### Adverse Reactions / Precautions
- Always be prepared for use of paralytic and intubation (maintain positive control of airway).
- **Head trauma:** Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur. Some formulations are specifically contraindicated.
- May cause Hypotension, Use with caution in hypovolemic patients.
- 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>Chest Pain/AMI:</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><strong>2-5 mg</strong> q 5-15 min PRN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute pain (moderate-to-severe):</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM, SubQ:</td>
</tr>
<tr>
<td><strong>5-10 mg</strong> every 4 hours as needed; usual dosage range: 5-15 mg every 4 hours as needed. Patients with prior opioid exposure may require higher initial doses.</td>
</tr>
<tr>
<td>IV:</td>
</tr>
<tr>
<td><strong>2-3 mg</strong> every 5 minutes until pain relief or if associated sedation, oxygen saturation &lt;95%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute pain (moderate-to-severe):</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM, SubQ:</td>
</tr>
<tr>
<td><strong>0.1-0.2 mg/kg.</strong></td>
</tr>
</tbody>
</table>

| IV:                             |
| **0.1-0.2 mg/kg q 120 min PRN, not to exceed 10 mg per dose** |

<table>
<thead>
<tr>
<th>Continuous infusion:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10-30 mcg/kg/hour; titrate PRN for pain</strong></td>
</tr>
</tbody>
</table>
**NALOXONE**  
♀, Lactation *(Caution)*  
Trade Name: Narcan

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Antidote, Opioid Antagonist</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Competes and displaces opioids at opioid receptor sites, reversing narcotic effects.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
<th>Labeled Indications: Reversal of opioid drug effects, including respiratory depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contraindications</td>
<td>Hyper sensitivity to naloxone or any component of the formulation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>Recurrence of respiratory depression is possible continue to watch for respiratory depression until patient hand-off.</td>
</tr>
<tr>
<td>May cause narcotic withdrawal effects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opioid overdose</strong> (with standard ACLS protocols):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV, IM, SubQ:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0.4-2 mg; may dose every 2-3 minutes if needed;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o If no response after 10 mg total, look for other cause of respiratory depression.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Following reversal, may need to readminister after 20-60 minutes.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reversal of respiratory depression with therapeutic opioid doses:**  
IV, IM, SubQ:  
• 0.1-0.4 mg titrated to adequate respiratory rate. If not improved after 0.8 mg total, look for other cause of respiratory depression.  

**Opioid overdose** (with standard PALS protocols):  
IV, IM, SubQ:  
• <5 years or ≤20 kg (unlabeled dose): 0.1 mg/kg/dose (maximum dose: 2 mg); repeat every 2-3 minutes PRN  
• ≥5 years or >20 kg: Adult Dosing  

**Reversal of respiratory depression with therapeutic opioid doses:**  
IV, IM, SubQ:  
• 0.001-0.015 mg/kg/dose; repeat as needed.
**NIFEDIPINE**

<table>
<thead>
<tr>
<th>Lactation</th>
<th>Trade Name: Procardia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>(Not Recommended)</td>
</tr>
</tbody>
</table>

### Class / Mechanism of Action

**Antianginal Agent, Calcium Channel Blocker**

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).

### 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:

**High altitude pulmonary edema (unlabeled use):**

PO:
- **10 mg** every 4-6 hours

**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:

### Angina/coronary artery disease:
**PO:**
- **Sublingual**: 0.4 mg every 5 minutes for maximum of 3 doses in 15 minutes
- **Translingual**: 1 spray (0.4mg per spray) onto or under tongue every 3-5 minutes for maximum of 3 doses in 15 minutes

### 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 related Respiratory Distress:
**IV Drip:**
- Start at 10 mcg/min, titrate up or down to:
  - 10% reduction in MAP if normotensive
  - 30% reduction in MAP if hypertensive.
  - Max dose: 400mcg/minute

### 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)
**NOREPINEPHRINE**  
♀️ Lactation *(Caution)*  
Trade Name: **Levophed**

### 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.

ACLS Guidelines 2010: 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 Vescicant; 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: **ADULT**

<table>
<thead>
<tr>
<th>Hypotension/shock:</th>
<th></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>
</tr>
<tr>
<td>• Initial: 2-20 mcg/minute; titrate to effect.</td>
<td></td>
</tr>
<tr>
<td>o Maintenance: 2-4 mcg/minute</td>
<td></td>
</tr>
<tr>
<td><strong>Post ROSC Hypotension:</strong></td>
<td></td>
</tr>
<tr>
<td>• Initial: 0.1-0.5 mcg/kg/minute titrate to effect.</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:** 2-20mcg/min (120-1200mcg/hr)

**MIX 4 mg/500 mL**

**CONCENTRATION 8 mcg/mL**

<table>
<thead>
<tr>
<th>Dose mcg/min</th>
<th>Rate mL/hr</th>
<th>Micro (60 gtt/mL) 20 gtt/mL</th>
<th>Macro (60 gtt/mL) 15 gtt/mL</th>
<th>Macro (60 gtt/mL) 10 gtt/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>15</td>
<td>15</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>23</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>30</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>38</td>
<td>38</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>45</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>53</td>
<td>53</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
<td>60</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>68</td>
<td>68</td>
<td>23</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
<td>75</td>
<td>25</td>
<td>19</td>
</tr>
<tr>
<td>11</td>
<td>83</td>
<td>83</td>
<td>28</td>
<td>21</td>
</tr>
<tr>
<td>12</td>
<td>90</td>
<td>90</td>
<td>30</td>
<td>23</td>
</tr>
<tr>
<td>13</td>
<td>98</td>
<td>98</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>14</td>
<td>105</td>
<td>105</td>
<td>35</td>
<td>26</td>
</tr>
<tr>
<td>15</td>
<td>113</td>
<td>113</td>
<td>38</td>
<td>28</td>
</tr>
<tr>
<td>16</td>
<td>120</td>
<td>120</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>17</td>
<td>128</td>
<td>128</td>
<td>43</td>
<td>32</td>
</tr>
<tr>
<td>18</td>
<td>135</td>
<td>135</td>
<td>45</td>
<td>34</td>
</tr>
<tr>
<td>19</td>
<td>143</td>
<td>143</td>
<td>48</td>
<td>36</td>
</tr>
<tr>
<td>20</td>
<td>150</td>
<td>150</td>
<td>50</td>
<td>38</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 0.5mcg/min every 2 minutes PRN to target MAP >60mmHg.
### ONDANSETRON (Zofran)

**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:

#### Nausea and Vomiting

<table>
<thead>
<tr>
<th>Route</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO/IM/PO</td>
<td>4-8 mg</td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td><strong>Treatment of severe or refractory hyperemesis gravidarum (unlabeled use):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV:</td>
<td>8 mg administered over 15 minutes every 12 hours</td>
<td></td>
</tr>
</tbody>
</table>
## PHENYLEPHRINE 📌, Lactation? (Caution)  
**Trade Name:** Neosynephrine

### Class / Mechanism of Action
**Alpha Adrenergic Agonist**  
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.

### Indications
**Labeled Indications:** Treatment of hypotension, vascular failure in shock

### Contraindications
- Hypersensitivity to phenylephrine or any component of the formulation  
- Ventricular Tachycardia and Hypertension

### 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.  
- Not recommended for routine use in the treatment of septic 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

### Dose and Administration:

<table>
<thead>
<tr>
<th>Hypotension / Shock:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV Push:</strong></td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>‧ <strong>100-500 mcg/dose</strong> every 10-15 minutes as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‧ initial dose should not exceed 500 mcg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‧ Start with lower doses and adjust higher based on length of desired hemodynamic effect</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IV Infusion:**  
- **100 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.

**Maintenance infusion:**  
- Rate of **40-60 mcg/min** after BP stabilizes.

- **Mixing Phenylephrine Solution**  
  Mix 10 mg phenylephrine in 250 mL D5W/NS for a concentration of 40 mcg/mL or Mix 10 mg phenylephrine in 100 mL NS for a concentration of 100 mcg/mL if using push-dose.

If unable to maintain MAP >60mmHg, add Epinephrine infusion.
## PRALIDOXIME 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 2.1 mg and pralidoxime chloride 600 mg through one needle.

**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.
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:

<table>
<thead>
<tr>
<th>Antiemetic:</th>
<th>ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV push over &gt;1 minute</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>12.5 mg, not to exceed 25 mg</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- May repeat 12.5mg once after 10 minutes if first dose ineffective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Subsequent dose of 25mg may be given every 4 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Can dilute with 10-20mL of NS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Sedation, analgesia/hypnotic adjunct: | | |
| IM, IV: | | |
| **25-50 mg** in combination with analgesic or hypnotic (at reduced dosage) | | |

| Allergic conditions (including allergic reactions to blood or plasma): | | |
| IM, IV: | | |
| **25 mg**, may repeat in 2 hours when necessary | | |

| 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**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Anesthetic</td>
</tr>
<tr>
<td>Lipophilic intravenous general anesthetic.</td>
</tr>
<tr>
<td>Onset of action IV bolus: 9-51 seconds (average 30 seconds), Duration is dose and rate dependent: 3-10 minutes, prolonged with continued doses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications</strong>: Induction of anesthesia in patients ≥3 years of age; maintenance of anesthesia in patients &gt;2 months of age; sedation in intubated, mechanically-ventilated ICU patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hypersensitivity to propofol or any component of the formulation</td>
</tr>
<tr>
<td>- Allergy to eggs, egg products, soybeans, soy products, and peanuts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- May cause Hypotension especially in hypovolemic patients or if bolus dosing is used.</td>
</tr>
<tr>
<td>- Head Injury patients or those with suspected / known increased intracranial pressure are at increased risk of decreased cerebral perfusion pressure.</td>
</tr>
<tr>
<td>- Do not use in pre-hospital trauma environment or in transfer patients unless directed by medical director or provided written orders by referring provider.</td>
</tr>
<tr>
<td>- No Analgesic properties. Must supplement with analgesic agents.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADULT</strong></td>
</tr>
<tr>
<td><strong>Sedation/ RSI</strong>: (For use in intubated patients only)</td>
</tr>
<tr>
<td>IV Push:</td>
</tr>
<tr>
<td>- 0.5-1.5 mg/kg every 5-10min PRN.</td>
</tr>
<tr>
<td>Maintenance of general anesthesia:</td>
</tr>
<tr>
<td>IV Infusion:</td>
</tr>
<tr>
<td>- 10-50 mcg/kg/min via infusion pump or Dial-a-Drip.Titrate to minimum effective dose. (See infusion chart next page)</td>
</tr>
<tr>
<td>- MAX DOSE: 100 mcg/kg/min.</td>
</tr>
<tr>
<td>- Use of Dial-a-Drip tubing in the absence of an infusion pump will increase accuracy of infusion dosage.</td>
</tr>
</tbody>
</table>

| **PEDIATRIC** |
| Sedation/ RSI: (For use in intubated patients only) |
| IV Push: |
| - 3 mg/kg every 5-10min PRN. |
| Maintenance of general anesthesia, |
| IV Infusion: |
| Healthy children 2 months to 16 years: |
| - 125-300 mcg/kg/minute (or 7.5-18 mg/kg/hour) |

Note: Wait 3-5 minutes between dosage changes to clinically assess drug effects. Smaller doses are required when used with opioids.
**PROPOFOL (DIPRIVAN)**

**Dosing Range:** 10–50 mcg/kg/min (600–3000 mcg/kg/hr)

**CONCENTRATION:** 10 mg/mL

<table>
<thead>
<tr>
<th>Pt. Weight</th>
<th>Dose Rate Micro (60 gtt/mL)</th>
<th>Dose Rate Macro (60 gtt/mL)</th>
<th>Dose Rate Micro (10 gtt/mL)</th>
<th>Dose Rate Macro (10 gtt/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>mcg/kg/min</td>
<td>mL/hr</td>
<td>gtt/min</td>
<td>gtt/min</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>35</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>40</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>45</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>15</td>
<td>15</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**Macro-Drip (20 gtt/mL) or Micro-Drip is set of choice for this infusion**

Titrate to minimum effective dose. Allow 3–5 minutes between dosing changes to sedative and hemodynamic effects.

---

**PROPOFOL (DIPRIVAN)**

**Dosing Range:** 10–50 mcg/kg/min (600–3000 mcg/kg/hr)

**CONCENTRATION:** 10 mg/mL

<table>
<thead>
<tr>
<th>Pt. Weight</th>
<th>Dose Rate Micro (60 gtt/mL)</th>
<th>Dose Rate Macro (60 gtt/mL)</th>
<th>Dose Rate Micro (10 gtt/mL)</th>
<th>Dose Rate Macro (10 gtt/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>mcg/kg/min</td>
<td>mL/hr</td>
<td>gtt/min</td>
<td>gtt/min</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>25</td>
<td>11</td>
<td>11</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>30</td>
<td>13</td>
<td>13</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>35</td>
<td>15</td>
<td>15</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>17</td>
<td>17</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>45</td>
<td>19</td>
<td>19</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>50</td>
<td>21</td>
<td>21</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

**Macro-Drip (20 gtt/mL) or Micro-Drip is set of choice for this infusion**

Titrate to minimum effective dose. Allow 3–5 minutes between dosing changes to sedative and hemodynamic effects.
RANITIDINE (Caution)  
Trade Name: Zantac

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histamine H&lt;sub&gt;2&lt;/sub&gt; Antagonist</td>
</tr>
<tr>
<td>H&lt;sub&gt;2&lt;/sub&gt; Antagonist block the action of histamine at the H&lt;sub&gt;2&lt;/sub&gt; receptors of the parietal cells in the stomach. Onset of action IV: 1-2 minutes, Duration: approximately 2-5 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled Indications: Pathological hypersecretory conditions; Anaphylaxis-adjunct therapy (off label)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypersensitivity to ranitidine or any component of the formulation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection: Rapid administration has been associated with bradycardia (rare), usually in patients with predisposing risk factors for cardiac rhythm disorders. Do not exceed the recommended IV administration rate(s)</td>
</tr>
<tr>
<td>Confusion: Rare cases of reversible confusion have been associated with ranitidine; usually elderly or severely ill patients</td>
</tr>
<tr>
<td>Drug-drug interactions: Potentially significant interactions may exist</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaphylaxis-adjunct therapy:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV: Must be diluted.</td>
<td>50mg IV initial dose.</td>
<td></td>
</tr>
<tr>
<td>Intermittent bolus:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum rate of administration of 10 mg/minute (infuse over at least 5 minutes); however, in adults may also be administered at a maximum rate of 25 mg/minute (or over 2 minutes) if necessary.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pathological hypersecretory conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous IV infusion:</td>
</tr>
<tr>
<td>administer at a rate of 1 mg/kg/hour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anaphylaxis-adjunct therapy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: Must be diluted.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pathological hypersecretory conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous IV infusion:</td>
</tr>
<tr>
<td>administer at a rate of 0.1 mg/kg/hour</td>
</tr>
</tbody>
</table>
**ROCURONIUM**

**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 30 minutes (increases with higher doses)

**Indications**

Labeled Indications: Rapid sequence 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>ADULT</th>
<th>PEDIATRIC (Always Reference BROSELOW Tape)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rapid sequence intubation (RSI):</strong></td>
<td><strong>Rapid sequence intubation (unlabeled use):</strong></td>
</tr>
<tr>
<td>IV Push:</td>
<td>IV:</td>
</tr>
<tr>
<td>• 1mg/kg</td>
<td>• 1mg/kg</td>
</tr>
<tr>
<td>(Dosing ranges from 0.6-1.2 mg/kg)</td>
<td>(Dosing ranges from 0.9 mg/kg or 1.2 mg/kg.)</td>
</tr>
<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>
<td><strong>Army Rotary wing RSI and maintenance bolus dosing:</strong> (unlabeled and unreferenced dose)</td>
</tr>
<tr>
<td></td>
<td>IV Push:</td>
</tr>
<tr>
<td></td>
<td>• 1mg/kg every 30-45 minutes</td>
</tr>
<tr>
<td><strong>Army Rotary wing RSI and maintenance bolus dosing:</strong> (unlabeled and unreferenced dose)</td>
<td><strong>Maintenance for continued surgical relaxation:</strong></td>
</tr>
<tr>
<td>IV Push:</td>
<td>IV:</td>
</tr>
<tr>
<td>• 1mg/kg every 30-45 minutes</td>
<td>• Bolus: 0.075-0.15 mg/kg</td>
</tr>
<tr>
<td><strong>ICU paralysis (eg, facilitate mechanical ventilation):</strong></td>
<td>- Redosing interval is guided by monitoring with a peripheral nerve stimulator or</td>
</tr>
<tr>
<td>IV:</td>
<td>• Continuous infusion: 7-12 mcg/kg/minute (0.42-0.72 mg/kg/hour)</td>
</tr>
<tr>
<td>• Initial bolus dose: 0.6-1 mg/kg,</td>
<td>- Use lower end of the continuous infusion dosing range for neonates and infants up to age 28 days and the upper end for children &gt;2 to ≤11 years of age</td>
</tr>
</tbody>
</table>
| • Maintenance: continuous infusion of 8-12 mcg/kg/minute | **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.
# SODIUM BICARBONATE

## Class / Mechanism of Action

**Alkalinizing 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></td>
</tr>
<tr>
<td>IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 mEq/kg; May repeat to maintain QRS &lt;100</td>
<td></td>
<td>Follow Adult Dosing</td>
</tr>
<tr>
<td>Start Maintenance Infusion: 100-150mEq (2-3 amps) in 1 L D5 / NS @ 100-200 mL/hr IV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cardiac arrest (ACLS Guidelines, 2015):**

<table>
<thead>
<tr>
<th>IV:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mEq/kg dose; repeat doses should be guided by arterial blood gases</td>
<td>Follow Adult Dosing</td>
<td></td>
</tr>
</tbody>
</table>

**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 (e.g., metabolic acidosis, hyperkalemia, or tricyclic antidepressant overdose), sodium bicarbonate may be beneficial.

