“My duties as an aviation medical aidman are: first to be totally dedicated to the preservation of life and limb of my fellow Soldier;”

FY18 Version
Published
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Summary of Changes

- Added Page numbers
- P. 1, 11, 12- Updated logo and name to reflect change from the formerly titled United States Army School of Aviation Medicine (USASAM) to the newly titled School of Army Aviation Medicine (SAAM)
- P. 1- Added Date and version # to SMOG
- P. 2- Added Summary of Changes
- P. 7- Updated AKO link for accessing SMOG
- P. 28- Aligned Fentanyl Dose with Drug Card
- P. 29- Aligned Fentanyl Dose with Drug Card
- P. 46- Clarified Lidocaine dosage for IO flush
- P. 47- Adjusted Norepinephrine doses to align with drug cards
  - Added examples of alternative vasopressors
- P. 48- Replaced Dopamine with Epinephrine for alternative vasopressor
- P. 52- Added IV Acetaminophen dose
- P. 53- Corrected spelling error
- P. 58- Adjusted Ketamine Dose
- P. 66- Removed Pre-treatment Atropine (no longer recommended)
  - Adjusted Vecuronium dose to align with drug card
  - Aligned Rocuronium dosing schedule with drug card
  - Adjusted “Continued Sedation” Ketamine dose
- P. 68- Replaced D12.5 (Dextrose 12.5%) with D10 (Dextrose 10%) and adjusted dosing
- P. 69- Aligned Furosemide dose with drug card
  - Adjusted “Solu-Medrol” to “Methylprednisolone”
- P. 70- Corrected spelling error
- P. 71- Aligned Vecuronium dose with drug card
  - Removed Lidocaine as a pre-treatment medication. Alternative medications have shown higher efficacy and are listed.
  - Added Ketamine as a sedative agent of choice to “Paralysis/Sedation” section
  - Added Rocuronium as an alternative RSI paralytic in “Paralysis/Sedation” section
- P. 82- Administrative corrections
- P. 85- Added Onadsetron dose
  - Replaced Calcium Gluconate with Calcium Chloride
- P. 86- Added Lidocaine dose if Amiodorone unavailable
- P. 88- Administrative corrections
- P. 90- Adjusted Glucagon and Ondansetron doses
• P. 91- Added Lidocaine dose if Amiodorone unavailable
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  - Replaced Calcium Gluconate with Calcium Chloride
• P. 93- Adjusted Glucagon and Ondansetron doses
• P. 94- Administrative corrections
  - Added Epinephrine infusion dosage to Pearls
• P. 100- Adjusted weight for Epi-Pen Jr. usage
• P. 101- Adjusted Dexamethasone dosage
• P. 107- Adjusted Activated Charcoal dosing
  - Adjusted Glucagon dose for Beta Blocker OD
  - Adjusted Atropine dosing schedule for organophosphate exposure
• P. 108- Administrative corrections
  - Adjusted Glucagon dose for Beta Blocker OD and AMS
  - Adjusted Atropine dosing schedule for organophosphate exposure
• P. 110- Adjusted Glucagon dose
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• P. 117- Adjusted Norepinephrine doses to align with drug cards
• P. 119- Adjusted Promethazine dose
• P. 120- Adjusted Thiamine and Glucagon doses
• P. 150-201
  - 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.
• P. 202- **NEW** Added new Quick reference pocket drug card. Allows for cargo pocket
  size quick reference card while on duty
• P. 203- **NEW** Added Quick reference Drug Dilution chart
• P. 209- Added ISR website address to access DA 4700 Patient Care Report (PCR)
• P. 212-213 Adjusted standing order sheet to be fillable
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INTRODUCTION

This current set of medical guidelines has gone through some significant improvements since the original release in 2014. They were developed through a collaboration of Emergency Medicine professionals, experienced Flight Medics, Aeromedical Physician Assistants, Critical Care Nurses, and Flight Surgeons. Our shared goal is to ensure enroute care is excellent and standard across all prehospital units. It is our vision that all of these enhancements and improvements will advance enroute care across the services and Department of Defense.

These medical guidelines are intended to guide Critical Care Flight Paramedics (CCFP) and prehospital professionals in the response and management of emergency situations and the care and treatment of patients in a garrison and theater of war environment. Unit medical providers are not expected to employ these guidelines blindly. In fact, 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 they are approved by the unit supervising physician and/or medical director.

This book 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.
REFERENCES and GUIDELINES

1. FM 4-02.2, 12 August 2014
2. ATP 4-25.13, 15 February 2013
3. TC 3-04.93, 31 August 2009
4. TC 3-04.33, 10 May 2013
5. TC 3-04.21, 4 November 2013
6. TC 3-04.11, 19 November 2009
7. AR 40-8, 16 May 2007
8. STP 8-68W13-SM-TG, 3 May 2013
9. TC 8-800, 15 September 2014
26. AR 40-3, 23 April 2013
27. AR 40-61, 28 January 2005
28. FM 4-02.1, 8 December 2009
29. AR 190-51, 30 September 1993
30. AR 710-2, 28 March 2008
31. DA Pam 710-2-1, 31 December 1997
32. DOD 4145.19–R–1, 15 September 1979
33. JP 4-02, 26 July 2012
Standard Medical Operating Guidelines can be found at the following website:  
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, inter-facility, 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 (non-combat), 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 versus 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 non-organic 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, 1st flow chart within Treatment Guidelines and Procedures).** 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.
# TREATMENT GUIDELINES AND PROCEDURES

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IV. SEXUAL ASSAULT

V. TREATMENT OF MINORS

VI. PATIENT REFUSAL

VII. MEDICATION, DRUG CARDS
   a. General Use
      i. Use as clinically indicated per guideline.
         1. Oxygen
         2. 0.9% Sodium Chloride (Normal Saline)
         3. Ringers, Lactate
         4. 3% Hypertonic Saline
         5. Dextrose 5% in water, D5W
         6. Blood Product (Guideline and Procedures)
   b. Medications:
      i. If carried, these medications are available for use, within the limitations of these
guidelines and drug cards. These medications may be used during transfer of
critical care patients when provided written orders and guidance from the
transferring physician. These medications are available for use on any patient,
within the limitations of these guidelines, as clinically indicated, and to address
acute life threatening emergencies not accounted for on the transferring
physician’s written orders. The medications listed below do not constitute the
entire available medication list of the CCFP. Medical Directors can add
additional medications as required for mission accomplishment.
         1. Acetaminophen
         2. Acetazolamide
         3. Acetylsalicylic Acid
         4. Activated Charcoal
         5. Adenosine
         6. Albuterol
         7. Amiodarone
         8. Atropine
         9. Calcium Chloride
        10. Calcium Gluconate
        11. Dexamethasone
        12. Dextrose
        13. Diazepam
        14. Diphenhydramine
        15. Dobutamine
        16. Dopamine
17. Epinephrine 1:1,000
18. Epinephrine 1:10,000
19. Etomidate
20. Fentanyl
21. Furosemide
22. Glucagon
23. Heparin
24. Hetastarch
25. Hydromorphone
26. Hydroxocobalamin
27. Ketamine
28. Ketorolac
29. Labetalol
30. Lidocaine
31. Lorazepam
32. Magnesium Sulfate
33. Mannitol
34. Methylprednisolone
35. Midazolam
36. Morphine
37. Naloxone
38. Nifedipine
39. Nitroglycerin
40. Norepinephrine
41. Ondansetron
42. Phenylephrine
43. Pralidoxime Chloride
44. Promethazine
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46. Rocuronium
47. Sodium Bicarbonate
48. Succinylcholine
49. Thiamine
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TREATMENT GUIDELINES AND PROCEDURES