**Hyperkalemia (ACLS Guidelines, 2015):**

<table>
<thead>
<tr>
<th>IV:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>50 mEq over 5 minutes</td>
<td>Follow Adult Dosing</td>
<td></td>
</tr>
</tbody>
</table>

**Metabolic acidosis:**

If acid-base status is not available: 2-5 mEq/kg infusion over 4-8 hours.
# SUCCINYLCHOLINE

**Class / Mechanism of Action**

**Depolarizing Neuromuscular Blocking Agent (Paralytic)**
Acts like acetylcholine, produces myoneural depolarization causing sustained flaccid skeletal muscle paralysis. Onset of action IV: 45-60 seconds, Duration 5-9 minutes with single dose

## Indications

**Labeled Indications:** Rapid sequence 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

## 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>RSI / Neuromuscular blockade:</th>
<th>ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1-1.5 mg/kg</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Pretreatment with 10% dosage of non-depolarizing agents prior to neuromuscular-blockade with Succinylcholine is **NO LONGER ADVISED**

<table>
<thead>
<tr>
<th>RSI / Neuromuscular blockade:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10kg:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial: 1.5-2 mg/kg/dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;10kg:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial: 1-1.5 mg/kg/dose</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Pretreatment with 10% dosage of non-depolarizing agents prior to neuromuscular-blockade with Succinylcholine is **NO LONGER ADVISED**
<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin, water soluble</td>
</tr>
<tr>
<td>Essential coenzyme in carbohydrate metabolism. Onset of action IV/IM: Rapid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled Indications: Treatment of thiamine deficiency including beriberi, Wernicke's encephalopathy, Korsakoff's syndrome, neuritis associated with pregnancy, or in alcoholic patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to thiamine or any component of the formulation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Administration of dextrose may worsen acute symptoms of thiamine deficiency; use caution when low thiamine is suspect</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS; Seizure; Syncope; Malnutrition; Vomiting and Diarrhea; w/ Hx of ETOH abuse:</td>
<td>100mg/day</td>
<td><strong>AMS or Seizure w/ signs of Malnutrition:</strong></td>
</tr>
<tr>
<td>IM/IV:</td>
<td></td>
<td>IM/IV:</td>
</tr>
<tr>
<td>• 100mg/day</td>
<td></td>
<td>• 25mg/day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AMS or Seizure w/ signs of Malnutrition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM/IV:</td>
</tr>
<tr>
<td>TRAENEXAMIC ACID</td>
</tr>
<tr>
<td>------------------</td>
</tr>
</tbody>
</table>

**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**

**Labeled Indications:**

**Unlabeled:** Trauma-associated hemorrhage

**Contraindications**

- Hypersensitivity to tranexamic acid
- Subarachnoid hemorrhage
- Thromboembolic disease (Cerebral Thrombosis, DVT, PE)
- **TXA is contraindicated in trauma if initial dose is not given within first 3 hours following traumatic event (Ideal dosing time-frame is within 1 hour of trauma)**

**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.

**Dose and Administration:**

<table>
<thead>
<tr>
<th>Trauma-associated hemorrhage (unlabeled use):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV:</strong></td>
</tr>
<tr>
<td>- Initial Dose: 1 gram of TXA in 100 cc NS or LR ASAP, but NOT later than 3 hours after injury</td>
</tr>
<tr>
<td>- Follow-up dose: 1 gram of TXA over the next 8 hours following blood, Hextend, or other fluid treatment to attain hemodynamic stability.</td>
</tr>
</tbody>
</table>

**TCCC Guidelines, September 2012:**

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

- Administer 1 gram of tranexamic acid in 100 cc Normal Saline or Lactated Ringers as soon as possible but NOT later than 3 hours after injury.
- Begin second infusion of 1 gram TXA after Hextend or other fluid treatment.
<table>
<thead>
<tr>
<th><strong>Class / Mechanism of Action</strong></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 25-40 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Indications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Endotracheal intubation, facilitates mechanical ventilation in ICU patients</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Contraindications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to vecuronium or any component of the formulation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Adverse Reactions / Precautions</strong></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>
</tr>
<tr>
<td>o Must provide appropriate sedation and analgesia prior to paralytic use and throughout maintenance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dose and Administration:</strong> ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rapid sequence intubation (RSI) and maintenance of paralysis:</strong></td>
<td></td>
</tr>
<tr>
<td>IV Push:</td>
<td></td>
</tr>
<tr>
<td>• Induction: <strong>0.1 mg/kg</strong></td>
<td></td>
</tr>
<tr>
<td>• Maintenance: <strong>0.1 mg/kg</strong> every 30-60 minutes PRN</td>
<td></td>
</tr>
<tr>
<td>IV Continuous infusion:</td>
<td></td>
</tr>
<tr>
<td>• <strong>1 mcg/kg/min</strong> and titrate to 2:4 train of four (TOF) if stimulation devise is available.</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> 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.</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Vecuronium is only recommended for use in RSI in the absence of available Succinylcholine or Rocuronium, as they are the preferred induction agents.</td>
<td></td>
</tr>
</tbody>
</table>

| **Rapid sequence intubation (RSI) and maintenance of paralysis:** |
| IV Push: |
| • Induction: **0.1-0.15 mg/kg** |
| • Intermittent bolus dosing: **0.1 mg/kg** every 30-60 minutes PRN |
| IV Continuous infusion: |
| • **1-2.5 mcg/kg/minute** |
Indication for Advanced Airway
• NO Gag Reflex
• Not Protecting Airway (GCS <8)
• Suspect Deterioration

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

SpO₂ >93% on O₂?
YES
NO

Indication for Advanced Airway
• NO Gag Reflex
• Not Protecting Airway (GCS <8)
• Suspect Deterioration

Reposition Airway
(jaw-thrust for c-spine injury)
Sweep (not blind) & Suction as needed
Heimlich maneuver if indicated

Breathing Impacted by:
• Penetrating or Blunt Chest Trauma
• Penetrating Abdominal Trauma?

Consider:
RSI PROCEDURE if:
• Intact Gag Reflex
• Conscious OR
• GCS >8

Yes
NO

Definitive Airway Established and SpO₂ >93% on O₂?
YES
NO

Establish Advanced Airway per Procedure in the following sequence:
(Move to next procedure per individual competencies, contraindications, and/or attempt failures)
1. ENDOTRACHEAL INTUBATION
2. BIAD
3. CRICOThYROIDOTOMY

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

Consider:
Direct Laryngoscopy to visualize for foreign body obstruction if Sweep, Suction and Heimlich fail to open airway

SpO₂ >90%? (Room Air)
YES
NO

SpO₂ >93% on Supplemental O₂?
YES
NO

SpO₂ Decreasing or <90% (Room Air) with / without supporting Signs / Symptoms of:
• Tachypnea, Tachycardia, Fever, Cough, Wheezing, Rhonchi, Rales, Shock

Airway Open?
YES
NO

Consider: Definitive Airway if de-compensating (SpO₂ <90% on O₂)

NO
YES

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

SpO₂ >90%?

YES
NO

DEFINITIVE AIRWAY

Continuous Monitoring
Repeat: Sedative & Paralytic per dose and time guideline
Reassess Interventions
Restart Protocol
Consider other Causes
FAILED AIRWAY GUIDELINE

RSI PROCEDURE if:
• Intact Gag Reflex
• Conscious
• GCS >8

Definitive Airway if de-compensating (SpO₂ <90% on O₂)

Reassess Interventions
Restart Protocol
Consider other Causes
FAILED AIRWAY GUIDELINE

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

Consider:
RCS PROCEDURE if:
• Intact Gag Reflex
• Conscious
• GCS >8

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

Consider: Definitive Airway if de-compensating (SpO₂ <90% on O₂)

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

Consider:
RCS PROCEDURE if:
• Intact Gag Reflex
• Conscious
• GCS >8

Definitive Airway if de-compensating (SpO₂ <90% on O₂)

SpO₂ >93% on O₂?
YES
NO

Definitive Airway if de-compensating (SpO₂ <90% on O₂)

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

Consider:
RCS PROCEDURE if:
• Intact Gag Reflex
• Conscious
• GCS >8

Definitive Airway if de-compensating (SpO₂ <90% on O₂)

SpO₂ >93% on Supplemental O₂?
YES
NO

Definitive Airway if de-compensating (SpO₂ <90% on O₂)

Return to Guideline:
TACTICAL EVACUATION
OR
RESPIRATORY DISTRESS

Consider:
RCS PROCEDURE if:
• Intact Gag Reflex
• Conscious
• GCS >8

Definitive Airway if de-compensating (SpO₂ <90% on O₂)
Continued from: Tactical Evacuation Guideline or Pediatric Respiratory Distress Guideline

Indications of:
- Respiratory Distress / Failure
- Patient Unable to Protect Airway (GCS <8)

Airway Open?
- YES
- NO

Need for Advanced Airway?
- NO Gag Reflex
- Not Protecting Airway (GCS <8)
- Suspect Deterioration
- Insert Nasopharyngeal Airway (NPA)
  (if NO basal skull fracture suspected)
- Consider Placing OPA (no gag reflex)
- Start Supplemental O2
- BVM (Assisted Ventilations) as needed

SpO2 >93 percent
  (Room Air)
- YES
- NO

SpO2 >93 percent on O2?
- YES
- NO

Definitive Airway Established and SpO2 >93 percent on O2?
- YES
- NO

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 <8-10y/o)

Consider:
- RSI PROCEDURE if:
  - Intact Gag reflex
  - Conscious OR
  - GCS >8

Consider:
- Direct Laryngoscopy to visualize foreign body obstruction. If present Sweep, Suction, and Heimlich to open airway

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

Recheck every 5 minutes
Advanced Airway if de-compensating (SpO2 <94 percent on O2)

Consider:
- Sedative & Paralytic per dose and time guideline
- Reassess Interventions
- Consider other Causes
- Recheck every 5 minutes
- Restart Protocol if de-compensating

Indicated
- YES
- NO

Not Indicated

Breathing Impacted by:
- Penetrating or Blunt Chest Trauma OR
- Penetrating Abdominal Trauma?
- YES
- NO

SpO2 >93 percent on Supplemental O2?
- YES
- NO

Return to Guideline: TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS

Return to Protocol: TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS

CHEST TRAUMA Guideline

PROCEDURES

PEDIATRIC AIRWAY

Indications of:
- Respiratory Distress / Failure
- Patient Unable to Protect Airway (GCS <8)
**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:
  - Pursing 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:
  1. Pharmacologically-Assisted Sedation using KETAMINE followed by supraglottic airway device placement (do not attempt BIAD placement without sedation in patients with intact gag reflex)
  2. Surgical cricothyroidotomy using approved device. (modified 6.0 ET not ideal)

**VENTILATOR SETTINGS:**

- **Mode:** AC or ASV (Hamilton T1 only)
- **Rate:** 18 (adjust PRN for CO₂ >45 and ventilatory need) (Keep <35)
- **Tidal Volume:** 8mL/kg initially. Reduce by 1mL/kg every 2 hours to meet 6mL/kg.
- **I:E** = 1:2
- **PEEP:** 5
- **FiO₂:** 100% initially- adjust as necessary IAW PEEP/FiO₂ chart listed in Procedure A12; O₂ saturation goals are 92-95%.
- **Goal FiO₂/PEEP** = as low as possible while maintaining adequate Spo₂ saturation.

**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

*Paralytics:
- Vecuronium 0.08-0.15 mg/kg
- Rocuronium 1mg/kg, q25-40min

*Succinylcholine 1.5mg/kg-Non Trauma

**Continued Sedation:**
- Fentanyl 0.5-2mcg/kg, q30-60min
- Ketamine 1-2mg/kg, q10-20min
- Midazolam 0.1mg/kg-NO Pain Control, q15-30m
- Propofol 0.5-1.5mg/kg-NO Pain Control, q5-10m

* Paralyzed = Preferred medication for Battlefield Trauma Patients

**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 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.

**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

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).

**Quick Menu**
AIRWAY CONFIRMATION

CLINICAL INDICATIONS:
• Post endotracheal intubation to confirm proper placement of endotracheal tube.

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.
• 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)
• 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 (seconds), the pulse oxygenation should increase to normal range (this is not reliable in excessively cold patients, methemoglobinemia, or CO poisoning).

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!
EXTRAGLOTTIC/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.
### Failed Airway Criteria:
- Unable to open airway
- Two (2) Failed Intubation attempts by most proficient technician on scene
  - Assumes at least 1 attempt with King-LT™ / Supraglottic Airway under PAI (unless contraindicated or appropriate size not available) and 2 attempts with ET Tube
  - OR
- Intubation contraindicated due to anatomical abnormalities or major upper airway trauma

### Pearls:
- Continuous pulse oximetry should be utilized in all patients with an inadequate respiratory function.
- Continuous EtCO₂ monitoring should be attached when available to monitor adequacy of ventilation.
- If suspicion of head, neck, or facial trauma, maintain cervical spine support (neutral position) and perform the jaw thrust maneuver.
- **Contraindications for Oropharyngeal Airway (OPA):** Intact gag reflex, conscious or semiconscious, severe facial trauma.
- **Contraindications for Nasopharyngeal Airway (Nasal trumpet):** Known esophageal disease, recent ingestion of caustic substances, severe facial trauma, possible nasal and adjacent fractures (basilar skull).
- **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 Flight Paramedics once approved by medical director. This should be utilized quickly with severe airway trauma or inability to intubate.
  - Puncture cric. membrane with 14ga IV attached to 3mL syringe at 90 degree angle. Once air aspirated, change angle to 45 degree and advance CATHETER ONLY. Remove needle / syringe and secure catheter in place. Remove plunger from syringe and attach adapter from 7-0 ETT. Reattach this to catheter and attach BVM w/ 100% O₂. (Note: this procedure requires 50psi O₂ and adapter for catheter hub.)

### Respiratory Rate: (breaths/min, without Advanced Airway and NOT performing BLS)
- Infant: 30-60
- Toddler: 24-40
- Preschooler: 22-34
- School-age: 18-30
- Adolescent: 12-16

### Flowchart:
```
Criteria: Unable to open airway
- Two (2) Failed Intubation attempts by most proficient technician on scene
  - Assumes at least 1 attempt with King-LT™ / Supraglottic Airway under PAI (unless contraindicated or appropriate size not available) and 2 attempts with ET Tube
  - OR
- Intubation contraindicated due to anatomical abnormalities or major upper airway trauma

#### All Attempted as Appropriate:
- Reposition Airway (jaw-thrust for c-spine injury)
- Sweep & Suction (as needed)
- Heimlich Maneuver / Abdominal Thrusts / Back Slaps (as indicated)

#### Respiratory Rate: (breaths/min, without Advanced Airway and NOT performing BLS)
- Infant: 30-60
- Toddler: 24-40
- Preschooler: 22-34
- School-age: 18-30
- Adolescent: 12-16

#### Able to Ventilate with BVM?
- NO
  - CRICOXYTHROIDOTOMY open, percutaneous (>10 y/o) or needle
  - Ventilate Patient (per age respiratory rate)

- YES
  - Continue BVM

#### If adequate ventilation with BVM, continue BVM. If inadequate, continue with protocol.

- (*See Pearls) Attempt to:
  - Insert Oral Airway AND/OR
  - Nasopharyngeal Airway (NPA) (if NO basal skull fracture suspected)

- Continue BVM

#### Respiratory Rate: (breaths/min, without Advanced Airway and NOT performing BLS)
- Infant: 30-60
- Toddler: 24-40
- Preschooler: 22-34
- School-age: 18-30
- Adolescent: 12-16
```
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.
RAPID SEQUENCE INTUBATION

CLINICAL INDICATIONS:

- Respiratory failure
- Patient who has suffered airway burns or presents with signs of allergic reaction / allergy or other disorder which threatens to obstruct airway preventing adequate respirations.

CONTRAINDICATIONS:

- Massive upper airway trauma distorting anatomy
- Penetrating neck trauma

PROCEDURE (6Ps):

Prepare: Ensure all equipment ready / functional (including rescue airway) and patient positioned / prepared. Ensure patient on monitor, to include PO2.

Pre-oxygenation: Using a NRB, have patient breathe 100% O2 for several minutes (at least five) prior to intubation. If this is not possible, have patient take 3-5 deep breaths while on 100% O2. Breaths can be delivered/assisted as needed with BVM. Use passive oxygenation with nasal cannula if able before and during procedure.

Pre-medication: This can begin during pre-oxygenation and should take place 1-2 min prior to intubation. Pretreatment medications:

- Fentanyl for head injury, cardiac ischemia or aortic dissection. (Drug of choice if pretreatment medications are used) *** Consider lower dose for trauma patients due to endogenous opioid production occurring in trauma.
- Atropine in Pediatric Patients (Evidence does not support the routine usage. If bradycardia is suspected, give atropine as indicated. 2015 AHA update)

Paralysis / Sedation: Continue passive oxygenation with nasal cannula if able. Standard paralysis/sedation should consist of Etomidate followed in approx. 1 min by Succinylcholine. Rocuronium and *Vecuronium can be used, but are not recommended as first-line due to long duration of action. Sedation should always be performed prior to paralysis. Wait until fasciculations seen and jaw “loose” to attempt visualization. In patients suffering from acute large burns and crush injuries where hyperkalemia is a concern, Rocuronium is the preferred agent.

Pass the Tube: Visualization of the cords / arytenoids cartilages should be noted / documented. Tube must be seen passing these structures. Do not use excessive force as this can damage the cords.