I. THE FLIGHT MEDIC OATH

FLIGHT MEDICS OATH

My duties as an aviation medical aidman are: first to be totally dedicated to the preservation of life and limb of my fellow soldier;
Second to maintain myself in a state of perpetual readiness:
Thirdly to show by example devotion to duty, honor, and country.
I will not lose faith in my God, my country, my duty, or my colleagues.
I will strive to provide the best care possible to those entrusted to my skills
This I solemnly swear on my honor and by the heavens in which men fly.
(The Flight Medics Oath, SSG George J. Parks)

II. MEDEVAC CLINICAL GUIDELINES and PROCEDURES
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.

- 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 untreated or unstable KNOWN 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)

Wheels Down

“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

- REASSESS: If unstable move to:
  - HEMORRHAGE CONTROL
  - EXTREMITY TRAUMA
  - MULTIPLE TRAUMA

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

- REASSESS: If unstable move to:
  - Next Level Airway intervention per procedure

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

- REASSESS: If unstable move to:
  - Next Level intervention per procedure

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

- Hypotension / Shock Guideline

- Head Injury Guideline

- Document Patient Care

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).
- Goal < 5 minutes time on scene prior to wheels up.
**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 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.
# 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/marketed</td>
</tr>
<tr>
<td>3.</td>
<td>Patient meets criteria for en route critical care transport: risk documented by sending physician (POST-OPERATIVE and CC INTRAFACILITY TRANSFER, Pre-Transfer Patient Status Requirements)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation Steps</th>
<th>Positioning and Proper Monitoring:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Patient moved to litter (collapsible handles), positioned, padded, strapped, equipment (with necessary attachments) added and secured.</td>
</tr>
<tr>
<td>2.</td>
<td>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°. (For eye injured patients, fox shield in place. For burn patients, JTTB burn sheet initiated.)</td>
</tr>
<tr>
<td>3.</td>
<td>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.</td>
<td>IV / IO access verified, patent, and secured.</td>
</tr>
<tr>
<td>5.</td>
<td>Arterial line inserted and secured, if indicated. Transducer accessible.</td>
</tr>
<tr>
<td>6.</td>
<td>Ventilator tubing checked to be free from obstruction, with ETCO₂ and secondary lines attached.</td>
</tr>
<tr>
<td>7.</td>
<td>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.</td>
<td>Chest tubes to water seal/suction (place Heimlich valve for non-atrium chest drainage systems).</td>
</tr>
<tr>
<td>9.</td>
<td>Wound vacuum disconnected and stowed.</td>
</tr>
<tr>
<td>10.</td>
<td>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.</td>
</tr>
<tr>
<td>13.</td>
</tr>
<tr>
<td>14.</td>
</tr>
<tr>
<td>15.</td>
</tr>
</tbody>
</table>

**Ventilator Management:**

| 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. |
| 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. |

**Final Verification:**

| 18. | Transferring Physician, Flight Paramedic, ECCN (or Flight Provider) verbally agrees to flight care plan. |
| 19. | Critical Care Transfer Orders reviewed and signed by transferring physician. (STANDARD ORDER SET for CRITICAL CARE TRANSFERS) |
| 20. | Enroute CC Transfer Document with completed preflight and enroute care data handed over to and confirmed by receiving provider / facility. (CENTCOM Transfer Document) |
## Vital Functions

### Assessment Reference Charts

#### Heart Rate/Min

<table>
<thead>
<tr>
<th>Age</th>
<th>Awake Rate</th>
<th>Mean</th>
<th>Sleeping Rate</th>
<th>Blood Pressure Average</th>
<th>Lower Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn to 3mo</td>
<td>85-205</td>
<td>140</td>
<td>80-160</td>
<td>1-10y</td>
<td>90+(years old x2)mmHg</td>
</tr>
<tr>
<td>3mo-2y</td>
<td>100-190</td>
<td>130</td>
<td>75-160</td>
<td>&gt; 10y</td>
<td>70+(years old x2)mmHg</td>
</tr>
<tr>
<td>2-10y</td>
<td>60-140</td>
<td>80</td>
<td>60-90</td>
<td>MAP</td>
<td>55+(years old x1.5)mmHg</td>
</tr>
<tr>
<td>&gt;10y</td>
<td>60-100</td>
<td>75</td>
<td>50-90</td>
<td>MAP</td>
<td>55+(years old x1.5)mmHg</td>
</tr>
</tbody>
</table>

#### Respiratory Rate/Min

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

#### Oxygen Saturation

<table>
<thead>
<tr>
<th>SpO₂ (Peripheral O₂ Sat)</th>
<th>All Ages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>96-100% or &gt;94% for patient with Normal Hemoglobin level</td>
</tr>
<tr>
<td></td>
<td>&gt;75-95%</td>
</tr>
<tr>
<td></td>
<td>&gt;75-95%</td>
</tr>
<tr>
<td></td>
<td>35-45 mmHg</td>
</tr>
</tbody>
</table>
## Vital Functions
### Assessment Reference Charts

<table>
<thead>
<tr>
<th>RESPONSE</th>
<th>ADULT</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Opening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spontaneous</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>To Speech</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>To Pain</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Verbal Response</th>
<th>Child</th>
<th></th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oriented</td>
<td>5</td>
<td>Oriented</td>
<td>Coos and Babbles</td>
</tr>
<tr>
<td>Confused Conversation</td>
<td>4</td>
<td>Confused Conversation</td>
<td>Irritable, Cries</td>
</tr>
<tr>
<td>Inappropriate Words</td>
<td>3</td>
<td>Inappropriate Words</td>
<td>Cries in Response to Pain</td>
</tr>
<tr>
<td>Incomprehensible Sounds</td>
<td>2</td>
<td>Incomprehensible Words / Sounds</td>
<td>Moans in Response to Pain</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Best Motor Response</th>
<th>Child</th>
<th></th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obeys Commands</td>
<td>6</td>
<td>Obeys Commands</td>
<td>Moves Spontaneously</td>
</tr>
<tr>
<td>Localizes Pain</td>
<td>5</td>
<td>Localizes Painful Stimulus</td>
<td>Withdraws to Touch</td>
</tr>
<tr>
<td>Flexion Withdrawal to Pain</td>
<td>4</td>
<td>Flexion Withdrawal to Pain</td>
<td>Withdraws from Painful Stimulus</td>
</tr>
<tr>
<td>Abnormal Flexion (Decorticate)</td>
<td>3</td>
<td>Abnormal Flexion (Decorticate)</td>
<td>Abnormal Flexion (Decorticate)</td>
</tr>
<tr>
<td>Extension (Decerebrate)</td>
<td>2</td>
<td>Extension (Decerebrate)</td>
<td>Extension (Decerebrate)</td>
</tr>
<tr>
<td>None (Flaccid)</td>
<td>1</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)
## Vital Functions
### Assessment Reference Charts

### MUSCULOSKELETAL INJURY and PERIPHERAL NERVE ASSESSMENT

### UPPER EXTREMITIES

<table>
<thead>
<tr>
<th>NERVE</th>
<th>MOTOR Testing</th>
<th>SENSATION Testing</th>
<th>INJURY to Consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ulnar</td>
<td>Index and Little Finger Abduction</td>
<td>Little Finger</td>
<td>Elbow Injury</td>
</tr>
<tr>
<td>Median Distal</td>
<td>Thenar Contraction with Opposition</td>
<td>Index Finger</td>
<td>Wrist Fracture or Dislocation</td>
</tr>
<tr>
<td>Median, Anterior Interoseous</td>
<td>Index Tip Extension</td>
<td>None</td>
<td>Supracondylar Fracture of Humerus</td>
</tr>
<tr>
<td>Musculocutaneous</td>
<td>Elbow Flexion</td>
<td>Radial Forearm</td>
<td>Anterior Shoulder Dislocation</td>
</tr>
<tr>
<td>Radial</td>
<td>Thumb, Finger group Extension</td>
<td>First Dorsal Web Space</td>
<td>Distal Humeral Shaft, Anterior Shoulder Dislocation</td>
</tr>
<tr>
<td>Axillary</td>
<td>Deltoid</td>
<td>Lateral Shoulder</td>
<td>Anterior Shoulder Dislocation, Proximal Humerus Fracture</td>
</tr>
</tbody>
</table>

### LOWER EXTREMITIES

<table>
<thead>
<tr>
<th>NERVE</th>
<th>MOTOR Testing</th>
<th>SENSATION Testing</th>
<th>INJURY to Consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoral</td>
<td>Knee Extension</td>
<td>Anterior Knee</td>
<td>Pubic Rami Fractures</td>
</tr>
<tr>
<td>Obturator</td>
<td>Hip Adduction</td>
<td>Medial Thigh</td>
<td>Obturator Ring Fractures</td>
</tr>
<tr>
<td>Posterior Tibial</td>
<td>Toe Flexion</td>
<td>Sole of Foot</td>
<td>Knee Dislocation</td>
</tr>
<tr>
<td>Superficial Peroneal</td>
<td>Ankle Eversion</td>
<td>Lateral Dorsum of Foot</td>
<td>Fibular Neck Fracture, Knee Dislocation</td>
</tr>
<tr>
<td>Deep Peroneal</td>
<td>Ankle / Toe Dorsiflexion</td>
<td>Dorsal 1st-2nd Web Space</td>
<td>Fibular Neck Fracture, Compartment Syndrome</td>
</tr>
<tr>
<td>Sciatic Nerve</td>
<td>Plantar Flexion</td>
<td>Foot</td>
<td>Posterior Hip Dislocation</td>
</tr>
<tr>
<td>Superior Gluteal</td>
<td>Hip Abduction</td>
<td>Upper Buttocks</td>
<td>Acetabular Fracture</td>
</tr>
<tr>
<td>Inferior Gluteal</td>
<td>Hip Extension</td>
<td>Lower Buttocks</td>
<td>Acetabular Fracture</td>
</tr>
</tbody>
</table>

### MUSCLE STRENGTH GRADING

<table>
<thead>
<tr>
<th>SCORE</th>
<th>EXAM RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Total Paralysis</td>
</tr>
<tr>
<td>1</td>
<td>Palpable or Visible Contraction</td>
</tr>
<tr>
<td>2</td>
<td>Full Range of Motion Without Gravity</td>
</tr>
<tr>
<td>3</td>
<td>Full Range of Motion Against Gravity</td>
</tr>
<tr>
<td>4</td>
<td>Full Range of Motion, but Less than Normal Strength</td>
</tr>
<tr>
<td>5</td>
<td>Normal Strength</td>
</tr>
<tr>
<td>NT</td>
<td>Not Testable</td>
</tr>
</tbody>
</table>
# Vital Functions Assessment Reference Charts

## PEDIATRIC ALS EQUIPMENT
*(Always use a Broselow® Pediatric Emergency Tape if available)*

<table>
<thead>
<tr>
<th>AGE and WEIGHT</th>
<th>Premie 3kg</th>
<th>0-6 mos 3.5kg</th>
<th>6-12 Mos 7kg</th>
<th>1-3 yrs 10-12kg</th>
<th>4-7 yrs 16-18kg</th>
<th>8-10 yrs 24-30kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airway and Breathing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2 MASK</td>
<td>Premie, Newborn</td>
<td>Newborn</td>
<td>Pediatric</td>
<td>Pediatric</td>
<td>Pediatric</td>
<td>Adult</td>
</tr>
<tr>
<td>ORAL AIRWAY</td>
<td>Infant</td>
<td>Infant, Small</td>
<td>Small</td>
<td>Small</td>
<td>Medium</td>
<td>Medium, Large</td>
</tr>
<tr>
<td>BAG-MASK</td>
<td>Infant</td>
<td>Infant</td>
<td>Pediatric</td>
<td>Pediatric</td>
<td>Pediatric</td>
<td>Pediatric, Adult</td>
</tr>
<tr>
<td>LARYNGOSCOPE</td>
<td>0 Straight</td>
<td>1 Straight</td>
<td>1 Straight</td>
<td>1 Straight</td>
<td>2 Straight or Curved</td>
<td>2-3 Straight or Curved</td>
</tr>
<tr>
<td>ET TUBE</td>
<td>2.5-3.0 uncuffed</td>
<td>3.0-3.5 uncuffed</td>
<td>3.5-4.0 unc / cuffed</td>
<td>4.0-4.5 unc / cuffed</td>
<td>5.0-5.5 unc / cuffed</td>
<td>5.5-6.5 cuffed</td>
</tr>
<tr>
<td>STYLET</td>
<td>6 Fr</td>
<td>6 Fr</td>
<td>6 Fr</td>
<td>6 Fr</td>
<td>14 Fr</td>
<td>14 Fr</td>
</tr>
<tr>
<td>SUCTION</td>
<td>6-8 Fr</td>
<td>8 Fr</td>
<td>8-10 Fr</td>
<td>10 Fr</td>
<td>14 Fr</td>
<td>14 Fr</td>
</tr>
<tr>
<td><strong>Circulation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP CUFF</td>
<td>Premie, Newborn</td>
<td>Newborn, Infant</td>
<td>Infant, Child</td>
<td>Child</td>
<td>Child</td>
<td>Child, Adult</td>
</tr>
<tr>
<td>IV CATHETER</td>
<td>22-24 ga</td>
<td>22 ga</td>
<td>22 ga</td>
<td>20-22 ga</td>
<td>20 ga</td>
<td>18-20 ga</td>
</tr>
<tr>
<td><strong>Supplemental Equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONG/ING TUBE</td>
<td>8 Fr</td>
<td>10 Fr</td>
<td>12 Fr</td>
<td>12 Fr</td>
<td>12 Fr</td>
<td>14 Fr</td>
</tr>
<tr>
<td>CHEST TUBE</td>
<td>10-14 Fr</td>
<td>12-18 Fr</td>
<td>14-20 Fr</td>
<td>14-24 Fr</td>
<td>20-28 Fr</td>
<td>28-38 Fr</td>
</tr>
<tr>
<td>URINARY CATHETER</td>
<td>5 Fr feeding</td>
<td>6 Fr or 5-8 Fr feeding</td>
<td>8 Fr</td>
<td>10 Fr</td>
<td>10-12 Fr</td>
<td>12 Fr</td>
</tr>
<tr>
<td>CERVICAL COLLAR</td>
<td></td>
<td></td>
<td>Small</td>
<td>Small</td>
<td>Small</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Vital Functions
Assessment Reference Charts (Broselow® Pediatric Emergency Tape)