RSI MEDICATIONS

<table>
<thead>
<tr>
<th>Pretreatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Fentanyl 3 mcg/kg IV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Induction Agents:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etomidate 0.3-0.5 mg/kg IV</td>
</tr>
<tr>
<td>Propofol 0.5-1.5 mg/kg IV</td>
</tr>
<tr>
<td>Ketamine 1-2 mg/kg IV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paralytics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Succinylcholine 1.5 mg/kg</td>
</tr>
<tr>
<td>Rocuronium 1 mg/kg</td>
</tr>
<tr>
<td>Vecuronium 0.08-0.15 mg/kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sedatives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midazolam 0.1 mg/kg</td>
</tr>
<tr>
<td>Fentanyl 0.5-2 mcg/kg</td>
</tr>
<tr>
<td>Propofol 0.5-1 mg/kg</td>
</tr>
</tbody>
</table>
Post-Flight: Once ETT in place, inflate bulb and begin bagging patient – do not let go of tube until secured with tape or commercial device. Placement should be confirmed with >1 method, capnography preferred. Other methods: capnometer, esophageal detection device, bilateral equal chest rise, PO₂ rise / maintained >95%, equal bilateral breath sounds.
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 and 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 90º angle. Do not advance needle once air returned.
- Change angle to 45º 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 hemo 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.

Document procedure, results, and vital signs.

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 stop-gap 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.

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.
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 should include:*
- **Mode:** Assist Control (AC) or ASV (Hamilton T1 only)
- **Tidal Volume (Vt):** 8 cc/kg, (Predicted/Ideal Body Weight (PBW/IBW)). (Appropriate range is 6-8 cc/kg PBW)
  - IBW calculation for Ideal Body Weight in Kg:
    - Men: ([height in inches – 60] x 2.2] + 50
    - Women: ([height in inches – 60] x 2.2] + 45
  - If ALI/ARDS, the goal is to get down to 6 cc/kg.
  - *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
- **Rate (RR):** Initially 18, adjust based on CO₂ (If CO₂ >45mmHg) and ventilatory needs (do not exceed >35 bpm)
- **I:E:** 1:2 (Patients with obstructive lung diseases should have increased I:E around 1:4 or 1:5)
- **FiO₂/PEEP (Should be adjusted in concert per the chart below)**
  - Start at 100% (1.0) FiO₂ and PEEP of 5
  - 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.

<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>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

162
PROCEDURE A12

* Hypotensive patients (MAP <70 or SBP <90) may respond negatively to increased PEEP causing decreased venous return. Monitor for increased hypotension and tachycardia.

- **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

  **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.

**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:
  - **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 (extraglotic airway or cric).

  **If ETT moves freely, access for ETT bulb rupture.**

  - **Obstructions:** Assess for secretions in ETT. Suction if indicated.
  - **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 escarotomy if circumferential burn. Consider additional paralysis and sedation if patient does not tolerate ventilation.
  - **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 H\(_2\)O): 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 dyssynchrony**: 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 SPO\(_2\) and ETCO\(_2\) 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 $V_t$ delivered. Peak airway pressure is variable and increases as needed to deliver prescribed $V_t$.

**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 ($V_t$):** The volume of gas, either inhaled or exhaled, during a breath and commonly expressed in milliliters. $V_t$ is generally set between 6-10ml/kg IBW (ideal body weight), to prevent lung over-distension and barotrauma.

**Minute Ventilation ($V_E$):** The average volume of gas entering, or leaving, the lungs per minute, commonly expressed in liters per minute. The product of $V_t$ and RR (respiratory rate). Normal $V_E$ is 5 – 10 L/min.

**Inspiratory (I) and Expiratory (E) time and I:E ratio:** The speed at which the $V_t$ 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/H$_2$O.

**Peak flow rate or peak inspiratory flow:** The highest flow, or speed, that is set to deliver the $V_t$ 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 ($P_{AW}$):** Represents the total pressure that is required to deliver the $V_t$ and depends upon various airway resistance, lung compliance, and chest wall factors. It is expressed in centimeters of water (cm H$_2$O).

**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 H$_2$O) 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.
HEMORRHAGE
CONTROL PROCEDURES

CLINICAL INDICATIONS:
• Hemorrhage

CONTRAINICATIONS:
• None

PROCEDURE:
• Rapid bleeding / arterial source recognized (extremities, axial, inguinal) – immediate application of extremity and/or junctional tourniquets, as appropriately needed, to stop bleeding.
• All other bleeding:
  o Apply combat dressing and apply direct pressure. Must apply adequate force to compress vessels.
  o 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. If bleeding continues, apply a pressure dressing to the wound if applicable.
  o Maintain pressure on wound at all times – only checking in 10min intervals or if bandages soaked through.
  o 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.
  o 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.
  o Penetrating abdominal / thoracic injuries require a large amount of pressure to compress vessels.
  o In pelvic wounds – utilize pelvic binding to limit capacity for hemorrhage (tie pelvis with sheet / commercial binder).
  o Administer IVFs as per guideline – use care with internal bleeding so as not to raise SBP above 80mmHg. MAP should be greater than >60mmHg.

Document procedure, results, and vital signs.
Clear end-points for fluid resuscitation remain unclear. Resuscitation should be geared towards patient response to therapy.

MAP = Mean Arterial Pressure: \( \text{MAP} = \left(\frac{2 \times \text{diastolic BP} + \text{systolic BP}}{3}\right) \)

**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.

**Hemorrhage Classification (ATLS)**

**Class I** - EBL up to 15% of blood volume. Minimally elevated HR, minimal change in BP, pulse pressure, or respiratory rate.

**Class II** - EBL between 15%-30% blood volume. Tachycardia (100-120), tachypnea (20-24), decreased pulse pressure; SBP may start to decline from baseline. Skin may become cool, clammy, and possible delayed capillary refill.

**Class III** - EBL between 30%-40% of blood volume. SBP and mental status decrease. Any decrease in SBP less than 90mmHg or drop in blood pressure greater than 20-30 percent from baseline is concerning. HR > 120, respiratory rate can be elevated above 24. Urine output will be diminished. Capillary refill will be delay (> 2 seconds).

**Class IV** - EBL > 40% of blood volume. SBP will be <90mmHg, pulse pressure narrowed (≤ 25mmHg), tachycardia (>120), urine output minimal or absent. Skin will be cold, pale, and capillary refill is delayed.
TOURNIQUET APPLICATION

CLINICAL INDICATIONS:
- Extremity trauma / amputation with continued external hemorrhage.

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.) followed by DELIBERATE placement as needed 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 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 on patient (forehead). (“T” signifies tourniquet). Do not cover tourniquet. Recheck tourniquet intermittently (q 15min) and after any movements to ensure no new bleeding / loosening has occurred.

- TC3 recommendation:
  - “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.
  - Do not remove a tourniquet that has been in place more than 6 hours unless close monitoring and lab capability are available.”

  Document procedure, results, and vital signs.
JUNCTIONAL TOURNIQUET APPLICATION

CLINICAL INDICATIONS:

- High level amputation not amenable 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.
- Do not remove / loosen tourniquet once in place. The uniqueness of junctional tourniquets do not lend themselves to conversion well and should be left to Roles with surgical capability.

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 tourniquet proximal to anticipated IV puncture site.
• Identify vein to be cannulated and cleanse overlying area with alcohol / betadine.
• While holding vein to be cannulated and maintain skin / vessel traction, 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 20mL 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) – 2cm (2 finger widths) distal to greater tuberosity on lateral aspect.
    - 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, puncture bone (felt as firm resistance followed by “pop”).
- Attempt to aspirate blood then flush. **IO should flush easily – this is confirmation of placement, not aspiration of blood.** (May add 2% lidocaine without epinephrine to flush to decrease pain associated with flushing.) If flushes easily – attach IV line and use as needed.
- Constantly monitor for increased tension in muscular compartments as misplacement into a compartment with subsequent fluid administration can lead to iatrogenic compartment syndrome.
- Document procedure, results, and vital signs.
IV / IO PROTOCOL

**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, proceed to IO.

- **Intraosseous Device** for
  - Life / limb-threatening event if unable to obtain peripheral IV access

- Ensure open and functioning
  - Fluid bolus per specific protocol
  - At a minimum, maintain a slow “to-keep-open” (TKO) drip

- If patient is deemed a “hard stick”, IO should be conducted first.

**Pearls:**
- 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.
- Intraosseous confirmed in place by good flush / good flow – may not aspirate blood.
  - Utilize EZ-IO™, FAST-1™, 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
    - BLUF: GAIN VASCULAR ACCESS where available based upon patient.
  - Pressure infusion bag is recommended for IO starting at 300mmHg.
- Following IV attempt failure and IO attempt failure, **external jugular lines** can be attempted for life-threatening events with no peripheral access.
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
**ORDER OF PRECEDENCE:**

- Resuscitate with Whole Blood
- Plasma, RBCs, Platelets in a 1:1:1 Ratio
- 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 secondary, 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/Plasmalyte 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.
  - Inflate 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.
- Continue resuscitation until palpable radial pulse, improved mental status or SBP of 70-80 mmHg and MAP >60 mmHg.
- Addition of Calcium when administering any amount blood should be considered. Citrate binding can adversely affect serum Calcium levels.
- Monitor patient every 5 minutes and document any patient signs and symptoms consistent with a transfusion reaction. These include: chills, back or chest pain, rash, fever, hives and/or wheezing.
  - Document procedure, results, and vital signs of 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 of at least 70 mmHg.
- Blood is very viscous, use the largest line available, if possible, to infuse.

*** Blood component therapy is location specific and is not standard for all missions OCONUS and CONUS.***
# BLOOD TRANSFUSION RELATED REACTIONS

<table>
<thead>
<tr>
<th>Differential Diagnosis:</th>
<th>Signs and Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaphylaxis reaction</td>
<td>Rapid onset of shock, hypotension (&lt;100mmHg systolic), angioedema, and respiratory distress</td>
</tr>
<tr>
<td>Acute hemolytic transfusion reaction (AHTR)</td>
<td>Fever (&gt;100.4°F), chills, flank pain, red/brown urine</td>
</tr>
<tr>
<td>Febrile non-hemolytic transfusion reaction (FNHTR)</td>
<td>Fever (&gt;100.4°F) increase of 1°C or 2°F from baseline, chills, possible dyspnea</td>
</tr>
<tr>
<td>Transfusion-related acute lung injury (TRALI)</td>
<td>Hypoxemia (SPO2 &lt;94%), Fever (&gt;100.4°F), hypotension (&lt;100mmHg systolic), cyanosis, tachypnea (&gt;24 breaths per minute), tachycardia (&gt;100 bpm)</td>
</tr>
<tr>
<td>Transfusional volume/circulatory overload (TACO)</td>
<td>Dyspnea, orthopnea, tachycardia (&gt;100 bpm), wide pulse pressure, hypertension (&gt;140mmHg systolic), hypoxemia (SPO2 &lt;94%), headache, possible seizure</td>
</tr>
<tr>
<td>Mechanical-caused hemolysis</td>
<td>Varies with each device. Fever (&gt;100.4°F), chills, possible dyspnea</td>
</tr>
<tr>
<td>Transfusion-transmitted bacterial infection</td>
<td>Fever (&gt;102.2°F or &gt;3.6°F change after transfusion), rigors, tachycardia (&gt;120 bpm or &gt;40 bpm following transfusion), rise or fall of systolic blood pressure (&gt;30mmHg)</td>
</tr>
</tbody>
</table>

## 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 1gm IV every 6 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.
**PROCEDURES**

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

**TRALI / TACO**
- **STOP TRANSFUSION**

**STOP TRANSFUSION**

**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

**Diphenhydramine** 50mg
- **IV/IO/IM/PO**

**Methylprednisone** 125mg
- **IV/IO**

**Consider:**
- **Albuterol** 90mcg
  - 2 puffs or 2.5mg nebulized

**500mL NS**
- if not previously started

**If concerned for anaphylaxis:**
- **Epinephrine** 1:1000
- 0.3mg-0.5mg IM

**Acetaminophen** 500mg PO or 1G
- **IV**

**Reassess Patient**
- Document on SF 518

**Notify blood bank of all transfusion related reactions.**

**Febrile Transfusion Reaction**
- **STOP TRANSFUSION**

**Febrile Non-hemolytic Transfusion Reaction (FNHTR)**

**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’s recommendations.
- Record result and treat any glucose abnormalities per appropriate guideline.
- Perform quality assurance on glucometers weekly, if any suspicious recordings are noted, and/or per manufacturer’s recommendations.

Document procedure, results, and vital signs.
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 2-4J/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 padds 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 other 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

Assess Rhythm

Appropriate ACLS guideline

Evaluate for Criteria for Death / No Resuscitation

Criteria for Death / No Resuscitation:
- Presence of decay / lividity / rigor mortis
- Decapitation
- Incineration
- Massively deforming head / chest trauma
- Downtime >15min with no CPR

Cardiac arrest in MASCAL situations requires frequent re-triage to apply care where it will be most effective.

Pearls:
- As with all ACLS 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.
- 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.

Withhold Resuscitation

Attach Monitor / Defibrillator
Begin BLS / CPR

CARDIAC ARREST
BRADYCARDIA with PULSE
TACHYCARDIA with PULSE

TRAUMA ARREST
SALT Mass Casualty Triage Algorithm (Sort, Assess, Lifesaving Interventions, Treatment/Transport)
Rule of Tens

**TBSA > 20%, may require acute fluid resuscitation in prehospital**

**LR(best)>NS(2nd best)>Hextend(only to 1L)**

**Adults**- 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. Monitor urine output with goal of target UOP of 30 - 50 mL/hr.

**Pediatrics**- 3 x TBSA x body weight (kg) gives the volume for initial 24 hrs. Monitor urine output with goal of 0.5 to 1 mL/kg/hr in children.

**High Voltage Injury**:

- **ADULT**: 4mL LR x Weight (kg) x % BSA spread over initial 24 hours (Parkland Formula)
  - Give ½ of total volume over 1st 8 hours from time of burn.

**Example**: Adult 70kg patient with 50% TBSA 2nd/3rd degree (Chemical or Thermal burn)

- 2mL LR x 70(kg) x 50(%TBSA) = 7,000mL LR in 1st 24hrs

- 3,500mL (% of 7,000) is given over 1st 8hrs from TOB

- 3,500mL/8hrs = 437mL/hr over 1st 8 hrs

**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 RSI / 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>
</tr>
</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.

Universal Patient Care Guideline
- O2 (if hypoxicem)
- IV / IO Guideline (prn)
- Cardiac Monitor (prn)

Control Bleeding

Tooth Avulsion?

If less than 1hr – attempt to replace tooth in socket (*See Pearls)

Place tooth in NS (milk if available)

When appropriate, return to:
- Tactical Evacuation Guideline
- PAIN MANAGEMENT Guideline

PAIN MANAGEMENT Guideline

Continued from:
- Tactical Evacuation Guideline

DENTAL PROBLEMS

<table>
<thead>
<tr>
<th>Signs and Symptoms:</th>
<th>Differential Diagnosis:</th>
</tr>
</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>
SPINAL EVALUATION & IMMobilization

CLINICAL INDICATIONS: (Cervical collar)

- Trauma resulting in the following: loss of consciousness, questionable loss of consciousness, temporary amnesia.
- Pt. involved in the following: major blast/explosion, direct blunt force/penetrating trauma to head, neck, torso or pelvis, sudden acceleration/deceleration or lateral bending forces on the neck/torso, fall from height, ejection or fall from any motorized vehicle, or vehicle roll over.

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.
- Maintaining spinal stability, log-roll the patient onto their side and palpate the spinal column for any step-off, deformity, or tenderness to palpation. If any of this exists, patient should be rolled back onto a spinal board, if available.
- After palpation, test upper and lower gross motor function by having patient move arms and legs slightly.
- Conduct an abbreviated combat neurologic exam:
  - Muscle strength- test bilateral upper and lower extremities for variations. If limited to pain or injury note in patient care report.
  - Sensory- test light touch and pin-prick sensation at major dermatomes.
  - DOCUMENT all findings and time the test was conducted. This information will serve as a baseline.
- Place patient into a rigid C-collar and then apply head blocks with tape to the spinal board. A C-collar itself does not provide adequate stabilization if unstable injuries exist.
- In pregnant patients, place blocks / padding under the right hip to elevate it. This relieves pressure on the inferior vena cava and improves venous return to the heart.
  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.
- 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

Patient care according to guideline based on specific complaint

- Pain >3/10
- Vocalizes / Signals Pain and requests relief
  OR
- Indication for IV / IM medications?