<table>
<thead>
<tr>
<th>Color</th>
<th>Kg</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray</td>
<td>3-5 kg</td>
<td>6-11 lbs</td>
</tr>
<tr>
<td>Pink</td>
<td>6-7 kg</td>
<td>13-15 lbs</td>
</tr>
<tr>
<td>Red</td>
<td>8-9 kg</td>
<td>17-20 lbs</td>
</tr>
<tr>
<td>Purple</td>
<td>10-11 kg</td>
<td>22-25 lbs</td>
</tr>
<tr>
<td>Yellow</td>
<td>12-14 kg</td>
<td>27-32 lbs</td>
</tr>
<tr>
<td>White</td>
<td>15-18 kg</td>
<td>34-41 lbs</td>
</tr>
<tr>
<td>Blue</td>
<td>19-23 kg</td>
<td>42-52 lbs</td>
</tr>
<tr>
<td>Orange</td>
<td>24-29 kg</td>
<td>54-65 lbs</td>
</tr>
<tr>
<td>Green</td>
<td>30-36 kg</td>
<td>67-80 lbs</td>
</tr>
<tr>
<td>40 kg</td>
<td>40 kg</td>
<td>90 lbs</td>
</tr>
<tr>
<td>45 kg</td>
<td>45 kg</td>
<td>101 lbs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color</th>
<th>Give</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray (3-5 kg)</td>
<td>80 ml</td>
</tr>
<tr>
<td>Pink (6-7 kg)</td>
<td>130 ml</td>
</tr>
<tr>
<td>Red (8-9 kg)</td>
<td>170 ml</td>
</tr>
<tr>
<td>Purple (10-11 kg)</td>
<td>210 ml</td>
</tr>
<tr>
<td>Yellow (12-14 kg)</td>
<td>260 ml</td>
</tr>
<tr>
<td>White (15-18 kg)</td>
<td>340 ml</td>
</tr>
<tr>
<td>Blue (19-23 kg)</td>
<td>420 ml</td>
</tr>
<tr>
<td>Orange (24-29 kg)</td>
<td>500 ml</td>
</tr>
<tr>
<td>Green (30-36 kg)</td>
<td>500 ml</td>
</tr>
<tr>
<td>40 kg</td>
<td>500 ml</td>
</tr>
<tr>
<td>45 kg</td>
<td>500 ml</td>
</tr>
</tbody>
</table>

ZOLL® Defibrillation Energy Settings for PEDIATRIC Patients

<table>
<thead>
<tr>
<th>Color</th>
<th>First</th>
<th>Second</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray (3-5kg)</td>
<td>8 J</td>
<td>15 J</td>
<td>30 J</td>
</tr>
<tr>
<td>Pink (6-7kg)</td>
<td>10 J</td>
<td>20 J</td>
<td>50 J</td>
</tr>
<tr>
<td>Red (8-9 kg)</td>
<td>15 J</td>
<td>30 J</td>
<td>75 J</td>
</tr>
<tr>
<td>Purple (10-11 kg)</td>
<td>20 J</td>
<td>30 J</td>
<td>100 J</td>
</tr>
<tr>
<td>Yellow (12-14 kg)</td>
<td>20 J</td>
<td>50 J</td>
<td>120 J</td>
</tr>
<tr>
<td>White (15-18 kg)</td>
<td>30 J</td>
<td>50 J</td>
<td>150 J</td>
</tr>
<tr>
<td>Blue (19-23 kg)</td>
<td>30 J</td>
<td>75 J</td>
<td>150 J</td>
</tr>
<tr>
<td>Orange (24-29 kg)</td>
<td>50 J</td>
<td>100 J</td>
<td>200 J</td>
</tr>
<tr>
<td>Green (30-36 kg)</td>
<td>50 J</td>
<td>120 J</td>
<td>200 J</td>
</tr>
<tr>
<td>40 kg</td>
<td>75 J</td>
<td>150 J</td>
<td>200 J</td>
</tr>
<tr>
<td>45 kg</td>
<td>75 J</td>
<td>150 J</td>
<td>200 J</td>
</tr>
</tbody>
</table>
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.

Universal Patient Care Guideline

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; 45mm for humerus or use of universal/adjustable depth needle.
  - 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.
**PAIN MANAGEMENT**

**Signs and Symptoms:**
- Tachycardia
- Diaphoresis
- Elevated Blood Pressure
- Vocalizes and/or Signals Pain

---

**Continued From:**

Tactical Evacuation Guideline

Patient care according to **guideline** based on **specific complaint**

- **Pain >3/10**
- **Vocalizes / Signals Pain and requests relief**

**Indication for IV / IM medications?**

**YES**

**IV / IO Guideline**

**NO**

**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

---

**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 Extreme 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**

**AVERAGE PEDIATRIC VITAL FUNCTIONS**

<table>
<thead>
<tr>
<th>Age</th>
<th>Awake Rate</th>
<th>Mean</th>
<th>Sleeping Rate</th>
<th>Blood Pressure</th>
<th>Average</th>
<th>Lower Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn to 3mo</td>
<td>85-205</td>
<td>140</td>
<td>80-160</td>
<td>1-10y</td>
<td>90+(years old x2)mmHg</td>
<td>70+(years old x2)mmHg</td>
</tr>
<tr>
<td>3mo-2y</td>
<td>100-190</td>
<td>130</td>
<td>75-160</td>
<td>&gt;10y</td>
<td>90mmHg</td>
<td></td>
</tr>
<tr>
<td>2-10y</td>
<td>60-140</td>
<td>80</td>
<td>60-90</td>
<td>MAP</td>
<td>55+(years old x1.5)mmHg</td>
<td></td>
</tr>
<tr>
<td>&gt;10y</td>
<td>60-100</td>
<td>75</td>
<td>50-90</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Signs and Symptoms:**
- Tachycardia, Diaphoresis, Elevated Blood Pressure, Cry, Grimace, Splinting, Guarding

**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

Follow Procedural steps of:
**PAIN MANAGEMENT GUIDELINE**

Utilize Appropriate Medication in Pediatric Dose.

**FENTANYL 0.5-1mcg/kg SIVP**
q 20-30min (Max 4mcg/kg)

**MORPHINE 0.1mg/kg IV SIVP/IM**
q 120min (Max 0.4mg/kg)

**Acetaminophen**
10-15mg/kg PO / PR

**ONDANSETRON** (for Nausea)
- ≤40kg 0.1mg/kg IV
- >40kg 4mg IV
**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 patient encounter.
- Any mishaps / errors should be brought to attention of medical control ASAP.
- Contact medical control for any necessary assistance when feasible.
Universal Patient Care Protocol

Utilize Broselow® Pediatric Emergency Tape for all weight-based drug administration. Verify correct drug and dose prior to administration.

Prior to flight day, verify presence and operational condition of all equipment, medications, and supplies required for operational readiness.

Following each flight – recheck and verify all supplies stocked and ready. If unable due to operation tempo – attempt to call ahead and have supplies delivered on arrival.

If class VIII items or patient movement items are depleted, advise commander and adjust as necessary to accommodate mission requirements.

All medication errors, clinical errors, or adverse outcomes should be reported to the medical director ASAP.

Assume patient's condition is worse than what is presented. Anticipate deterioration and address aggressively.

Follow appropriate SMOG for patient treatment. Real-time treatment of the patient is the responsibility of the flight medic with the patient.

For any patient that does not fit into a guideline (SMOG), Contact and Consult medical control. If this is not possible, provide standard care within the education, training and scope of the provider, until MTF is reached.

**Pearls:**
- Supportive care for all patients includes routine monitoring, IV guideline, O₂ / airway support, and fluid resuscitation (as required) to maintain or approach “normal” vital signs.
- Always check and double-check medications, dosage, condition, indication, potential adverse reactions, and control measures prior to administration. Record any patient allergies prior to administration of drugs.
- Check medical supplies and equipment prior to accepting / flying mission. Arrival on scene without proper equipment will result in inability to provide optimal care, and may result in adverse outcomes.
- Any medication / clinical errors or other care-associated concerns should be brought to the attention of the medical officer / director ASAP following the mission or at earliest possible time.
POST-OPERATIVE & CC
INTRAFACTORILITY 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 70-80 mmHg, MAP >60 mmHg (permissive hypotension)
   3) If elevated ICP or CPP, maintain MAP 80−110 mmHg, SBP 110−160 mmHg
   4) Hematocrit >24% (or Hgb >8 g/dL)
   5) Platelet count >50/mm³
   6) INR <2.0
   7) pH >7.3
   8) Base deficit <5 mEq/L
   9) Temperature >35.5°C or 96°F
   10) ETCO₂ 35−45 mmHg, SPO₂ >92%, and/or PaCO₂ 35−45 mmHg

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 >97°F and <100°F), stabilization of fractures, and initial post-operative recovery.

c. Attempt to keep patient packaging time at <25 minutes; use of warming devices in accordance with the JTS Hypothermia Prevention CPG.

d. Movement of Deceased Patients:
   1) In general, patients who meet clinical criteria for death are not to be transported by MEDEVAC, with the exception of extreme extenuating circumstances, such as emergency exfiltration during CSAR.
   2) If vital signs are absent prior to launch, make all reasonable attempts to resuscitate as clinical and tactical circumstances permit. If unsuccessful, consider basic cardiac ultrasound (as available) to determine whether any signs of cardiac activity are present. If absent, mission abort is warranted.
3) In such circumstances, contact and consultation with medical control or other available physician is suggested, in order to facilitate field determination of death and cessation of resuscitative efforts.

**PROCEDURE:**

a. **Role 2/3 provider responsibilities:**

It is the responsibility of the transferring physician to write enroute care orders appropriate for the transport environment and individualized for each patient in consultation with the Critical Care Flight Paramedic and/or the ECCN (or attending Flight Provider) prior to launch. The Flight Paramedic / Provider should be given a **Standard Order Set for Critical Care Transfers** or similar document with en route care orders signed by the transferring physician.

1) Provide a complete report to Flight Paramedic / Provider.
2) Provide all patient-specific related medical records.
3) Assist Flight Paramedic / Provider with packaging patient for transport as requested.
4) Complete specified areas on the appropriate patient care report
   i. Administrative data
   ii. Most current laboratory data
   iii. Mechanism of Injury (MOI)
   iv. Diagnosis
   v. Procedures
5) Place patient on ventilator at least 30 minutes prior to flight. Obtain pre-flight ABG to ensure patient tolerates ventilator settings.
6) It is strongly suggested that the transferring physician make every possible attempt to contact and discuss the case with the receiving physician or facility representative. Flight Paramedics and ECCNs should confirm or encourage this vital "physician-to-physician hand-off" if practicable.

b. **FLIGHT PARAMEDIC / PROVIDER responsibilities prior to transfer:**

1) Obtain orders for en route care from transferring physician; review orders and discuss potential en route problems with transferring physician, reconcile medications (ensure needed medications, specific to patient’s condition, are obtained and prepared), allergies and patient’s weight, confirm patient’s identification, and secure personal effects.
2) Perform primary & secondary assessment ensuring an understanding of the patient’s injuries / illness / procedures performed.
3) Spinal immobilization is indicated during transfer if ordered by transferring physician.
4) Assess placement and secure all tubes, lines, and drains & ensure proper functioning.
5) Ensure endotracheal tube is secure; secure pulse oximeter / ETCO₂ monitor.
6) Review ABG – ABG should be done within 30 minutes of flight; patient should be on transport ventilator with vent settings for transport; ABG obtained 15 minutes after being placed on transport ventilator.

7) Ensure vascular access X 2 - peripheral, central or IO and A-line as needed.

8) Check all bandages, splints, dressing, fixation devices and tourniquets for placement and ensure no evidence of ongoing hemorrhage.

9) If indicated, insert OG/NG tube for gastric decompression, especially in intubated patients; cap or place to suction.

10) Empty Foley catheter bag prior to flight; ensure UOP documentation by transferring facility.

11) For an intubated patient, provide adequate analgesia and sedation PRIOR to giving additional paralytic medications. Re-dose medications as needed prior to flight in accordance with transferring physician’s orders.

12) Continue administration of blood products if ordered by transferring physician. If anticipated administration of blood products enroute, Flight Paramedic/Provider should request orders for blood products and appropriate blood products from the transferring physician and use FDA approved fluid warming device as appropriate for warming fluids.

13) Collect all patient care documentation for transport with patient, i.e. pre-hospital, transport, labs, x-rays, transferring facility notes, etc.

14) Remove all air from IV fluid bags and place all free flowing bags in pressure bags.

15) Ensure patient is properly packaged in a warming device unless contraindicated prior to transfer. Follow directions specific to each warming device ensuring over heating or thermal burns do not occur. Hypothermia, acidosis and coagulopathy constitute the “triad of death” in trauma patients.

16) Securely affix all equipment, supplies, loose tubing and lines to NATO litter prior to moving the patient to the vehicle or aircraft.

17) Once patient is packaged, ensure all lines are leveled and monitors are zeroed.

18) Provide eye and ear protection to patient.

c. Special considerations:

1) Eye Trauma: Fox shields should be placed for any patient with a suspected or confirmed open globe, possible intraocular foreign body or eye injury. Avoid placing dressing under the Fox shield and manipulation of 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. (JTTS CPG - Initial Care of Ocular & Adnexal Injuries)

2) Compartment Syndrome: Patients with extremity injuries, abdominal injuries/surgery, burns, coagulopathy and those who have received massive transfusion are at risk for compartment syndrome. Ensure proper assessment prior to flight. If compartment syndrome is suspected during flight, place extremity at the level of the heart. Pain out of proportion to the injury and paresthesia are symptoms
of compartment syndrome, as well as pallor, paralysis, pulselessness, and poikilothermia. Patients who are sedated, paralyzed or have an epidural or block in place are at increased risk and require judicious hands on assessment of at risk abdomen and extremities. (JTTS CPG – Compartment Syndrome and Fasciotomy)

3) Burns: For patients with partial and/or full-thickness burns to > 20% TBSA, use of the Burn Patient Admission Orders and JTTS Burn Resuscitation Flow Sheet are REQUIRED and should be continued during transfer to another facility. (JTTS CPG – Burn)

4) Advanced pain management modalities: For patients with epidurals, continuous peripheral nerve blocks, PCA infusions, or other pain medicine infusions, a pain note should be completed prior to transport as it is a vital part of provider communication. (JTTS CPG – Management of Pain, Anxiety and Delirium in Injured Warfighters)

5) Sedation and pain management must be maintained at appropriate levels throughout transport. As appropriate and as directed by transferring physician, attempt to maintain sedation target as follows using the Riker Sedation-Agitation Scale (SAS)
**Riker Sedation-Agitation Scale (SAS):** Used as sedation target goal for Post Surgical / CC

- Non-intubated patients, provide sedation as needed to maintain a goal SAS Score of 3-4.
- Intubated patients, provided sedation as needed to maintain a goal SAS Score of 1-2.