Consider:
Acetaminophen 1gram PO prn every 6-8 hours max 4gm in 24 hour period

Return To:
Tactical Evacuation Guideline OR Appropriate Guideline per Complaint

Ketamine

Standard Dose:
- 0.5 mg/kg IM/IN
- 0.1-0.2 mg/kg IV/IO

Induction / Dissociative:
- 1.0-2.5 mg/kg IV

TCCC recommended dose:
- 50mg IM/IN q 30min prn
- 20mg IV/IO q 20min prn

 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.
  - Use caution unless the patient has no history of seizures or chronic benzodiazepine use.
- 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.
- Ketamine is neuro protective and is recommended as first line analgesic agent per TCCC.
- 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 lollipop 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 weight</th>
<th>cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;61cm 3-5kg</td>
<td></td>
</tr>
<tr>
<td>61cm 6-7kg</td>
<td></td>
</tr>
<tr>
<td>67cm 8-9kg</td>
<td></td>
</tr>
<tr>
<td>75cm 10-11kg</td>
<td></td>
</tr>
<tr>
<td>87cm 12-14kg</td>
<td></td>
</tr>
<tr>
<td>96cm 15-18kg</td>
<td></td>
</tr>
<tr>
<td>109cm 19-23kg</td>
<td></td>
</tr>
<tr>
<td>122cm 24-29kg</td>
<td></td>
</tr>
<tr>
<td>138cm 30-36kg</td>
<td></td>
</tr>
<tr>
<td>149+cm 37&gt;kg</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AGE</th>
<th>MONTHS</th>
<th>YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>27</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>30</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>33</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>39</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>42</td>
<td>43</td>
<td>44</td>
</tr>
<tr>
<td>45</td>
<td>46</td>
<td>47</td>
</tr>
<tr>
<td>48</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>51</td>
<td>52</td>
<td>53</td>
</tr>
<tr>
<td>54</td>
<td>55</td>
<td>56</td>
</tr>
<tr>
<td>57</td>
<td>58</td>
<td>59</td>
</tr>
<tr>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>63</td>
<td>64</td>
<td>65</td>
</tr>
<tr>
<td>66</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td>69</td>
<td>70</td>
<td>71</td>
</tr>
<tr>
<td>72</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td>75</td>
<td>76</td>
<td>77</td>
</tr>
<tr>
<td>78</td>
<td>79</td>
<td>80</td>
</tr>
<tr>
<td>81</td>
<td>82</td>
<td>83</td>
</tr>
<tr>
<td>84</td>
<td>85</td>
<td>86</td>
</tr>
<tr>
<td>87</td>
<td>88</td>
<td>89</td>
</tr>
<tr>
<td>90</td>
<td>91</td>
<td>92</td>
</tr>
<tr>
<td>93</td>
<td>94</td>
<td>95</td>
</tr>
<tr>
<td>96</td>
<td>97</td>
<td>98</td>
</tr>
<tr>
<td>99</td>
<td>100</td>
<td>101</td>
</tr>
<tr>
<td>102</td>
<td>103</td>
<td>104</td>
</tr>
<tr>
<td>105</td>
<td>106</td>
<td>107</td>
</tr>
<tr>
<td>108</td>
<td>109</td>
<td>110</td>
</tr>
<tr>
<td>111</td>
<td>112</td>
<td>113</td>
</tr>
<tr>
<td>114</td>
<td>115</td>
<td>116</td>
</tr>
<tr>
<td>117</td>
<td>118</td>
<td>119</td>
</tr>
<tr>
<td>120</td>
<td>121</td>
<td>122</td>
</tr>
<tr>
<td>123</td>
<td>124</td>
<td>125</td>
</tr>
<tr>
<td>126</td>
<td>127</td>
<td>128</td>
</tr>
<tr>
<td>129</td>
<td>130</td>
<td>131</td>
</tr>
<tr>
<td>132</td>
<td>133</td>
<td>134</td>
</tr>
<tr>
<td>135</td>
<td>136</td>
<td>137</td>
</tr>
<tr>
<td>138</td>
<td>139</td>
<td>140</td>
</tr>
<tr>
<td>141</td>
<td>142</td>
<td>143</td>
</tr>
<tr>
<td>144</td>
<td>145</td>
<td>146</td>
</tr>
<tr>
<td>147</td>
<td>148</td>
<td>149</td>
</tr>
<tr>
<td>150</td>
<td>151</td>
<td>152</td>
</tr>
<tr>
<td>153</td>
<td>154</td>
<td>155</td>
</tr>
<tr>
<td>156</td>
<td>157</td>
<td>158</td>
</tr>
<tr>
<td>159</td>
<td>160</td>
<td>161</td>
</tr>
<tr>
<td>162</td>
<td>163</td>
<td>164</td>
</tr>
<tr>
<td>165</td>
<td>166</td>
<td>167</td>
</tr>
<tr>
<td>168</td>
<td>169</td>
<td>170</td>
</tr>
<tr>
<td>171</td>
<td>172</td>
<td>173</td>
</tr>
<tr>
<td>174</td>
<td>175</td>
<td>176</td>
</tr>
<tr>
<td>177</td>
<td>178</td>
<td>179</td>
</tr>
<tr>
<td>180</td>
<td>181</td>
<td>182</td>
</tr>
<tr>
<td>183</td>
<td>184</td>
<td>185</td>
</tr>
<tr>
<td>186</td>
<td>187</td>
<td>188</td>
</tr>
<tr>
<td>189</td>
<td>190</td>
<td>191</td>
</tr>
<tr>
<td>192</td>
<td>193</td>
<td>194</td>
</tr>
</tbody>
</table>

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient

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>

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
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.

- **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.
POST-OPERATIVE & CC
INTERFACILITY TRANSFER

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 70-80mmHg, MAP >60mmHg (permissive hypotension)
   3) If elevated ICP or CPP, maintain MAP 80><110mmHg, SBP 110><160mmHg
   4) Hematocrit >24% (or Hgb >8g/dL)
   5) Platelet count >50/mm³
   6) INR <2.0
   7) pH >7.3
   8) Base deficit <5mEq/L
   9) Temperature >35.5ºC or 96ºF
   10) ETCO₂ 35><45, SPO₂ >92%, and/or PaCO₂ 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 70-80 mmHg, MAP >60 mmHg, UOP >0.5 mL/kg/hr, and/or BD <2, Temp >97ºF and <100ºF), 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 / ETCO$_2$ 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. (JTS 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. (JTS 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 [JTS 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. (JTS 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>
<th>7 Dangerous agitation</th>
<th>6 Very agitated</th>
<th>5 Agitated</th>
<th>4 Calm, cooperative</th>
<th>3 Sedated</th>
<th>2 Very sedated</th>
<th>1 Unarousable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulling at endotracheal tube, trying to remove catheters, climbing over bedrail, striking at staff, thrashing from side-to-side</td>
<td>Does not calm despite frequent verbal reminding of limits, requires physical restraints, biting endotracheal tube</td>
<td>Anxious or physically agitated, attempting to sit up, calms down on verbal instructions</td>
<td>Calm, arousals easily, follows commands</td>
<td>Difficult to arouse, awakens to verbal stimuli or gentle shaking but drifts off again, follows simple commands</td>
<td>Aroused to physical stimuli but does not communicate or follow commands, may move spontaneously</td>
<td>Minimal or no response to noxious stimuli, does not communicate or follow commands</td>
<td></td>
</tr>
</tbody>
</table>

ECC Nurse Protocols May 2012

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.

di. **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 handoff 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-FLIGHT CHECKLIST

*(for Critical Care and Post-Surgical Transfers)*

*Once the decision is made to transfer a patient and an accepting physician has been obtained, the following steps will be taken to prepare the patient for transport:*

<table>
<thead>
<tr>
<th>Initials</th>
<th>Evaluation Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Anesthesia called: intubation if indicated. ETT secured/marked</td>
</tr>
<tr>
<td>3.</td>
<td>Patient meets criteria for en route critical care transport: risk documented by sending physician <em>(POST-OPERATIVE and CC INTRAFACILITY TRANSFER, Pre-Transfer Patient Status Requirements)</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient moved to litter (collapsible handles), positioned, padded, strapped, equipment (with necessary attachments) added and secured.</td>
</tr>
<tr>
<td>2. For head-injured patients, a pre-sedation neurologic examination will be performed. GCS and neurological exam documented on the en route care form, suggest placing patient sitting at 30°-45°. <em>(For eye injured patients, fox shield in place. For burn patients, JTS burn sheet initiated.)</em></td>
</tr>
<tr>
<td>3. Ventilator switched to PMI vent at least 20-30 min prior to flight and set with transfer settings ordered by physician.</td>
</tr>
<tr>
<td>4. IV / IO access verified, patent, and secured.</td>
</tr>
<tr>
<td>5. Arterial line inserted and secured, if indicated. Transducer accessible.</td>
</tr>
<tr>
<td>6. Ventilator tubing checked to be free from obstruction, with ETCO₂ and secondary lines attached.</td>
</tr>
<tr>
<td>7. Orogastric or nasogastric tube is inserted (unless contraindicated), placement verified with chest x-ray, and attached to low-intermittent suction.</td>
</tr>
<tr>
<td>8. Chest tubes to water seal/suction (place Heimlich valve for non-atrium chest drainage systems).</td>
</tr>
<tr>
<td>9. Wound vacuum disconnected and stowed.</td>
</tr>
<tr>
<td>10. Foley catheter secured, urine output measured and documented.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment, Medication, Chart, and Personnel Preparation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Medications needed for flight prepared and organized.</td>
</tr>
<tr>
<td>13. Complete chart photocopied (including x-ray cd), patient belongings bagged and tagged. Transfer Document, or other theater / unit approved transfer document, has been initiated.</td>
</tr>
<tr>
<td>14. Earplugs and eye protection for patient and flight nurse.</td>
</tr>
<tr>
<td>15. If facility sends medical attendant, attendant must have relevant personal protective equipment. In a combat environment this includes: Uniform, Kevlar, IBA, Weapon, ID Card, and equipment for transport.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ventilator Management:</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Blood gas (preferably ABG) obtained, 15 min after initial settings and ventilator changes. All efforts will be made to have a documented blood gas within 30 minutes prior to flight time.</td>
</tr>
<tr>
<td>17. Adjust ventilator settings and check O₂ tank for length of flight. Resuscitator bag under patient’s head with tubing connected to O₂ source, vent tubing free from obstruction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final Verification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Transferring Physician, Flight Paramedic, ECCN (or Flight Provider) verbally agrees to flight care plan.</td>
</tr>
<tr>
<td>19. Critical Care Transfer Orders reviewed and signed by transferring physician. <em>(STANDARD ORDER SET for CRITICAL CARE TRANSFERS)</em></td>
</tr>
<tr>
<td>20. Enroute CC Transfer Document with completed preflight and enroute care data handed over to and confirmed by receiving provider / facility.</td>
</tr>
</tbody>
</table>
**PRE-TRANSPORT CHECKLIST**

**Tactical Situation or Patient Condition Requiring Immediate Transport?**

- NO
- YES

**MITES CHECK**

- **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.
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.
# Vital Functions

## Assessment Reference Charts

### Average Vital Functions by age

<table>
<thead>
<tr>
<th>BROSELOW cm (approx)</th>
<th>weight</th>
<th>AGE</th>
<th>MONTHS</th>
<th>YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td>kg</td>
<td>0</td>
<td>1-12</td>
<td>1-5</td>
</tr>
<tr>
<td>&lt;61 cm</td>
<td>3-5kg</td>
<td>1</td>
<td>15-24</td>
<td>6-10</td>
</tr>
<tr>
<td>61 cm</td>
<td>6-7kg</td>
<td>2</td>
<td>25-36</td>
<td>11-13</td>
</tr>
<tr>
<td>67 cm</td>
<td>8-9kg</td>
<td>3</td>
<td>37-48</td>
<td>14-16</td>
</tr>
<tr>
<td>75 cm</td>
<td>10-11kg</td>
<td>4</td>
<td>49-60</td>
<td>17-19</td>
</tr>
<tr>
<td>87 cm</td>
<td>12-14kg</td>
<td>5</td>
<td>61-72</td>
<td>20-22</td>
</tr>
<tr>
<td>96 cm</td>
<td>15-18kg</td>
<td>6</td>
<td>73-84</td>
<td>23-25</td>
</tr>
<tr>
<td>109 cm</td>
<td>19-23kg</td>
<td>7</td>
<td>85-96</td>
<td>26-28</td>
</tr>
<tr>
<td>122 cm</td>
<td>24-29kg</td>
<td>8</td>
<td>97-108</td>
<td>29-31</td>
</tr>
<tr>
<td>138 cm</td>
<td>30-36kg</td>
<td>9</td>
<td>109-120</td>
<td>32-34</td>
</tr>
<tr>
<td>149 cm</td>
<td>37+kg</td>
<td>10</td>
<td>121-132</td>
<td>35-37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>133-144</td>
<td>38-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12-16</td>
<td>145-156</td>
<td></td>
</tr>
</tbody>
</table>

- **Heart Rate**
  - Sea Level: 107-181 bpm
  - 5,000 Feet MLS: 93-161 bpm

- **Respiratory Rate**
  - Sea Level: 25-66 breaths/min
  - 5,000 Feet MLS: 22-64 breaths/min

- **Systolic BP**
  - Sea Level: 60-170 mmHg
  - 5,000 Feet MLS: 79-105 mmHg

- **Diastolic BP**
  - Sea Level: 34-81 mmHg
  - 5,000 Feet MLS: 40-69 mmHg

- **Urine (mL/kg/hr)**
  - Sea Level: 2-1.5 mL/kg/hr
  - 5,000 Feet MLS: 1 mL/kg/hr

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient.

### Oxygen Saturation

<table>
<thead>
<tr>
<th><strong>SpO2</strong> (Peripheral O2 Sat)</th>
<th><strong>Sea Level</strong></th>
<th><strong>5,000 Feet MLS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;94% for patient with Normal Hemoglobin level</td>
<td>&gt;92%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>StO2</strong> (Tissue O2 Sat)</th>
<th><strong>Sea Level</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;75-95%</td>
<td></td>
</tr>
</tbody>
</table>

**EtCO2**

35-45 mmHg
## 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>Eye Opening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Spontaneous</td>
<td>Eye Opening Response Same as Adult</td>
<td></td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>To Speech</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>To pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal Response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Oriented</td>
<td>Oriented</td>
<td>Coos and babbles</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Confused Conversation</td>
<td>Confused Conversation</td>
<td>Irritable, Cries</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Inappropriate Words</td>
<td>Inappropriate Words</td>
<td>Cries in Response to pain</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Incomprehensible Sounds</td>
<td>Incomprehensible Words/Sounds</td>
<td>Moans in Response to Pain</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Best Motor Response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Obeys Commands</td>
<td>Obeys Commands</td>
<td>Moves Spontaneously</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Localizes Pain</td>
<td>Localizes Pain</td>
<td>Withdraws to Touch</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Flexion Withdrawal to Pain</td>
<td>Flexion Withdrawal to Pain</td>
<td>Withdraws from Pain Stimulus</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Abnormal Flexion (Decorticate)</td>
<td>Abnormal Flexion (Decorticate)</td>
<td>Abnormal Flexion (Decorticate)</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Extension (Decerebrate)</td>
<td>Extension (Decerebrate)</td>
<td>Extension (Decerebrate)</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>None (Flaccid)</td>
<td>None (Flaccid)</td>
<td>None (Flaccid)</td>
</tr>
</tbody>
</table>

For Intubated Patient use **Verbal “T”**
(Example: Eyes open to pain, Intubated, and Localizes would be E2,V1,M5, or **GCS 8T**)

### FORMS
## 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 Interosseous</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, Anterior Shoulder Dislocation</td>
<td>Thumb, Finger group Extension</td>
<td>First Dorsal Web Space</td>
<td>Radial</td>
</tr>
<tr>
<td>Anterior Shoulder Dislocation, 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, Knee Dislocation</td>
<td>Ankle Eversion</td>
<td>Lateral Dorsum of Foot</td>
<td>Superficial Peroneal</td>
</tr>
<tr>
<td>Fibular Neck Fracture, Compartment Syndrome</td>
<td>Ankle / Toe Dorsiflexion</td>
<td>Dorsal 1st-2nd Web Space</td>
<td>Deep Peroneal</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

### (Always use a Broselow® Pediatric Emergency Tape if available)

<table>
<thead>
<tr>
<th>BROSELOW (approx) cm</th>
<th>weight</th>
<th>AGE</th>
<th>MONTHS</th>
<th>YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td>weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;61 cm</td>
<td>3-5kg</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>61 cm</td>
<td>6-7kg</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>67 cm</td>
<td>8-9kg</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>75 cm</td>
<td>10-11kg</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>87 cm</td>
<td>12-14kg</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>96 cm</td>
<td>15-18kg</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>109 cm</td>
<td>19-23kg</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>122 cm</td>
<td>24-29kg</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>138 cm</td>
<td>30-36kg</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>149+ cm</td>
<td>37+kg</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>

### ZOLL® Defibrillation Energy Settings for PEDIATRIC Patients

<table>
<thead>
<tr>
<th>ZOLL DEFIB ENERGY</th>
<th>1st</th>
<th>2nd</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>8J</td>
<td>15J</td>
<td>30J</td>
</tr>
<tr>
<td>2nd</td>
<td>10J</td>
<td>20J</td>
<td>50J</td>
</tr>
<tr>
<td>MAXIMUM</td>
<td>30J</td>
<td>50J</td>
<td>75J</td>
</tr>
</tbody>
</table>

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient

---

**BROSELOW**

- Newborn
- Infant
- Toddler
- Child
- Child/Adult
- Adult
- Newborn/Infant
- Newborn/Small Child
- Infant/Small Child
- Infant/Child
- Child
- Child/Small Child
- Child/S Adult
- Peds/Adult

**SUCTION**

- 6-8
- 8
- 8-10
- 10
- 12

**BP CUFF**

- Newborn/Infant
- Infant/Child
- Child
- Child/Adult
- Adult

**IV CATHETER**

- 22-24
- 20-24
- 18-22
- 18-20
- 16-20

**OG/NG TUBE**

- 5-8
- 8-10
- 10-12
- 12-14
- 14-18
- 18

**CHEST TUBE**

- 10-12
- 16-20
- 20-24
- 24-32
- 28-32
- 32-40

**URINARY CATHETER**

- 5-8
- 8-10
- 10-12
- 12

**CERVICAL COLLAR**

- N/A
- Small
- S/M
- Medium
- M/L

---

**FLUID BOLUS**

- 80ml
- 130ml
- 170ml
- 210ml
- 260ml
- 340ml
- 420ml
- 500ml

**ZOLL DEFIB ENERGY**

- 1st
- 2nd
- MAXIMUM

- 8J
- 10J
- 15J
- 20J
- 30J
- 50J
- 75J
- 100J
- 120J
- 150J
- 200J

Weights and lengths in above chart are estimates, to achieve most accuracy utilize Broselow tape on patient.

---

**FORMS**
# 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>Male 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>

<table>
<thead>
<tr>
<th>Hematology</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>Male 13-18 g/100 mL</td>
<td>Female 12-16 g/100mL</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>Male 0.2-0.5 mg/dL</td>
<td>Female 0.3-0.9 mg/dL</td>
</tr>
<tr>
<td>Platelets</td>
<td>140,000-450,000/ml</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cardiac Markers</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Troponin I*</td>
<td>Onset 4-6 hrs.</td>
<td>Peak 12-24 hrs.</td>
</tr>
<tr>
<td>Troponin T*</td>
<td>Onset 3-4 hrs.</td>
<td>Peak 10-24 hrs.</td>
</tr>
<tr>
<td>Myoglobin</td>
<td>Male 10-95 ng/ml</td>
<td>Female 10-65 ng/ml</td>
</tr>
<tr>
<td></td>
<td>Onset 1-3 hrs.</td>
<td>Peak Peak: 6-10 hrs.</td>
</tr>
<tr>
<td>INR</td>
<td>only if Tx for DVT</td>
<td>0.8-1.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Normal Blood Gasses</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.35-7.45</td>
<td></td>
</tr>
<tr>
<td>Paco2</td>
<td>35-45 mm Hg</td>
<td></td>
</tr>
<tr>
<td>HCO3</td>
<td>22-26 mmol/L</td>
<td></td>
</tr>
<tr>
<td>Base excess</td>
<td>(-2)-(+2) mEq/L</td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>19-24 mEq/L</td>
<td></td>
</tr>
<tr>
<td>SaO2</td>
<td>96-100%</td>
<td></td>
</tr>
</tbody>
</table>

*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 = (Age/4)+4 (Age divided by 4 plus 4)
• ETT Depth = 3 x ETT Size (Endotracheal)
• Weight in kg (>1 year) = (Age (years) x 2) + 8
• Systolic Blood Pressure minimum = 70 + [2 x Age (years)]

MEDICATION FORMULAS:

• Mcg/kg/min (micrograms/kilogram/minute) = [16.7 X Drug Concentration (mg/ml) x infusion rate (ml/h)] Weight (kg).
• INFUSION RATE (ml/h) = [Desired mcg/kg/min x Weight (kg) x 60]/Drug concentration (mcg/mL)

HEMODYNAMIC FORMULAS:

• MAP: Mean Arterial Pressure = [(2 x DBP) + SBP]/3.
• SBP = (Systolic Blood Pressure)
• DBP = (Diastolic Blood pressure)
• / = (Divided by)

• PULSE PRESSURE: SBP – 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>178</td>
<td>311</td>
<td>2630</td>
<td>3450</td>
</tr>
<tr>
<td>Length of use (min)</td>
<td>89</td>
<td>155</td>
<td>1315</td>
<td>1725</td>
</tr>
<tr>
<td>Length of use (min)</td>
<td>59</td>
<td>104</td>
<td>876</td>
<td>1150</td>
</tr>
<tr>
<td>Length of use (min)</td>
<td>44</td>
<td>78</td>
<td>658</td>
<td>862</td>
</tr>
<tr>
<td>Length of use (min)</td>
<td>35</td>
<td>62</td>
<td>526</td>
<td>690</td>
</tr>
<tr>
<td>Length of use (min)</td>
<td>30</td>
<td>52</td>
<td>438</td>
<td>575</td>
</tr>
<tr>
<td>Length of use (min)</td>
<td>23</td>
<td>41</td>
<td>350</td>
<td>460</td>
</tr>
</tbody>
</table>

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 x Flow (L/min)**
### Adult Lund Browder Burn Estimate & Diagram

<table>
<thead>
<tr>
<th>Total Area front/back (circumferential)</th>
<th>one side—adult</th>
<th>one side—posterior</th>
<th>Do not include in total TBSA</th>
<th>1st °</th>
<th>2nd °</th>
<th>3rd °</th>
<th>TBSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>7</td>
<td>3.5</td>
<td>3.5</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Neck</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Anterior trunk*</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Posterior trunk*</td>
<td>13</td>
<td>0</td>
<td>13</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Right buttock</td>
<td>2.5</td>
<td>na</td>
<td>2.5</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Left buttock</td>
<td>2.5</td>
<td>na</td>
<td>2.5</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Genitalia</td>
<td>1</td>
<td>1</td>
<td>na</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Right upper arm</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Left upper arm</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Right lower arm</td>
<td>3</td>
<td>1.5</td>
<td>1.5</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Left lower arm</td>
<td>3</td>
<td>1.5</td>
<td>1.5</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Right hand</td>
<td>2.5</td>
<td>1.25</td>
<td>1.25</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Left hand</td>
<td>2.5</td>
<td>1.25</td>
<td>1.25</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Right thigh</td>
<td>9.5</td>
<td>4.75</td>
<td>4.75</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Left thigh</td>
<td>9.5</td>
<td>4.75</td>
<td>4.75</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Right leg</td>
<td>7</td>
<td>3.5</td>
<td>3.5</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Left leg</td>
<td>7</td>
<td>3.5</td>
<td>3.5</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Right foot</td>
<td>3.5</td>
<td>1.75</td>
<td>1.75</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Left foot</td>
<td>3.5</td>
<td>1.75</td>
<td>1.75</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td><strong>100</strong></td>
<td><strong>48</strong></td>
<td><strong>52</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

**Age:**

**Sex:**

**Weight:**

---

**Patient Identification**

---
## Pediatric Lund Browder Burn Estimate & Diagram

<table>
<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 1st</th>
<th>2nd*</th>
<th>3rd*</th>
<th>TBSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>17</td>
<td>13</td>
<td>11</td>
<td>9</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neck</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Anterior trunk*</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Posterior trunk*</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right buttock</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left buttock</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Genitalia</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right upper arm</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left upper arm</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right lower arm</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left lower arm</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right hand</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left hand</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right thigh</td>
<td>6.5</td>
<td>8</td>
<td>8.5</td>
<td>9</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left thigh</td>
<td>6.5</td>
<td>8</td>
<td>8.5</td>
<td>9</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right leg</td>
<td>5</td>
<td>5.5</td>
<td>6</td>
<td>6.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left leg</td>
<td>5</td>
<td>5.5</td>
<td>6</td>
<td>6.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Right foot</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left foot</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Diagram

[Diagram of a baby's body showing the areas and their percentage estimates]
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 1-2
[ ] Lorazepam ___mg Q___minutes IVP PRN sedation to Riker 1-2
[ ] Fentanyl ____mcg Q___minutes IVP PRN pain
[ ] Morphine ___mg Q___minutes IVP PRN pain
[ ] Other________________________________

Paralytics:
[ ] Rocuronium ______mg IVP Q____minutes PRN
[ ] Vecuronium ______mg IVP Q____minutes PRN

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 Flow Sheet

<table>
<thead>
<tr>
<th>Date</th>
<th>Initial Treatment Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>SSN</th>
<th>Pre-burn estimated weight (kg)</th>
<th>%TBSA (Do not include superficial 1st degree burn)</th>
<th>Calculate Rule of Tens (if &gt;40&lt;80kg, %TBSA x 10 = starting rate for LR)</th>
<th>Calculate max 24hr volume (250ml x kg) Avoid over-resuscitation, use adjuncts if necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Date & Time of Injury

<table>
<thead>
<tr>
<th>Tx Site/Team</th>
<th>HR from burn</th>
<th>Local Time</th>
<th>Crystalloid*(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) / CVP (6-8mmHg)</th>
<th>Pressors (Vasopressin 0.04 u/min)</th>
<th>Bladder Pressure (Q4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 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</th>
<th>Initial Treatment Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>SSN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date &amp; Time of Injury</th>
<th>BAMC/ISR Burn Team DSN 312-429-2876: Yes No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx Site/Team</td>
<td>HR from burn</td>
</tr>
<tr>
<td>25th</td>
<td></td>
</tr>
<tr>
<td>26th</td>
<td></td>
</tr>
<tr>
<td>27th</td>
<td></td>
</tr>
<tr>
<td>28th</td>
<td></td>
</tr>
<tr>
<td>29th</td>
<td></td>
</tr>
<tr>
<td>30th</td>
<td></td>
</tr>
<tr>
<td>31st</td>
<td></td>
</tr>
<tr>
<td>32nd</td>
<td></td>
</tr>
<tr>
<td>33rd</td>
<td></td>
</tr>
<tr>
<td>34th</td>
<td></td>
</tr>
<tr>
<td>35th</td>
<td></td>
</tr>
<tr>
<td>36th</td>
<td></td>
</tr>
<tr>
<td>37th</td>
<td></td>
</tr>
<tr>
<td>38th</td>
<td></td>
</tr>
<tr>
<td>39th</td>
<td></td>
</tr>
<tr>
<td>40th</td>
<td></td>
</tr>
<tr>
<td>41st</td>
<td></td>
</tr>
<tr>
<td>42nd</td>
<td></td>
</tr>
<tr>
<td>43nd</td>
<td></td>
</tr>
<tr>
<td>44th</td>
<td></td>
</tr>
<tr>
<td>45th</td>
<td></td>
</tr>
<tr>
<td>46th</td>
<td></td>
</tr>
<tr>
<td>47th</td>
<td></td>
</tr>
<tr>
<td>48th</td>
<td></td>
</tr>
</tbody>
</table>

**Total Fluids:**  
*Titrate LR hourly to maintain adequate UOP (30-50ml/hr) and perfusion*
<table>
<thead>
<tr>
<th>Date</th>
<th>Initial Treatment Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>SSN</td>
</tr>
<tr>
<td>Pre-burn</td>
<td>%TBSA</td>
</tr>
<tr>
<td>estimated</td>
<td>Calculate Rule of Tens</td>
</tr>
<tr>
<td>weight (kg)</td>
<td>if &gt;40&lt;80kg, %TBSA x 10</td>
</tr>
<tr>
<td></td>
<td>starting rate for LR</td>
</tr>
<tr>
<td>%TBSA</td>
<td>Calculate max 24hr volume</td>
</tr>
<tr>
<td></td>
<td>(250ml x kg)</td>
</tr>
<tr>
<td></td>
<td>Avoid over-resuscitation,</td>
</tr>
<tr>
<td></td>
<td>use adjuncts if necessary</td>
</tr>
</tbody>
</table>

**Date & Time of Injury**

<table>
<thead>
<tr>
<th>Date &amp; Time of Injury</th>
<th>BAMC/ISR Burn Team DSN 312-429-2876: Yes No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Tx Site/Team**

<table>
<thead>
<tr>
<th>Tx Site/Team</th>
<th>HR from burn</th>
<th>Local Time</th>
<th>Crystalloid* (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>
</tr>
</thead>
<tbody>
<tr>
<td>49th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51st</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61st</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>71st</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Fluids:**

*Titrate LR hourly to maintain adequate UOP (30-50ml/hr) and perfusion
**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 ETT ≥ 7.5 fr 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 (Hextend 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>
<thead>
<tr>
<th>5% Albumin Infusion (ml/hr)</th>
<th>30-49% TBSA</th>
<th>50-69% TBSA</th>
<th>70-100% TBSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;70 kg</td>
<td>30</td>
<td>70</td>
<td>110</td>
</tr>
<tr>
<td>70-90 kg</td>
<td>40</td>
<td>80</td>
<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
- 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)
Tactical Evacuation After Action Report & Patient Care Record

Event: Date Time Time Zone L O Z MM ( ) Pt# of Tail to Tail Y N Leg # of

9-Line: Time Platform Dispatch Cat Assessed Cat

Trauma MIST Report:

M = Mechanism of Injury, I = Injury, S = Signs & Symptoms, T = Treatments

Disease Diagnosis:

Comments

Pickup: Time Role Other Region Other Location

Dropoff: Time Role Other Region Other Location

Capability

Direct Pressure

Hemostatic Dressing

Kerlix Dressing

Pressure Dressing

Tourniquet

Prior TQ: Reassess/tighten

R

O2 Source

Self NPA OPA Cric Trach ETT SGA Type

Breathing

Needle Decompression

Chest Equal Rise and Fall

Respiratory Effort

Unlabored Labored

Agonal Assisted

Airway

Annotate Injuries

(AMP)utation

(BL)eeding

(C)repitus

(D)eformity

(DG)Degloving

(E)chymosis

(FX)Fracture

(GSW)Gunshot Wound

(H)ematoma

(IMP)lanted Object

(LAC)eration

(P)ain

(PP)Peppering

(PW)Puncture Wound

(SQA)Subcutaneous Air

(TBI)Suspect

Other

Circulation - Hemorrhage Control

Tourniquet

Prior TQ: Reassess/tighten

R

O2 Source

Self NPA OPA Cric Trach ETT SGA Type

Vent Settings

Time Mode Rate TV FIO2

Initial

Change

Change

Circulation - Assessment

Rhythm/Ectopy

Pulses

Transfusion Indication

Blood Infusion

Time Component ABO/RH Unit Number Exp. Date Blood Age

IV Lines

Peripheral IO Type / Site

Central Line Location

Arterial Line

Wrist R L

Groat R L

Prepared By:

(5) Name, Rank & Title

Department/Service/Clinic (Tending 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 _______

For use of this form, see AR 40-66; the proponent agency is the Office of the Surgeon General.
### Vital Signs

<table>
<thead>
<tr>
<th>Time</th>
<th>HR</th>
<th>BP</th>
<th>RR</th>
<th>SpO2</th>
<th>ETCO2</th>
<th>Temp</th>
<th>F</th>
<th>C</th>
<th>AVPU</th>
<th>GCS: Eyes 1-4 Verbal 1-5 Motor 1-6</th>
<th>Total Pain 0-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- PERRLA: Right (R) Size (mm), Left (L) Size (mm)

### Additional Interventions

<table>
<thead>
<tr>
<th>Foley</th>
<th>Time</th>
<th>Comment</th>
<th>Gastric Tube</th>
<th>Oral</th>
<th>Nasal</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Protection: Eye Shield, Protective Eyewear
- Immobilization: C-Collar, C-Spine, Spine Board, Pelvic Splint, Pelvic Binder, Type
- Warming: Hypothermia Prevention, Product
- Other Interventions

### Medications and Fluids

<table>
<thead>
<tr>
<th>Time</th>
<th>Drug / Fluid</th>
<th>Dose</th>
<th>Route</th>
<th>Time</th>
<th>Drug / Fluid</th>
<th>Dose</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Narrative Summary of Care

#### Enroute Care Provider

- Last Name: 
- First Name: 
- Rank: 
- Capability: 
- Signature: 

- Email PCR to: usarmy.jbsa.medcom-aisr.list.jts-prehospital@mail.mil

### Documents Received

- TCCC Card
- Patient Chart
- None
- Other

### 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: 
- PtCat: 
- SSN: 
- DOB: 
- Gender: M, F
- Allergy: 
- Other: 

### OTHER EXAMINATION OR EVALUATION

- History/Physical
- Treatment
- Diagnostic Studies
- Flow Chart
- Other Examination or Evaluation
### Casuality's Protective Equipment (Check all worn)

- Helmet, Ballistic
- Plate Front
- Neck Protector (Back)
- Groin Shield
- Blast Gauge
- Tactical Vest (IOTV)
- Plate Back
- Throat Protector (Front)
- Pelvic Undergarment Tier 1
- Blast Sensor Helmet
- Eye Protection
- Plate Right Side
- Deltoid Right
- Pelvic Undergarment Tier 2
- Blast Sensor Other
- Ear Protection
- Plate Left Side
- Deltoid Left

### 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)

- **LastName** __________________________ **FirstName** __________________________ **MI** __________
- **BR#** __________ **Rank** __________ **Unit** __________________________
- **SSN** __________ **DOB** __________ **Gender** ☐ M ☐ F **PtCat** __________
- **Date** __________ **Allergy** __________ **Other** __________

---

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.
1. **BACKGROUND and PURPOSE**
   a. Tactical Evacuation (TACEVAC) Pre-Hospital, Pre-Medical Treatment Facility (pre-MTF), or intra-MTF documentation of medical interventions by TACEVAC medical personnel 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 OP3, Tactical Evacuation (TACEVAC) After Action Report (AAR) and Patient Care Record (PCR) will allow for individual care improvement as well as a method for process improvement and quality assurance for TACEVAC medical providers. It is designed specifically for use by TACEVAC medical personnel in order to document all evaluation and care provided for casualties.

2. **POLICY**
   a. Commanders will ensure that all TACEVAC providers use the PCR to document TACEVAC care. Such care relates to both battle and non-battle injuries.
   b. Once completed, the PCR will be included with the patient’s medical record and the trauma system’s trauma registry. TACEVAC unit commanders must establish a clear process to ensure entry of the medical information recorded in the electronic health record through the Joint Trauma System.
   c. TACEVAC medical personnel will complete all entries as fully as possible.
   d. Detailed instructions for preparing the PCR are provided in Table 1 and Table 2.
   e. All abbreviations authorized for use in DoD health records or DoD trauma registries may also be used on the PCR.
   f. Ideally, all entries on the PCR will be made electronically after care is provided, with digital signatures. Manual entries may be made using a non-smearing pen or marker.
   g. All entries on the PCR should be printed clearly, including the TACEVAC provider’s name.