<table>
<thead>
<tr>
<th>Definition</th>
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<tbody>
<tr>
<td>7 Dangerous agitation</td>
</tr>
<tr>
<td>Pulling at endotracheal tube, trying to remove catheters, climbing over bedrail, striking at staff, thrashing from side-to-side</td>
</tr>
<tr>
<td>6 Very agitated</td>
</tr>
<tr>
<td>Does not calm despite frequent verbal reminding of limits, requires physical restraints, biting endotracheal tube</td>
</tr>
<tr>
<td>5 Agitated</td>
</tr>
<tr>
<td>Anxious or physically agitated, attempting to sit up, calms down on verbal instructions</td>
</tr>
<tr>
<td>4 Calm, cooperative</td>
</tr>
<tr>
<td>Calm, arousals easily, follows commands</td>
</tr>
<tr>
<td>3 Sedated</td>
</tr>
<tr>
<td>Difficult to arouse, awakens to verbal stimuli or gentle shaking but drifts off again, follows simple commands</td>
</tr>
<tr>
<td>2 Very sedated</td>
</tr>
<tr>
<td>Arouses to physical stimuli but does not communicate or follow commands, may move spontaneously</td>
</tr>
<tr>
<td>1 Unarousable</td>
</tr>
<tr>
<td>Minimal or no response to noxious stimuli, does not communicate or follow commands</td>
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</tbody>
</table>

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d. **Patient Care Enroute to the Receiving Hospital**

1) Patient vital signs will be monitored continuously enroute and documented at least every 5 – 15 minutes per transferring physician’s orders.
2) Reassess patient at least every 15 minutes and address events as necessary following transferring physician’s orders and protocols for the specific illness or injury.
3) Assess pain control, sedation and need for paralysis. Re-dose medications as needed in accordance with transferring physician’s orders. Ideally, paralytic medication should not be administered near the end of the flight. Significant, adjunctive analgesia may be required to compensate for initial lift, landing and in flight combat maneuvers, therefore Flight Paramedic/Provider should consider carrying higher volumes of analgesia that would be normally used in ground transport or fixed facilities.
4) All events will be addressed with appropriate interventions according to transferring physician’s orders and protocols. All interventions require reassessment for patient response to the intervention.
5) All enroute care, including ventilator changes, medications, events, interventions, and patient’s response will be documented on the appropriate patient care documentation.

e. **Patient Report and Transfer of Care at the Receiving Hospital**

1) A verbal and written patient report will be given to the receiving nurse or physician upon delivery of the patient.
2) Routinely, the responsibility of care will be transferred at the receiving ED. On rare occasions (i.e. mass casualty incidents, pending emergency flights, etc.), care may need to be transferred on the helipad rather than at the bedside.
3) For Tail-to-Tail transfers, the Flight Paramedic/Provider initiating transport will send all documentation from the transferring facility and the patient care documentation from the first leg of the flight with the Flight Paramedic/Provider completing the second leg of the transfer. The Flight Paramedic/Provider completing the second leg of the transfer will initiate their own patient care documentation, circling “2nd Leg” at the top of the form and ensure all documentation is turned over to the MTF upon arrival and hand off of patient care.

4) The patient care documentation will be completed and left with the patient at the receiving facility at the time of patient handover. If unable to complete documentation due to extensive mission requirements, the patient care documentation will be forwarded to the appropriate medical information receiving facility/person IAW local / theater policy.

Any in-flight problems should be addressed per appropriate protocol and per written instruction from transferring physician. Continued problems should prompt contacting medical control as soon as it is possible.

**Document procedure, results, and vital signs.**
ALTITUDE PHYSIOLOGY AND PATIENT TRANSFER

ALTITUDE CONCERNS FOR AEROMEDICAL TRANSFERS:

- **Gas expansion** occurs as altitude above sea level increases. The volume of a gas will roughly double at 18,000’ mean sea level (½ sea level atmospheric pressure). 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 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. Verify with
supervising physician or flight surgeon before filling endotracheal tube with saline.

- **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.**
HEMORRHAGE

Signs and Symptoms in a Trauma Patient

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

Continued From:
Tactical Evacuation Guideline

Apply Direct Pressure and Indirect Pressure as able

Wound Location

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

Penetrating Chest?

YES

CHEST TRAUMA GUIDELINE
- Occlusive Dressing
- Hemostatic Dressing / Pack
- Pressure Dressing
- NEEDLE Thoracostomy
- TUBE Thoracostomy
- Pos P Ventilations

Consider Possibility of Intra-abdominal Bleeding from Penetrating Abdominal Injury

Penetrating Abdominal / Pelvic?

NO

Hypotension / Shock Guideline

Return to:
Tactical Evacuation Guideline

HEAD INJURY GUIDELINE

EXTREMITY GUIDELINE

Needle Thoracostomy Guideline
Tube Thoracostomy Guideline
HEMORRHAGE
CONTROL PROCEDURES

CLINICAL INDICATIONS:
• Hemorrhage

CONTRAINdicATIONS:
• 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 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 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 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: \( \text{MAP} = \frac{(2 \times \text{diastolic BP}) + \text{systolic BP}}{3} \)

**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 as proximal on limb to injury 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.) proximal to wound. Tourniquet should be placed at least 2” above the injury, 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.
- Secure ends of tension bar to prevent unwinding.
- Recheck tourniquet intermittently (q 15min) and after any movements to ensure no new bleeding / loosening has occurred.
- TC3 recommendation: “Every effort should be made to convert tourniquets in less than two hours if bleeding can be controlled by other means.”

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

CLINICAL INDICATIONS:

- High level amputation not amendable to a 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.

  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 traction on skin / vessel, 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, 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 – 2cm (2 finger widths) distal to greater tuberosity on lateral aspect.
    - Distal Femur - Proximal to patella (max 1cm) and 1-2cm medial to midline.
    - Proximal tibia – 2cm (2 finger widths) distal to tibial tuberosity on medial aspect.
    - Distal tibia – 2cm (2 finger widths) proximal to medial malleolus.
  - Manual IO
    - Proximal tibia and distal tibia – same as EZ IO™ site.
- Cleanse area overlying puncture site well. Failure to appropriately disinfect the area can lead to bone infections.
- Applying firm pressure, puncture skin at 90 degree 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 2-3ml's of 2% lidocaine (without epinephrine) to 5cc NS 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.
**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 (with Plasma as available)

Optimize Hemostasis: (See Pearls!)
(attempt 250ml aliquots to attain / maintain PHRG targets noted in Pearls section below)

Maintain SBP 70-80, MAP 60

No Response / Losing BP Control?

Consider (as LAST Resort):
Norepinephrine 8-12 mcg/min IV drip
Or alternate vasopressor (i.e. push-dose or infusion Phenylephrine or Epinephrine)

**Cardiac**

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

Non-Invasive PPV (BVM) vs. Advanced Airway

500mL NS/LR Bolus

No Response / Losing BP Control?

**Non-trauma & Non-cardiac**

2L NS/LR Bolus x 2 PRN

No Response / Losing BP Control?