### Table 1: DA Form 4700 Tactical Evacuation After Action Report and Patient Care Record Instructions for completing Footer of Page 1 & 2

<table>
<thead>
<tr>
<th>Item</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics/Injury/Evacuation</td>
<td></td>
</tr>
<tr>
<td>Last Name, First Name, MI</td>
<td>Record patient’s name (Last, First and Middle Initial).</td>
</tr>
<tr>
<td>Battle Roster #</td>
<td>Record first letter of patient’s first name, then first letter of patient’s last name, then record the last four numbers of patient’s Social Security number. For example, John Doe 123-12-1234 is Battle Roster # ‘JD1234’.</td>
</tr>
<tr>
<td>Rank</td>
<td>Record patient’s rank.</td>
</tr>
<tr>
<td>Unit</td>
<td>Record patient’s unit name.</td>
</tr>
<tr>
<td>Pt Cat</td>
<td>Select the patient’s category from the dropdown list. Choices are: USA (U.S. Army), USAF (U.S. Air Force), USMC (U.S. Marine Corp), USN (U.S. Navy), USCG (U.S. Coast Guard), USPHS (U.S. Public Health Services), Civilian-Local (includes Host Nation), Civilian Other (includes Host Nation Police), Contractor, EPW (Enemy Prisoner of War), NATO-Coalition (joining military forces), NonNATO-Coalition (opposing military forces), or Other.</td>
</tr>
<tr>
<td>SSN</td>
<td>Record patient’s Social Security number or ID number.</td>
</tr>
<tr>
<td>DOB</td>
<td>Record patient’s Date Of Birth.</td>
</tr>
<tr>
<td>Gender</td>
<td>Mark an ‘X’ on the patient’s gender (Male (M) or Female (F)).</td>
</tr>
<tr>
<td>Allergy</td>
<td>Select patient’s known drug allergies from dropdown list. Choices are: NKDA (no known drug allergies), Opiates, Penicillin, Sulphur, or Other. If ‘Other’ is selected, record specific allergy on ‘Other’ adjacent line.</td>
</tr>
</tbody>
</table>

**Note:** This form, DA Form 4700 Tactical Evacuation After Action Report and Patient Care Record, is intended for Treatment documentation. Treatment is always marked with an ‘X’ and is not editable.
<table>
<thead>
<tr>
<th>Item</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Date/Time</td>
<td>Date. Record the date of injury. Select date from calendar popup or manually type the date (mmddyyyy). Date auto formats with slashes. Time. Record 24-hour time of injury (hhmm). Time auto formats hh:mm.</td>
</tr>
<tr>
<td>Time Zone</td>
<td>Mark an ‘X’ (L (Local) or Z (Zulu)) for time zone in which all times are recorded on this form</td>
</tr>
<tr>
<td>MM</td>
<td>Record the medical mission number, for example (S)01-16A. MM auto populates on page 2.</td>
</tr>
<tr>
<td>Pt # _____ of _____</td>
<td>Record the patient’s number (first blank) of the total number of patients (second blank) for this evacuation.</td>
</tr>
<tr>
<td>Tail to Tail</td>
<td>Mark an ‘X’ Y (yes) or N (no) for tail-to-tail evacuation.</td>
</tr>
<tr>
<td>Leg # _____ of _____</td>
<td>Record the leg number (first blank) of the total number of legs (second blank) for this evacuation.</td>
</tr>
<tr>
<td>9-Line</td>
<td>Time. Record 24-hour time of 9-Line (hhmm) in the same time zone as marked in ‘Time Zone’ above. Time auto formats hh:mm. Platform. Select the platform (aircraft) from the dropdown list. Dispatch Cat. Select the level of urgency: urgent, priority, or routine, from the dropdown list. Assessed Cat. Select the level of urgency: urgent, priority, or routine, from the dropdown list.</td>
</tr>
<tr>
<td>Disease Diagnosis</td>
<td>If the evacuation is due to disease, record the diagnosis of the disease. Record N/A if evacuation is not due to disease.</td>
</tr>
<tr>
<td>MIST Report</td>
<td>M. Select the dominant/primary Mechanism of injury from the dropdown list. If more than one Mechanism, specify additional mechanisms in Comments. I. Select the type of Injury from the dropdown list. S. Record the patient’s Signs and Symptoms. T. Record the Treatment given to the patient.</td>
</tr>
<tr>
<td>Comments</td>
<td>Record clarifying 9-Line comments.</td>
</tr>
<tr>
<td>Pickup</td>
<td>Time. Record 24-hour time of pickup. Time auto formats hh:mm. Role. Select the Role (level of care) from which the patient is picked up, from the dropdown list: 1-POI (Point of Injury), 1-Aid Station, Role 2, Role 3, Role 4, Other. If ‘Other’, record the level of care/facility. Region. Select the region in which the pickup occurred. If ‘Other’, record the region name. Location. Record the specific geographic location of the pickup.</td>
</tr>
<tr>
<td>Dropoff</td>
<td>Time. Record 24-hour time of dropoff. Time auto formats hh:mm. Role. Select the Role (level of care) at which the patient is dropped off, from the dropdown list: 1-Aid Station, Role 2, Role 3, Role 4, Other. If ‘Other’, record the level of care/facility. Region. Select the region in which the dropoff occurred. If ‘Other’, record the region name. Location. Record the specific geographic location of the dropoff.</td>
</tr>
<tr>
<td>Capability</td>
<td>Mark an ‘X’ for each capability present for this patient/mission. If ‘Other’, record the other capability present.</td>
</tr>
<tr>
<td>Circulation-Hemorrhage Control</td>
<td>Mark an ‘X’ for each type of dressing used to control bleeding. If ‘Other’ type of dressing, record the type.</td>
</tr>
<tr>
<td>Direct Pressure</td>
<td>Mark an ‘X’ (Y (yes), N (no), or N/A (not applicable) for previously applied tourniquet assessment/adjustment.</td>
</tr>
<tr>
<td>Item</td>
<td>Instruction</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tourniquet</td>
<td>Time On. Record 24-hour time (hh:mm) of all new tourniquet applications in the same time zone as marked in ‘Time Zone’ above. Time auto formats hh:mm. Extremity Tourniquet. Mark an ‘X’ on all types of extremity tourniquet applied, CAT (Combat Application Tourniquet), SOFTT (Special Operations Forces Tactical Tourniquet) and/or Other. If ‘Other’, record the extremity tourniquet type. Mark an ‘X’ on all locations, RUE (patient’s right arm (right upper extremity), LUE (patient’s left arm (left upper extremity), RLE (patient’s right leg (right lower extremity), LLE (patient’s left leg, (left lower extremity). Junctional Tourniquet. Mark an ‘X’ on type of truncal/junctional tourniquet applied, AAJT (Abdominal Aortic Junctional Tourniquet), CRoC (Combat Ready Clamp), JETT (Junctional Emergency Treatment Tool), SAM (Junctional tourniquet by SAM Medical Products), and/or Other. If ‘Other’, record the junctional tourniquet type. <strong>Note:</strong> Type of junctional tourniquet inherently describes tourniquet location. #. Record the number of tourniquets applied at the documented ‘Time On’ time.</td>
</tr>
<tr>
<td>TQ Comments</td>
<td>Record clarifying notes for tourniquets.</td>
</tr>
<tr>
<td>Airway</td>
<td></td>
</tr>
<tr>
<td>Treatment Types</td>
<td>Mark an ‘X’ for all types of airway treatment given. Self (none, patient breathes without assistance), NPA (nasopharyngeal airway), OPA (oropharyngeal airway), Cric (cricothyroidotomy), Trach (tracheotomy), ETT (endotracheal tube), SGA (supraglottic airway). Type. Record type of supraglottic airway treatment.</td>
</tr>
<tr>
<td>Tube</td>
<td>Size. Record the size of tube. Pos @____. Record the position (first blank) and select the Gums, Nare, or Teeth (second blank) from the dropdown list.</td>
</tr>
<tr>
<td>Confirmed</td>
<td>Mark an ‘X’ for all methods used to confirm breathing, BS (breath sounds), Vis (visualization/chest rise), ETCO$_2$ (End Tidal CO$_2$ device).</td>
</tr>
<tr>
<td>O$_2$ Source</td>
<td>Mark an ‘X’ for all sources used to deliver oxygen, NC (nasal cannula and nasal catheters), NRB (non-rebreather mask), BVM (bag valve mask), Vent (mechanical ventilator). LPM. Record flow of oxygen in liters per minute.</td>
</tr>
<tr>
<td>Intubated</td>
<td>Mark an ‘X’ for Prior to transport (intubation occurred prior to transport); By transport crew (intubation occurred during transport).</td>
</tr>
<tr>
<td>Suction</td>
<td>Mark an ‘X’ for ETT (Endotracheal tube), Yaunker (Oral suction tube).</td>
</tr>
<tr>
<td>Annotate Injuries</td>
<td>Record type of injury and location on the body map. Position the cursor over the location of the injury and type acronym for dominant injuries. For example, ‘GSW’ for gunshot wound. <strong>Note:</strong> Press the Tab key (or Shift+Tab) to position the cursor over the location. The cursor moves from Anterior Head to Posterior Head, Posterior Back/Buttocks to Anterior Chest/Abdomen, and then right arm, left arm, right leg, and left leg.</td>
</tr>
<tr>
<td>Breathing</td>
<td></td>
</tr>
<tr>
<td>Needle Decompression</td>
<td>Time. Record 24-hour time of all needle decompressions (ND) in the same time zone as marked in ‘Time Zone’ above. Mark an ‘X’ for R (right), L (left), Mid ax ( mid axillary), Mid clav (mid clavicle) locations of NDs.</td>
</tr>
<tr>
<td>Chest Tube</td>
<td>Time. Record 24-hour time of chest tube insertion in the same time zone as marked in ‘Time Zone’ above. Mark an ‘X’ for R (right) and/or L (left) chest tube location.</td>
</tr>
</tbody>
</table>

**Table 2**

**DA Form 4700 Tactical Evacuation After Action Report and Patient Care Record Instructions for completing Page 1.**
<table>
<thead>
<tr>
<th>Table 2</th>
<th>DA Form 4700 Tactical Evacuation After Action Report and Patient Care Record Instructions for completing Page 1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Instruction</td>
</tr>
<tr>
<td>Chest Equal Rise and Fall</td>
<td>Mark a ‘•’ for Y (yes), N (no) or N/A (not applicable) of equal chest rise and fall.</td>
</tr>
<tr>
<td>Respiratory Effort</td>
<td>Mark an ‘X’ for Unlabored, Labored, Agonal, and Assisted respiratory effort.</td>
</tr>
<tr>
<td>Vent Settings</td>
<td>Time. Record 24-hour time of initial and subsequent vent settings in the same time zone as marked in ‘Time Zone’ above. Record initial and subsequent vent setting values for Mode, Rate, TV, FiO₂, PEEP, PIP and ETCO₂.</td>
</tr>
<tr>
<td>Circulation Assessment</td>
<td></td>
</tr>
<tr>
<td>Rhythm/Ectopy</td>
<td>Mark an ‘X’ for NSR (normal sinus rhythm), SVT (supraventricular tachycardia), ST (sinus tachycardia), VT (ventricular tachyarrhythmias), SB (sinus bradycardia), VF (ventricular fibrillation), PEA (pulseless electrical activity), Paced, Asystole, A-Fib (atrial fibrillation), A-FLUT (atrial flutter) of heart rhythm/ectopy.</td>
</tr>
<tr>
<td>Pulses</td>
<td>Select A, D, +1, +2, +3 from the dropdown list for RAD, BRAC, CAR, FEM, PED, TEMP.</td>
</tr>
<tr>
<td>Circulation Resuscitation</td>
<td></td>
</tr>
<tr>
<td>Transfusion Indication</td>
<td>Mark an ‘X’ for Amputation, HR (heart rate) &gt; 120, SBP (systolic blood pressure) &lt; 90. Mark all that apply.</td>
</tr>
<tr>
<td>Blood Infusion</td>
<td>Time. Record 24-hour time infusion began in the same time zone as marked in ‘Time Zone’ above. Component. Select the infusion component, FDP (Freeze Dried Plasma), FFP (Fresh Frozen Plasma), PRBC (Packed Red Blood Cells), or Whole Blood from the dropdown list. ABO/RH. Select A+, A-, AB+, AB-, B+, B-, O+, or O- blood type from the dropdown list. Unit Number. Record the blood unit number, for example W012014000129P. Exp. Date. Record the blood expiration date. Select date from calendar popup or manually type the date (mmddyyyy). Date auto formats with slashes. Blood Age. Record the age of blood.</td>
</tr>
<tr>
<td>IV Lines</td>
<td>Peripheral. Mark an ‘X’ for R (right), L (left) Hand; R (right), L (left) Arm; R (right), L (left) EJ (external jugular) of all intravenous line sites. Record the gauge of all lines. IO Type/Site. Mark an ‘X’ for Fast-1, EZ IO intraosseous (IO) types used. If ‘Other’, record the IO type used. Mark an ‘X’ for (R (right), L (left) Humerus; (R (right), L (left) Tibia, Sternum IO sites. Central Line. Mark an ‘X’ for Triple lumen and/or Cordis central lines. Select Fem-R, Fem L, IJ-R, IJ-L, Subclav-R, Subclav-L site from the dropdown list. Arterial Line. Mark an ‘X’ for R (right), L (left) Wrist; R (right), L (left) Groin sites.</td>
</tr>
<tr>
<td>Prepared By/Department/Date</td>
<td>Prepared By</td>
</tr>
<tr>
<td></td>
<td>Department/Service/Clinic</td>
</tr>
<tr>
<td></td>
<td>Date</td>
</tr>
<tr>
<td>Table 3</td>
<td>DA Form 4700 Tactical Evacuation After Action Report and Patient Care Record Instructions for completing Page 2.</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Item</strong></td>
<td><strong>Instruction</strong></td>
</tr>
<tr>
<td>Vital Signs</td>
<td></td>
</tr>
<tr>
<td>Vital Sign Time/Values</td>
<td>Time. Record 24-hour time (hhmm) vital signs were obtained, in the same time zone as marked in ‘Time Zone’ page 1. Time auto formats hh:mm. Values. Record values for all known vital signs.HR (Heart Rate). BP (Blood Pressure): record the systolic value in first blank and diastolic value in second blank. Alternatively, record the P value. RR (Respiratory Rate). SpO2 (Oxygen saturation level). ETCO2 (End Tidal CO2). Temp (Temperature) and select F (Fahrenheit) or C (Celsius). AVPU, select patient’s level of consciousness: Alert, Verbal, Pain or Unresponsive. GCS, Eyes, Verbal, and Motor, select a value from the dropdown list, with 1 being the worst score, and 4, 5, or 6 respectively being the best score. GCS Total auto calculates the sum. 15 is the best score. Pain, select the patient’s level of pain from the dropdown list, with 0 being no pain, and 10 being the worst pain.</td>
</tr>
<tr>
<td>PERRLA</td>
<td>Mark an ‘X’ for R (right eye) and/or L (left eye) pupils equal, round, reactive to light and accommodation. Then record size in mm.</td>
</tr>
<tr>
<td>Field Ultrasound Results.</td>
<td>Record ultrasound results.</td>
</tr>
<tr>
<td>Other Diagnostics.</td>
<td>Record any other diagnostic results not otherwise specified.</td>
</tr>
<tr>
<td><strong>Additional Interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Record 24-hour time (hhmm) of each intervention in the same time zone as marked in ‘Time Zone’ page 1. Time auto formats hh:mm.</td>
</tr>
<tr>
<td>Foley</td>
<td>Record comments specific to Foley.</td>
</tr>
<tr>
<td>Gastric Tube</td>
<td>Mark an ‘X’ for Oral and/or Nasal. Record comments specific to gastric tube.</td>
</tr>
<tr>
<td>Protection</td>
<td>Mark an ‘X’ for Eye Shield, Protective Eyewear and for R (right), L (left) eye. Record comments specific to eye protection.</td>
</tr>
<tr>
<td>Immobilization</td>
<td>Mark an ‘X’ for C-Collar, C-Spine, Spine Board, Pelvic Splint, Pelvic Binder and/or Splint. If Pelvic Binder, record the type. If Splint, record type and location.</td>
</tr>
<tr>
<td>Warming</td>
<td>Mark an ‘X’ for hypothermia prevention administered. Record the product type/name.</td>
</tr>
<tr>
<td>Other Interventions</td>
<td>Record other interventions not otherwise specified.</td>
</tr>
<tr>
<td><strong>Medications and Fluids</strong></td>
<td></td>
</tr>
<tr>
<td>Medications and Fluids</td>
<td>Record name, dose, route, and 24-hour time of medications and fluids given.</td>
</tr>
<tr>
<td>Documents Received</td>
<td>Mark an ‘X’ for all documents received with the patient. TCCC (TCCC, DD1380 Tactical Combat Casualty Care Card), Patient Chart, None. If Other documentation was received, record the type, document title and/or description.</td>
</tr>
<tr>
<td><strong>Narrative Summary</strong></td>
<td></td>
</tr>
<tr>
<td>Narrative Summary</td>
<td>Record a summary of the care provided for the medical record. Do not include items documented previously. Do not include classified information.</td>
</tr>
<tr>
<td><strong>Enroute Care Provider</strong></td>
<td></td>
</tr>
<tr>
<td>Provider Name</td>
<td>Record the name (last, first) rank of the enroute care provider(s). Select the provider’s capability from the dropdown list (EMT-B, EMT-I, EMT-P, EMT-FPC, RN, CRNA, PA, MD/DO).</td>
</tr>
<tr>
<td>Provider Signature</td>
<td>Provider(s) digitally sign the form, recording the provider’s name, capability, date and time of signature. WARNING! Signature locks and prevents edits to Provider Name information.</td>
</tr>
<tr>
<td><strong>Prepared By/Department/Date</strong></td>
<td></td>
</tr>
<tr>
<td>Prepared By</td>
<td>The person who prepared the form digitally signs, recording his/her name, capability, date and time of signature. WARNING! Signature locks and prevents edits to entire form.</td>
</tr>
<tr>
<td>Department/Service/Clinic</td>
<td>Type/Record the department, service, and/or clinic that provided treatment. Auto populates field on page1/2.</td>
</tr>
</tbody>
</table>
3. **ISSUANCES**
   a. DoDI 6490.03, Deployment Health
   b. DoDI 6040.45, Service Treatment Record (ST) and Non-Service Treatment Records (NSTR)
   c. DHB Memorandum Tactical Evacuation Care Improvements within the Department of Defense 2011-03 (August 8, 2011)
   d. AR 40-66, Medical Record Administration and Healthcare Documentation
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)