Consider NOREPINEPHRINE 8-12mcg/min IV

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

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

**IV / IO GUIDELINE**
Maintain SBP 70-80, MAP 60
2L NS/LR Bolus x 2 PRN
Consider NOREPINEPHRINE 8-12mcg/min IV drip

**Continued From:**
Tactical Evacuation Guideline
AIRWAY GUIDELINE

**IV / IO GUIDELINE**
Maintain SBP >90, MAP >80

**HYPOTENSION / SHOCK**

**Symptomatic?**

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

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

**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” (attempt 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.
- Should treat patient prior to onset of shock if possible. Early signs of impending shock include tachycardia, orthostatic signs, and narrowing pulse pressure (systolic-diastolic BP).
- Consider all 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>
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<tbody>
<tr>
<td>0-12mths</td>
<td>&gt;60mmHg</td>
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<tr>
<td>1-2years</td>
<td>&gt;70</td>
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<tr>
<td>3-5y</td>
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</tr>
<tr>
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</table>

Pediatric HYPOTENSION / SHOCK

Pearls: Hypotension in pediatric patients is defined as a SBP less than 70 + [2 x age (yr)].
- Optimize Hemostasis: Fluid resuscitation in:
  o Pediatric hemorrhagic trauma with NO significant head injury should NOT follow permissive hypotension resuscitation guidelines (PHRG). Rapid infusion of crystalloid (20mL/kg of NS or LR), GOAL: Resuscitate as close to normal systolic pressure as possible.
    Normal pressure calculated by: 90 + [2 x age (yr)].
  o Pediatric Hemorrhagic trauma WITH significant head injury: > 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.
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
- Double, triple, or quadruple amputation

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

CONTRAINICATIONS:

- None

PRIOR TO BLOOD PRODUCT TRANSFUSION:

- Maximal hemorrhage control
- Treatment of suspected tension pneumothorax
  - Clinical signs may include: hypotension, hypo-perfusion, diminished or absent breath sounds. Late signs include: tracheal deviation and distended neck veins.
- Patent airway or airway control
- IV/IO access
- Hypothermia prevented and/or treated
PROCEDURE:

- 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 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.
- 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 component therapy is location specific and is not standard for all missions OCONUS and CONUS. Whole Blood not FDA approved will not be utilized on MEDEVAC air craft unless otherwise specified by area policy or Joint/Army Blood Program.
# BLOOD TRANSFUSION RELATED REACTIONS

<table>
<thead>
<tr>
<th>Differential Diagnosis</th>
<th>Signs and Symptoms</th>
</tr>
</thead>
<tbody>
<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>Acute hemolytic transfusion reaction (AHTR)</td>
<td>Fever (&gt;100.4°F), chills, flank pain, red/brown urine</td>
</tr>
<tr>
<td>Anaphylaxis reaction</td>
<td>Rapid onset of shock, hypotension (&lt;100mmHg systolic), angioedema, and respiratory distress</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>
<tr>
<td>Mechanical-caused hemolysis</td>
<td>Varies with each device. Fever (&gt;100.4°F), chills, possible dyspnea</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>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>
</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 500mg PO every 4 hours or 1 Gram 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.
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.
**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 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
- Hemotherox
- Intra-abdominal Injury / Bleeding
- Pelvis / Long-bone Fracture
- Spine / Spinal Cord Injury

**Cont: Possible Injuries / Diagnoses:**
- Head Injury
- Extremity Fracture / Dislocation
- HEENT Injuries
- Hypothermia
- Burns

---

**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 pelvis.
- Follow Length Based Resuscitation Tape.
CHEST TRAUMA

Signs and Symptoms of Chest Trauma
- Difficulty Breathing: Cyanosis / Pursing of lips / Accessory muscle involvement
- Rapid Respirations with \( \text{SPO}_2 \text{ decreasing or <93\%} \) (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

Signs of pneumo / hemothorax

Respiratory Distress
- YES
  - \( \text{SPO}_2 < 93\% \) (On \( \text{O}_2 \) & Patent Airway)
  - Use of Accessory Muscles
  - Unequal Rise and Fall
  - Cyanosis / Purse lips
  - \( \text{SOB} / \text{Can't speak in complete sentences} \)
  - Wheezing / Rhonchi / Rales / Absent Breath Sounds

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)

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

Flail Chest?
- YES
  - PAIN CONTROL
    Consider: Endotracheal Intubation
    Pos P Ventilation

Signs of pneumo / hemothorax

NO

Return to: Tactical Evacuation Guideline
Continued From:
Tactical Evacuation Guideline

Multiple Trauma Guideline

Pain Control Guideline

IV / IO Guideline

Wound Care / Protection

Amputation?

Pain / Swelling

Deformity

Altered Sensation / Function

Diminished Pulse / Cap Refill

Decreased Temperature

Bleeding

Abrasion

Contusion

Multi-trauma

Fracture

Dislocation

Laceration

Sprain / Strain

Amputation

• 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

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.
**HEAD INJURY**

**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

---

**Pediatric Multiple Trauma**

**Multiple Trauma Guidelines**

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

**Pediatric Airway**

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

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

---

**Isolated head Trauma?**

**YES**

**Spinal Immobilization Guideline**

**Assess GCS / Responsiveness Altered Mental Status?**
- GCS <8 or Unequal / Blown Pupils
  - GO TO: **SEIZURE GUIDELINE**
  - Pediatric SEIZURE
  - Return here once resolved

**GCS >8**

**Continued from: Tactical Evacuation Guideline**

**Same as previous**

---

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

---

**Seizure develops**

**Continuous Monitoring Reassess q5-10min**

---

**Sedation following Intubation:**
- Ketamine: 0.5-1mg/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

---

**Pearls:**

**Evidence of Elevated ICP and Herniation:** Unilateral or Bilateral Fixed / Sluggish and blown pupils, persistent / repetitive vomiting, decorticate or decerebrate posture, motor abnormalities, **Cushing’s Reflex**: (Hypertension & Bradycardia +/- Respiratory depression)

- Prevention of hypoxic insult is key! Maintain PO2 and maintain cerebral perfusion pressure by preventing hypotension.
  - Target Vital Functions: SBP >110mm Hg, SPO2 >93%, ETCO2 at 35-40mmHg, MAP 80-110.
  - It is CRITICALLY IMPORTANT to avoid both hypo-capnea and hyper-capnea. Dedicated and closely managed ventilation is key to optimal patient outcome.

- With clear signs of herniation, may consider hyperventilation with 100% O2 and capnography; titrate CO2 to 30-35mm Hg.

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

- KETAMINE (Dissociative, Analgesic, Induction agent): Preserves respiratory drive, increases HR, contractility, MAP, cerebral blood flow, and bronchodilation.
  - Not an absolute contraindicated in ICP with hypertension and/or spontaneous cerebral hemorrhage.
EYE INJURY / PAIN

Pearls:
- Normal visual acuity can be present even with severely injured eye.
- 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.
- 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 canula across the bridge of the nose attached to 1L of NS will also work.
**TRAUMA 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 withholding of resuscitative efforts.
- If unsure whether 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).
- *Spinal Immobilization should be considered after hemorrhage control and airway security.
- *Consider severe hypocalcemia if FDP or pRBCs have been recently been transfused due to calcium chelation and evidence of poor cardiac activity/contractility.
Universal Patient Care Guideline

1. Remove rings, bracelets, or other constricting items
2. Position patient supine
3. Immobilize area

AIRWAY Guideline

Consider:
1. Early establishment of Advanced Airway!