TQ: R Arm
TYPE: _______________ TIME: _______________

TQ: L Arm
TYPE: _______________ TIME: _______________

TQ: R Leg
TYPE: _______________ TIME: _______________

TQ: L Leg
TYPE: _______________ TIME: _______________

Signs & Symptoms: (Fill in the blank)

<table>
<thead>
<tr>
<th>Time</th>
<th>Pulse (Rate &amp; Location)</th>
<th>Blood Pressure</th>
<th>Respiratory Rate</th>
<th>Pulse Ox % O2 Sat</th>
<th>AVPU</th>
<th>Pain Scale (0-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BATTLE ROSTER #:

EVAC: ☐ Urgent ☐ Priority ☐ Routine

Treatments: (X all that apply, and fill in the blank)

<table>
<thead>
<tr>
<th>Type</th>
<th>TQ-</th>
<th>Extremity</th>
<th>Junctional</th>
<th>Truncal</th>
<th>Dressing-</th>
<th>Hemostatic</th>
<th>Pressure</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

A: ☐ Intact ☐ NPA ☐ CRIC ☐ ET-Tube ☐ SGA

B: ☐ O2 ☐ Needle-D ☐ Chest-Tube ☐ Chest-Seal

C:  

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Name</th>
<th>Volume</th>
<th>Route</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Product</td>
<td>Name</td>
<td>Volume</td>
<td>Route</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Meds:

<table>
<thead>
<tr>
<th>Analgesic</th>
<th>Name</th>
<th>Dose</th>
<th>Route</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g., Ketamine, Fentanyl, Morphine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Name</th>
<th>Dose</th>
<th>Route</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g., Moxifloxacin, Ertapenem)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th>Name</th>
<th>Dose</th>
<th>Route</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g., TXA)</td>
<td></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
<table>
<thead>
<tr>
<th>LINE</th>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Location of Pickup Site.</td>
</tr>
<tr>
<td>2</td>
<td>Radio Frequ., Call Sign, &amp; Suffix.</td>
</tr>
<tr>
<td>3</td>
<td>No. of Patients by Precedence.</td>
</tr>
<tr>
<td>4</td>
<td>Special Equipment Required.</td>
</tr>
<tr>
<td>5</td>
<td>Number of Patients by Type.</td>
</tr>
<tr>
<td>6</td>
<td>Security of Pickup Site (Wartime).</td>
</tr>
<tr>
<td>6</td>
<td>Number and Type of Wound, Injury, or Illness (Peacetime).</td>
</tr>
<tr>
<td>7</td>
<td>Method of Marking Pickup Site.</td>
</tr>
<tr>
<td>8</td>
<td>Patient Nationality and Status.</td>
</tr>
<tr>
<td>9</td>
<td>NBC Contamination (Wartime).</td>
</tr>
<tr>
<td>9</td>
<td>Terrain Description (Peacetime).</td>
</tr>
</tbody>
</table>

This publication contains technical or operational information that is for official Government use only. Distribution is limited to U.S. Government agencies. Requests from outside U.S. Government agencies for release of this publication under the Freedom of Information Act or the Foreign Military Sales Program must be made to Commander USAESTC, ATTN: GTA Program Manager ATIC-ITST-T, Fort Eustis, VA 23064-5166. DESTRUCTION NOTICE: Destroy by any method that will prevent disclosure of contents or reconstruction of document.
<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; btwn. 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>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: FM 8-10-6, Medical Evacuation in a Theater of Operations, pages 7-7 through 7-9.
# NATO AEROMEDICAL EVACUATION 9 LINE

## NATO MEDEVAC "9-Line" REQUEST

<table>
<thead>
<tr>
<th>NATO MEDEVAC “9-Line” REQUEST</th>
<th>DTG:</th>
<th>UNIT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LOCATION (GRID OF PICKUP ZONE)</td>
<td>(1)</td>
</tr>
<tr>
<td>2</td>
<td>CALL SIGN &amp; FREQ:</td>
<td>(2)</td>
</tr>
<tr>
<td>3</td>
<td>NUMBER OF PATIENTS/ PRIORITY:</td>
<td>(3) P1 ...... P2 ...... P3 ......</td>
</tr>
<tr>
<td></td>
<td>PRIORITY 1(P1) - URGENT; to be at hospital facility (R2/ R3) within 60 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRIORITY 2 (P2) - To be at hospital facility (R2/ R3) within 4 hours of notification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRIORITY 3 (P3) - To be at hospital facility R2/R3 within 24 hours of notification</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SPECIAL EQUIPMENT REQUIRED:</td>
<td>(4)</td>
</tr>
<tr>
<td></td>
<td>A - NONE</td>
<td>B - HOIST (Winch)</td>
</tr>
<tr>
<td>5</td>
<td>PATIENTS BY TYPE</td>
<td>(5) L ...... A ...... E ......</td>
</tr>
<tr>
<td></td>
<td>S- STRETCHER (On Litter)</td>
<td>W-WALKING (Ambulatory)</td>
</tr>
<tr>
<td>6</td>
<td>SECURITY AT PICKUP ZONE (PZ)</td>
<td>(6)</td>
</tr>
<tr>
<td></td>
<td>N - NO ENEMY</td>
<td>E - ENEMY IN AREA</td>
</tr>
<tr>
<td>7</td>
<td>PICKUP ZONE (PZ) MARKING METHOD</td>
<td>(7)</td>
</tr>
<tr>
<td></td>
<td>A - PANELS</td>
<td>B - PYRO</td>
</tr>
<tr>
<td>8</td>
<td>NUMBER OF PATIENTS BY NATIONALITY/STATUS</td>
<td>(8) A ...... B ...... C ...... D ...... E ...... F ......</td>
</tr>
<tr>
<td></td>
<td>A - NATO MILITARY</td>
<td>B - NATO CIVILIAN</td>
</tr>
<tr>
<td></td>
<td>D - NON-NATO CIVILIAN</td>
<td>E - POW/DETAINEE</td>
</tr>
<tr>
<td></td>
<td>G- CIV CAS (caused by friendly forces)</td>
<td>H-CHILD</td>
</tr>
<tr>
<td>9</td>
<td>TACTICAL CONSIDERATIONS/OTHER INFORMATION</td>
<td>(9)</td>
</tr>
</tbody>
</table>
EVAC CATEGORY: □ Urgent □ Priority □ Routine
UNIT: ___________ NAME: _________ TATTOO: _______ BREED: _______
DATE (DD-MM-YY): __________ TIME: ___________ BLOOD: DEA 1.1
GENDER: □ M □ F CASTRATION/SPAY: □ Y □ N □ POS □ NEG
Mechanism of Injury: (X all that apply)
□ IED □ GSW □ MINE □ BURN □ GRENADE □ ARTILLERY □ MORTAR □ FALL □ OTHER: ___________________________________________________
Injury: (Mark all injuries that apply with an X)

VITAL SIGNS:

<table>
<thead>
<tr>
<th>Time</th>
<th>Acute Pain Score (&lt;1)</th>
<th>Temperature (99-102)</th>
<th>Pulse Rate (60-80)</th>
<th>Respiratory Rate (16-30)</th>
<th>Blood Pressure (120/80)</th>
<th>Pulse Ox% (&gt;95%)</th>
<th>Capillary Refill (&lt;2 sec)</th>
</tr>
</thead>
</table>

CANINE ACUTE PAIN SCALE

<table>
<thead>
<tr>
<th>SCORE</th>
<th>BEHAVIORAL</th>
<th>PALPATION</th>
<th>BODY TENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Comfortable when resting</td>
<td>Nontender to wound palpation</td>
<td>Minimal</td>
</tr>
<tr>
<td>1</td>
<td>Slightly unsettled or restless</td>
<td>Reacts to palpation of wound</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Uncomfortable at rest, whimpers, licks wound</td>
<td>Flinches, whimpers, cries</td>
<td>Mild to Moderate (reassess analgesic plan)</td>
</tr>
<tr>
<td>3</td>
<td>Unsettled, crying, groaning, biting, chewing wound</td>
<td>Increased respiratory rate, sharp cry, growl, bite</td>
<td>Moderate (reassess analgesic plan)</td>
</tr>
<tr>
<td>4</td>
<td>Constantly groaning or screaming when unattended, may bite wound</td>
<td>Cries at non-painful palpation, may react aggressively</td>
<td>Moderate to severe (reassess analgesic plan)</td>
</tr>
</tbody>
</table>

FIRST RESPONDERS:

<table>
<thead>
<tr>
<th>RANK</th>
<th>FIRST NAME</th>
<th>LAST NAME</th>
<th>LAST 4</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Treatments:  (X all that apply)

**C:** □ Extremity-TQ □ Junctional-TQ □ Pressure-dressing □ Hemostatic-dressing

Type/Other: ______________________________________________________________________

**A:** □ Intact □ ET-Tube with bite guard □ Tracheostomy □ Tracheal Insufflation (Muzzle: YES  NO)

**B:** □ O2 □ Needle-D □ Chest-Tube □ Chest-Seal Type: _______________________________

(75% of K9s have fenestrated mediastinums)

**FLUIDS:**  (Trauma MAP target 65mmHg; Hemorrhage MAP 40mmHg; TBI MAP 80mmHg)

- **Total Crystalloid Shock Volume of fluids is 90 mls/kg:**
  - Give ¼ of the Total Shock Fluid Volume IV/IO in 10-20 min. then reassess; repeat another ¼ of the calculated “shock” volume if necessary every 10 min. until targeted endpoints

<table>
<thead>
<tr>
<th>CRYSALLOID</th>
<th>VOLUME</th>
<th>ROUTE</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROXYETHYL STARCH (HES)</td>
<td>10-20mls/kg over 5-10 min. (after ½ shock crystalloid not effective)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYPERTONIC SALINE</td>
<td>4mls/kg (If two or three ¼ shock boluses and one or two boluses of HES not effective)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MWD Blood/Plasma (no human)</td>
<td>2.5-10mls/kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(First blood transfusion can be done without blood typing)

**Meds:**

<table>
<thead>
<tr>
<th>NAME</th>
<th>DOSE</th>
<th>ROUTE</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALGESIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TXA 10mg/kg (in 100ml NaCl or LRS followed by 10 mg/kg/h CRI over 3 hours)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANTIBIOTIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KETOROLAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERTPENEM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MORPHINE (10mg auto inj.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIPHYDRAMINE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MELOXICAM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMOXCILLIN-CLAVULANIC ACID</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEFSOLIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEFOTAXIME</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEFTRIAXONE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OTHER:** □ Gastric trocarization □ External Cooling (tap water) □ Splint □ Hypothermia-Prevention □ Muzzle □ Other: ____________________________________________

**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 (2mg/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>Hydromorphone (2mg/ml)</td>
<td>0.1-0.2mg/kg</td>
<td>IV/IM</td>
<td>1.5 mls</td>
<td>1.75 mls</td>
<td>2 mls</td>
</tr>
<tr>
<td>Ketorolac (30mg/ml)</td>
<td>0.5mg/kg</td>
<td>IV/IM/PO</td>
<td>0.5 mls</td>
<td>0.55 mls</td>
<td>0.6 mls</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>
<tr>
<td>Morphine (10mg auto inj.)</td>
<td>0.2-0.5mg/kg</td>
<td>IM</td>
<td>1 auto</td>
<td>1 auto</td>
<td>2 auto</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>1-2 mg/kg</td>
<td>IV/IM/PO</td>
<td>50 mg</td>
<td>75 mg</td>
<td>100 mg</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>Amoxicillin-Clavulanic Acid</td>
<td>13.75mg/kg</td>
<td>PO</td>
<td>375 mg</td>
<td>440 mg</td>
<td>500 mg</td>
</tr>
<tr>
<td>Cefsolin</td>
<td>20-30mg/kg</td>
<td>IV/IM</td>
<td>600 mg</td>
<td>650 mg</td>
<td>700 mg</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>22 mg/kg</td>
<td>IV/IM/SQ</td>
<td>600 mg</td>
<td>700 mg</td>
<td>800 mg</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>25 mg/kg</td>
<td>IV/IM</td>
<td>700 mg</td>
<td>800 mg</td>
<td>900 mg</td>
</tr>
</tbody>
</table>

**NOTES:** ____________________________
PURPOSE: The cTCCC 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 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 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 will input the information into the registry and scan the cTCCC to upload into ROVR. The cTCCC becomes part of the canine’s permanent DoD medical 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

PATIENT IDENTIFICATION

- UNIT. Record the unit the canine is assigned
- ANIMAL NAME. (self-explanatory)
- TATTOO. (self-explanatory)
- BREED. (self-explanatory)
- DATE. (DD-MM-YY)
- TIME. Record all time local 24 hour military format, hh:mm
- BLOOD. DEA 1.1 (mark as appropriate if known)
- 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)

FIRST RESPONDERS (self-explanatory) Please provide AOC/MOS in the Rank column.
TREATMENTS (mark as appropriate)

C (circulation): self-explanatory

A (airway): self-explanatory

B (breathing): self-explanatory

FLUIDS (fill out as appropriate and complete as possible)

MEDICATIONS (MEDS) (fill out as appropriate and complete as possible – if other medications are given that aren’t mentioned on the form, please include whether they are an analgesic, antibiotic or TXA. Be as thorough as possible)

OTHER (Include other lifesaving techniques or treatments)

NOTES (Include any additional information (location/country, euthanized/KIA, treatment regiments that were used to 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.

DEFINITIONS
IED – Improvised explosive device
GSW – Gunshot wound
TQ – Tourniquet
ET – Endotracheal tube
TXA – Tranexamic acid
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 en-route 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 principle assumes that a combat trauma patient will respond to care most effectively when the order of care addresses circulation (stopping and preventing blood loss) 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 battlefield 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, 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 not satisfy this requirement in civilian based medicine due to state legal policies and 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, ACLS, and BLS. However, it is highly suggested 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. Further, 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. As such, 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 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 en route emergency
care on a rotary wing platform in the prehospital environment while conducting intratheater, CONUS, or other tactical/operational contingency.

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 oversight 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) Battalion Flight Surgeon (FS), with the assistance of the Aeromedical Physician Assistant (APA) and designated company Medical Training NCO. The Brigade Surgeon, through delegation from the Brigade Commander, has responsibility for overall medical oversight. In the event that the FS is not qualified to act as an EMS director or believes themselves underprepared to direct out-of-hospital EMS care internally, then local implementation and oversight of these policies shall be tasked to a nonorganic board-certified emergency physician. If an emergency physician is not available, Commanders are advised to nominate a primary care physician or surgeon possessing expertise in the conduct of prehospital emergency care and in the medical direction of pre-hospital Emergency Medical Service personnel practicing under their authority. This standard for medical direction is in common use by most state EMS agencies. In addition, all medical aircrew should maintain currency on recent literature and equipment pertaining to pre-hospital aeromedical evacuation and enroute care.

Mid-Level 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 CAB 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 Dean, School of Army Aviation Medicine (SAAM) or Director, Critical Care Flight Paramedic (CCFP) Program will 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 Dean, SAAM).
5. After all accepted/applicable inputs have been updated; the SMOG will receive final approval from Dean, SAAM and/or Aeromedical Consultant to TSG.
6. Once final approval is given, the SMOG will undergo OPSEC/PAO review prior to posting on the MEDEVAC Enterprise portal or JTS website.

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 battlefield trauma patient.
REFERENCES and GUIDELINES

JOINT TRAUMA SYSTEM, DEPARTMENT OF DEFENSE CENTER OF EXCELLENCE CLINICAL PRACTICE GUIDELINES

OTHER PUBLICATIONS

American Academy of Pediatrics, Pediatric Education for Prehospital Provider, Jones and Bartlett, 2016
MEDICAL DIRECTOR / UNIT COMMANDER

REVIEW AND APPROVAL PAGE

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, 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 Critical Care Flight Paramedic 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 Flight Paramedic 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.
Summary of Changes

- Formatting for easier comprehension and readability with more consistent verbiage throughout
- Hyperlinked text
- “Quick Menu” and “Drug Chart” buttons added to every page for instant reference as well as main section buttons on face page. These do not appear on printed versions to lesson ink wastage
- Right side header tabs added to enable flipping to a section if printed
- Updated Date and version # to SMOG
- Reformatted Vitals Functions chart for readability, added Broselow color chart approximations, using UpToDate
- Added “Any above the knee” amputation to immediate clinical indications for whole blood use in keeping with Vampire Program USCENTCOM Clinical Operating Protocols (CCOPs)
- Eye injury – added anxiety medications and expanded on rigid shield application IAW Aug 2018 JTS CPGs
- Needle Thoracostomy - Updated to align with IAW Aug 2018 TCCC standards
- IV/IO Protocol – bolded “external jugular lines”. Added IO needle descriptions
- Pain Mgt Protocol – rearranged Ketamine IM/IV doses for consistency
- All drug cards have been adjusted to align with the dosages and indications within the protocols, refined to remove redundancies and/or conflicting information, and revised for ease of use.
- Corrected Morphine dosages
- Adjusted tourniquet verbage to align with TCCC guidelines
- Blood component therapy adjusted to align with TCCC guidelines. Includes addition of Calcium earlier in treatment
- TBI goals of O2 sat/ETCO2/SBP adjusted for CPGs
- Pediatric Hypotension chart emphasis added
- Updated all Airway related algorithms to current AHA BLS guidelines and to JTS CPGs for reduced Oxygen requirements in trauma patients
- Added bevel direction to NPA procedure for clarity
- Changed Ventilator Management protocol to align with ARDSNet defined values.
- Changed verbiage for BIAD
- Added specific snakes to Envenomation guide
• SALT triage algorithm added for Trauma Arrest link. https://chemm.nlm.nih.gov/salttriage.htm
• Added examples of ECG rhythms to ACLS protocols
• Added Quick Reference Drug IV Drip Charts for common meds
• Added simple (finger) thoracotomy
• Added Crush Syndrome algorithm
• Added pressor priority chart, drug dilution chart
• Added Ranitidine Drug Card
• Adjusted beta blocker overdose treatment
• Corrected guideline for Narrow Irregular Cardioversion
• Addressed Hypothermia Management
• Rephrased “TXA with Plasma” in multi-trauma protocol to eschew obfuscation
• Added caution for Labetalol
• Added caution for Mannitol
• Updated MWD protocols
• Added Plasmalyte
• Updated Fluids to reflect shift to balanced isotonic crystalloids
• Added MWD TC3 Card
• Modified Vent management to include Continuous Positive Airway Pressure
• Adjusted dosage for 3% HTS
• Adjusted ETCO2 goals in Head Injuries
• Added order of precedence for blood administration
• Added Passive Oxygenation to RSI protocol
• Changed Lidocaine strength in IO protocol
ANTIBACTERIALS

- **Typhoid Fever (Sporadic)**
  - Standard regimen:
    - Ciprofloxacin 750mg PO bid x 7 days
    - Doxycycline 100mg PO bid x 7 days
  - Note: Medication must be continued for 7 days after symptoms resolve.

- **Brucellosis**
  - Trimethoprim-Sulfamethoxazole 160mg/800mg PO bid x 21 days

- **Gonococcal Infections**
  - Ceftriaxone 1g IM or IVPB
  - Azithromycin 1g PO once

- **Chronic Prostatitis**
  - Tetracycline 500mg PO 4 times/day x 4 weeks
  - Flomax 0.4mg PO bid x 4 weeks

- **Urinary Tract Infections**
  - Ciprofloxacin 500mg PO bid x 7 days

- **Acute Bacterial Sinusitis**
  - Amoxicillin 500mg PO 4 times/day x 10 days

- **Acute Conjunctivitis**
  - Hypromellose 0.1% SOE QID x 10 days

- **Nasopharyngeal Abscess**
  - Penicillin 500mg IM or IVPB 3 times/day x 10 days

- **Pharyngitis**
  - Amoxicillin 500mg PO 4 times/day x 5 days

- **Acute Upper Respiratory Infection**
  - Amoxicillin 500mg PO 4 times/day x 5 days

- **Acute Lower Respiratory Infection**
  - Amoxicillin 500mg PO 4 times/day x 5 days

- **Meningitis**
  - Ceftriaxone 1g IM or IVPB 2 times/day x 7 days

- **Acute Appendicitis**
  - Metronidazole 500mg PO 4 times/day x 5 days

- **Acute Cholangitis**
  - Piperacillin/Tazobactam 3.375g IM Q6H x 7 days
### CARDIAC continued

<table>
<thead>
<tr>
<th>DRUG</th>
<th>STANDARD DOSE</th>
<th>SMALL ADULT (60KG)</th>
<th>ADULT (80KG)</th>
<th>LARGE ADULT (100KG)</th>
<th>INDICATIONS</th>
<th>RESTRICTIONS/WARNINGS</th>
<th>DURATION</th>
<th>MAX DOSE/REPEATABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Bicarbonate</td>
<td>1mEq/kg IV/IO</td>
<td>60mEq</td>
<td>80mEq</td>
<td>100mEq</td>
<td>TCA OD; Prolonged Cardiac Arrest</td>
<td>Do not mix with other meds / flush after 1-2hrs</td>
<td>Maint Infusion of 100-150mEq in 1L D5W @ 100-200ml/hr for TCA OD</td>
<td></td>
</tr>
<tr>
<td>Labetalol</td>
<td>10-20mg IV/IO/over 1-2min</td>
<td>Urgency=10mg; Emergency=10-20mg</td>
<td>HTN Urgency/ Emergency</td>
<td>Lower MAP by &lt;20%</td>
<td>15-60 min</td>
<td>Repeat/double q 10min; Max 300mg</td>
<td>20mg/kg/hr infusion for Beta OD; 1000mg Q 10-20 x 3 doses PRN for Ca Channel Blocker OD</td>
<td></td>
</tr>
<tr>
<td>Calcium Chloride (100mg/ml)</td>
<td>Ca Glucose can alternatively be used @ 3x doses listed here (except for Beta Blocker OD)</td>
<td>500-1000mg over 2-5 min for Hyper K issues; 20mg/kg &gt;:5-10min for Beta Blocker OD; 1Gram &gt;:5min for Ca Blocker OD; 1G &gt;:5min after Blood</td>
<td>Hyperkalemia; Beta&amp;Calcium Channel Blocker OD</td>
<td>Central Line use preferred</td>
<td>30min-4hrs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CRINE

| Atropine | 0.05-0.1mg/kg/IV/KO q 5-10 min PRN | 3mg | 4mg | 5mg | Organophosphate/ Nerve Agent | Requires large amounts of Atropine (5-20x doses) | 5-15min | Double dose if previous dose does not relieve symptomatic (H2 blocker) |
| Pralidoxime Chloride (2-Pam) (Duodote ATNAA) | 1-3 Auto-Injectors (60mg ea) | Inject 1-3 injectors (based on severity of symptoms) IM. | Duodote/ATNAA Injector contains both Atropine (2.1mg) and 2-Pam (600mg) | Use Atropine 1st if only single dose 2-Pam (Mark V/NAKA Kit) | 15min | If symptoms remain after 15 min, re-inject subsequent doses (Max 1800mg 2-Pam) |

### Multi-use / Seizures / Other

| Diazepam | Anxiety: 2-10mg IV q 6hrs // Seizures: 5-10mg q 3-4hrs // Seizures following Nerve agent Exposure: 10mg IM for seizures or if IM Mark 1 Kit used | Anxiety / Seizures / Nerve Agent Seizures | Respiratory Depression | 20-30min | Max dose 30mg for seizures |
| Lorazepam | 1-2mg IV/IO | Seizures = 1-2mg q 15-30 min; Agitated/Comatose Patient = 1-2mg q 30-60 | Seizures / Agitated or Comatose Patient | Respiratory Depression | 30-120min | Max 8mg in 12hrs for seizures |
| Magnesium Sulfate | 1-2 Gram IV/IO | Seizures = 1-2g over 30 min; Wheezing / Respiratory Distress (3rd line) = 2g over 20 min (Pre)Eclampsia = 4-6g over 15-20min | Seizures / Wheezing in Resp Distress (Pre) Eclampsia | Dilute into 50-100ml NS or 0.5W | 30min | 2 Grams/hr infusion needed following loading dose for Eclampsia |

### Mannitol (20%) | 1 Gram/kg IV over <20 min | 60G | 80G | 100G | Mod to severe head Tx | Avoid in HTN Pt’s | 3-4hrs | Follow with 0.25 Gram/kg IV q 4hrs |

### FLUIDS

| Resuscitation (Crystalloid) | ≤20ml/kg | ≤200-500 ml Bolus to achieve systolic BP >90 | Hypotension / vasomotor | Blood 1st fluid choice | PRN | Titrated to maintain SBP >90 |

| Maintenance | 1-2 ml/kg | 75ml/hr(TIKO) / 105ml/hr(TIKO) / 150ml/hr(TIKO) | IV access / Homeostasis | Do not over hydrate | PRN | Titrated to effect |

| Burns >20% TBSA | 10ml % TBSA (Based on 40-80kg adult) | 10ml % TBSA Per Hour | 10ml % TBSA Per Hour | 10mL % TBSA Per Hour | >20% TBSA partial to full thickness burns | Track start time and amount infused | N/A | Add 100ml/hr for each 10kg over 80kg |

| Hypertonic Saline (3%) | 0.1-1 ml/kg/hr | 250ml bolus followed by 50-100ml/hr | ICP Reduction | Equates to 1.5 LNS | 2+ weeks | PRN up to 1500ml/day |

### Blood Products and Management

(See also Epinephrine and Benadryl for Hemolytic Reactions)

| PRBC (1u=250ml) | 10ml/kg | 1-2 units PRN to achieve Sys BP >90 - Life =42 days | Int/Ext Hemorrhage / Anti Donor | Monitor for Anaphylaxis / Hyperthermia / HyperR | PRN | Repeat PRN to maintain SYS BP >90 / MAP >60 / Hemostasis |

| FFP (1u=200-250ml) | 10ml/kg | 1-2 units PRN to achieve 1:1 ratio w/ PRBC’s (Shelf Life (thawed) > 5 days) | Int/Ext Hemorrhage / Anti Donor | Monitor for Anaphylaxis / Hyperthermia / HyperR | PRN | Ideal ratio of FFP:PRBC:Platelets is 1:1:1 |

### Acetaminophen

| 500mg PO or 1G IV | 500mg PO or 1Gm IV infusion | Peak Reaction | Infuse slowly | 6hrs | Use only for Non-Hemolytic react |

### HEMATOLOGY


### CHEMISTRIES

| Na 135-145 | Cl 95-105 | BUN 8-25 | Glu 60-100 |
| pH 7.35-7.45 | Pa CO2 22-26 | Pa O2 90-110 |

### VENTILATION MANAGEMENT

| Initial Vent Settings |

### FLUID MANAGEMENT

| Shock: Calculate 90ml/kg for total fluid to be infused: | Give |

Temperature 101-103 °F | 25% ≤ 10 min; reseass; give 25% > 20 min(PRN); reseass; give 25% > 25% Oxygen Therapy @ 100% / NIV or BiPAP |

Respirations 16-30/MIN | Panting |

Blood Pressure 120/80 (avg) mm Hg; MAP 90-100 | 10 min(PRN); last 25% > 10min (PRN) |

Heart Rate 50-80 | Intubate w/ 10.0 ET tube |

CO2 35-45 mmHg | Defib 2.5 Joules/Kg |

### INDICATION

| K9 MEDICATIONS |

| Anesthesia – Intermittent IV/IO/IM |

| Analgesia – Continuous IV/IO Infusion |

| Mid Sedation – IM |

| Agitated K9 Sedation – IM 1st/IV PRN |

| Cardiopulmonary Arrest BLS |

| V-FIB/V-TACH |

| ASYSTOLE/PE/A/BRADYCARDIA |

### NOTES

| D.O.P.E. – Displacement; Obstructions; Pneumothorax; Equipment Failure |

| Ideal Body Weight Calculation |

| Men | Women |

| Height in inches -60 x 2.2 | +50 |

| Height in inches -60 x 2.2 | +45 |

### MILITARY WORKING DOG

| VITALS |

| Normal | Excited |

| Temperature 101-103 °F | 103 °F |

| Respiration 16-30/MIN | Panting |

| Blood Pressure 120/80 (avg) mm Hg; MAP 90-100 | 10 min(PRN); last 25% > 10 min(PRN) |

| Heart Rate 35-80 |

| Pa CO2 35-45 mmHg | Defib 2.5 Joules/Kg |

### TROUBLESHOOTING
### Hematology

**Hemoglobin (Hgb)**
- Normal: 13.8-17.2 g/dL

**Hematocrit (Hct)**
- Normal: 37.8-47.1%

**White Blood Cells (WBC)**
- Normal: 5.0-10.7 x 10^9/L

**Platelets**
- Normal: 150-450 x 10^9/L

### Chemistry

**Sodium**
- Normal: 136-146 mEq/L

**Potassium**
- Normal: 3.4-5.1 mEq/L

**Calcium**
- Normal: 8.8-10.2 mg/dL

**Chloride**
- Normal: 95-106 mEq/L

**CO2**
- Normal: 22-28 mosm/L

**Bicarbonate**
- Normal: 22-28 mEq/L

**Urea Nitrogen (BUN)**
- Normal: 5-20 mg/dL

**Creatinine**
- Normal: 0.4-1.5 mg/dL

### Other

**Total Bilirubin**
- Normal: 0.2-1.2 mg/dL

**Direct Bilirubin**
- Normal: 0.0-0.2 mg/dL

**Lipase**
- Normal: 10-60 U/L

**Amylase**
- Normal: 5-40 U/L

**Blood Glucose**
- Normal: 60-100 mg/dL

### Veterinary Management

**Initial Vent Settings**
- **Adult** and **Pediatric** settings are the same.

**Respiratory Rate**
- Initial: 12-20 breaths/min

**Tidal Volume**
- Initial: 5-10 mL/kg

**PEEP**
- Initial: 5-10 cm H2O

**FiO2**
- Initial: 40-70%

**Heart Rate**
- Initial: 60-100 bpm

**Blood Pressure**
- Initial: 100/60 mm Hg

**Temperature**
- Normal: 99.6°F (37.0°C)

**Respiratory Status**
- Initial: Comfortable respiratory effort

**Hydration**
- Initial: Normal

**Blood Glucose**
- Initial: Normal

**Electrolytes**
- Initial: Normal

**Medication Dosage**

**Common Drugs**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Standard Dosing</th>
<th>Small Adult (0.1g/2.2 lbs)</th>
<th>Adult (0.1g/2.2 lbs)</th>
<th>Large Adult (0.1g/2.2 lbs)</th>
<th>Indications</th>
<th>Restrictions/Warnings</th>
<th>Duration</th>
<th>MAX Dose/Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketamine</td>
<td>0.5-1.0 mg/kg</td>
<td>0.5-1.0 mg/kg</td>
<td>10-20 mg/kg</td>
<td>10-20 mg/kg</td>
<td>Analgesia</td>
<td>2-4 mg/kg every 6-12 hr</td>
<td>4-6 hr</td>
<td>10 mg/kg every 6-12 hr</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>1-2 mcg/kg</td>
<td>1-2 mcg/kg</td>
<td>20-40 mcg/kg</td>
<td>20-40 mcg/kg</td>
<td>Analgesia</td>
<td>2-4 mcg/kg every 6-12 hr</td>
<td>4-6 hr</td>
<td>10 mg/kg every 6-12 hr</td>
</tr>
<tr>
<td>Pralidoxime</td>
<td>0.45 mg/kg</td>
<td>0.45 mg/kg</td>
<td>9-18 mg/kg</td>
<td>9-18 mg/kg</td>
<td>Analgesia</td>
<td>2-4 mg/kg every 6-12 hr</td>
<td>4-6 hr</td>
<td>10 mg/kg every 6-12 hr</td>
</tr>
<tr>
<td>Multi</td>
<td>0.25 mg/kg</td>
<td>0.25 mg/kg</td>
<td>5-10 mg/kg</td>
<td>5-10 mg/kg</td>
<td>Analgesia</td>
<td>2-4 mg/kg every 6-12 hr</td>
<td>4-6 hr</td>
<td>10 mg/kg every 6-12 hr</td>
</tr>
<tr>
<td>PRBC</td>
<td>0.1-0.25 mg/kg</td>
<td>0.1-0.25 mg/kg</td>
<td>2-5 mg/kg</td>
<td>2-5 mg/kg</td>
<td>Analgesia</td>
<td>2-4 mg/kg every 6-12 hr</td>
<td>4-6 hr</td>
<td>10 mg/kg every 6-12 hr</td>
</tr>
<tr>
<td>HetaStarch/Hextend</td>
<td>0.5-1.0 g/kg</td>
<td>0.5-1.0 g/kg</td>
<td>10-20 g/kg</td>
<td>10-20 g/kg</td>
<td>Analgesia</td>
<td>2-4 mg/kg every 6-12 hr</td>
<td>4-6 hr</td>
<td>10 mg/kg every 6-12 hr</td>
</tr>
</tbody>
</table>

**Additional Information**

- Medications are designed to fit inside the cargo pocket of the AED and should be stored while on MEDVAC duty and referenced for use during medication administration.

---

**Hemodynamic Monitoring**

**Hemodynamic Monitoring**

- **Systolic Blood Pressure (SBP)**
  - Normal: 100-120 mm Hg

- **Diastolic Blood Pressure (DBP)**
  - Normal: 60-80 mm Hg

- **Mean Arterial Pressure (MAP)**
  - Normal: 80-100 mm Hg

- **Heart Rate (HR)**
  - Normal: 60-100 bpm

- **Respiratory Rate (RR)**
  - Normal: 12-20 breaths/min

- **Oxygen Saturation (SpO2)**
  - Normal: 95-100%

**Vital Signs**

- Heart Rate (HR): 60-100 bpm
- Respiratory Rate (RR): 12-20 breaths/min
- Temperature: 99.6°F (37.0°C)
- Blood Pressure (BP): 100/60 mm Hg
- Oxygen Saturation (SpO2): 95-100%

**Comorbid Conditions**

- **Hypertension**: Blood pressure > 140/90 mm Hg
- **Diabetes Mellitus**: Blood glucose > 180 mg/dL
- **Obesity**: Body mass index (BMI) > 30 kg/m²

**Drug Administration**

- **Antidotes**
  - **Ketamine**: 0.5-1.0 mg/kg
  - **Fentanyl**: 1-2 mg/kg
  - **Pralidoxime**: 0.45 mg/kg

**Use of Medical Equipment**

- **Autotransfusion Systems**: Use for autotransfusion

**Cardiac Arrest**

- **Initial Management**
  - **Airway**: Open and secured
  - **Breathing**: Provide positive pressure ventilation
  - **Circulation**: CPR at 100-120 beats/min

**Drug Protocols**

- **Epinephrine**: 0.5 mg IV/IO
- **Norepinephrine**: 0.3-0.5 mg/kg IV/IO push
  - **Etomidate**: 0.1-1.5 mg/kg IV/IO push

**Additional Information**

- **Calcium**: 10-20 mg/kg IV/IO
- **Magnesium**: 2.5-5 mg/kg IV/IO

---

**Temperature Monitoring**

- **Rectal Temperature**
  - Normal: 36.5-38.0°C

**Hematocrit (Hct)**

- Normal: 37.8-47.1%

**Platelets**

- Normal: 150-450 x 10^9/L