Pediatric AIRWAY Guideline

Consider:
1. Early establishment of Advanced Airway!

AIRWAY INVOLVEMENT?

THERMAL / ELECTRIC (See Pearl)

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

PAIN CONTROL

- Place Foley Catheter (as able)
- Monitor Urinary Output

Tactical Evacuation Guideline

Urinary Output is the MOST Reliable Guide Predicting Adequate Resuscitation

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

BURNS

All TC3 interventions can be done through burnt or charred skin i.e. IV, TQ, surgical cricothyroidotomy, needle decompression. Consider escharotomy if circumferential burn to chest compromising ventilation.

>40% TBSA burn, comatose, symptomatic inhalation injury, or deep facial require large ETT (Sz 8 adult)

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

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.

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 Burns

- Thermal Burns

- Electrical Burns

- Radiation

- Secondary Trauma

Differential Diagnosis:

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

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.
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 nitrites for suspected cyanide toxicity in enclosed space fires – can worsen hypoxia. Creates methemoglobinemia. If cyanide toxicity is a tangible threat, consider IV Hydroxycobalmin (CYANOKIT®)

**Rule of Tens**

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

**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. Calculation determines initial 24 hours of fluid resuscitation. After first 8 hours, re-evaluate!!!

**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 (½ of 7,000) is given over 1st 8hrs from TOB
3,500mL/8hrs = 437mL/hr over 1st 8 hrs
SPINAL IMMOBILIZATION

Pearls:
- **IMMOBILIZE ONLY after addressing life threatening hemorrhage.**
- While controlling C-spine, roll patient and palpate spine for tenderness, deformity, or step-off.
- Range of motion should never be tested in patients with midline tenderness / deformity. If these are not present – testing requires patient to touch chin to chest, fully extend, and rotate fully from side to side without pain.
- Do not attempt to quantify patient’s injury as distracting. If it is hurting them severely regardless of type – it is distracting.
- It is always safer to immobilize if in doubt.
- A cervical collar does not provide adequate C-spine immobilization by itself – head blocks (commercial or field expedient) should be utilized and the patients head secured.

Altered mental status? YES

Significant mechanism of injury? Or Patient >65 or <5 NO

Any focal neurologic deficit? YES

Intoxication? NO

Distracting injury: Any painful injury that might distract the patient from the pain of a spinal injury? YES

Spinal Exam: Midline tenderness / deformity or painful ROM? NO

Spinal Immobilization Not Required

See: Spinal Evaluation & Immobilization Procedure Guideline

AVPU
- ALERT
- VERBAL: Responds to Verbal Command
- PAIN: Responds to Pain
- UNCONSCIOUS: Does NOT Respond to Anything

GLASGOW COMA SCALE
- EYE OPENING
  - Spontaneous 4
  - To Voice 3
  - To Pain 2
  - None 1
- Verbal Response
  - Oriented 5
  - Confused 4
  - Inappropriate Words 3
  - Incomprehensible Words 2
  - None 1
- Motor Response
  - Obey Commands 6
  - Localizes Pain 5
  - Withdraws from Pain 4
  - Flexion 3
  - Extension 2
  - None 1

Only required once in a tactically safe environment. (Perform at 1st opportunity when indicated and in a safe environment)
**AIRWAY**

Signs and Symptoms of Distress and/or Failure:
- **SpO₂ Decreasing or <94% (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
- **Airway Obstruction** due to Trauma, Edema, Excess Secretions, Foreign Body, or Tongue
- Apnea
- Decreased LOC (GCS <8)

---

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

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

**Reposition Airway**
(jaw-thrust for c-spine injury)
- Sweep & Suction as needed
- Heimlich maneuver if indicated

**Airway Open?**

**Return to Guideline:**
- Tactical Evacuation Guideline or Respiratory Distress Guideline

---

**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. **CRICOTHYROIDOTOMY**
3. **BIAD**
   - Non-RSI. EXCEPTION: cardiac arrest, when gag-reflex is absent, and rapid airway placement is critical

Consider: **RSI PROCEDURE** if:
- Intact Gag Reflex
- Conscious
- GCS >8

---

**SpO₂ >93% on O₂?**

- YES: Return to Guideline: Tactical Evacuation Guideline or Respiratory Distress Guideline
- NO: Reposition Airway
- YES: Consider: Direct Laryngoscopy to visualize for foreign body obstruction if Sweep, Suction and Heimlich fail to open airway

---

**SpO₂ >93% (Room Air)?**

- YES: Definitive Airway Established and SpO₂ >93% on O₂?
- NO: Recheck q5 minutes

---

**SpO₂ >93% on Supplemental O₂?**

- YES: Reassess Interventions
- NO: Restart protocol
- YES: Consider other Causes

---

**Breathing Impacted by:**
- Penetrating or Blunt Chest Trauma
- Penetrating Abdominal Trauma

**CHEST TRAUMA Protocol**

---

**Consider:**
- Start Supplemental O₂
- Place OPA / NPA prn
- Sweep and Suction prn
- Recheck q5 minutes
- BVM or assist with respiration prn
- Restart Guideline if de-compensating (SpO₂ <94% on O₂)

---

**NO**

**Return to Guideline:**
- Tactical Evacuation Guideline or Respiratory Distress Guideline

---

**Return to Guideline:**
- Tactical Evacuation Guideline or Respiratory Distress Guideline

---
**PEDIATRIC AIRWAY**

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

**Need for Advanced Airway?**
- NO Gag Reflex
- Not Protecting Airway (GCS <8)
- Suspect Deterioration

**Indications of: Definitive Airway**
- Established and SpO2 >93 percent on O2?

**Establish Advanced Airway per Procedure in the following sequence:**
(Move to next procedure per individual contraindications and attempt failures)
1. KING-LT™ (Size 2 for 12-25kg, 2.5 for 25-35kg, or 3 for child 4'-5' tall)
2. ENDOTRACHEAL INTUBATION
3. CRICOTHYROIDOTOMY (Use only when able to palpate cricothyroid membrane: typically children >12y/o)
4. Needle CRICOTHYROIDOTOMY (Unable to palpate cricothyroid membrane: Children <8-10y/o)

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

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

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

**Return to Guideline:**
TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS

**Return to Protocol:**
TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS
- Recheck every 5 minutes
- Advanced Airway if de-compensating

**Breathing Impacted by:**
- Penetrating or Blunt Chest Trauma
- Penetrating Abdominal Trauma

**SpO2 >93 percent on Supplemental O2?**

**SpO2 >93 percent (Room Air)**

**Consider:**
- Insert Nasopharyngeal Airway (NPA)
  (if NO basal skull fracture suspected)
- Consider Placing OPA (no gag reflex)
- Start Supplemental O2
- BVM (Assisted Ventilations) as needed

**No Gag Reflex**
- Not Protecting Airway (GCS <8)
- Suspect Deterioration

**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

**Return to Guideline:**
TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS
- Start Supplemental O2
- Place OPA / NPA prn
- Sweep and Suction prn
- Recheck every 5 minutes
- BVM or assist with respiration prn
- Restart Protocol if de-compensating (SpO2 <94 percent on O2)

**Definitive Airway Established and SpO2 >93 percent on O2?**

**Continuous Monitoring**
- Repeat: Sedative & Paralytic per dose and time guideline
- Reassess Interventions
- Restart Guideline
- Consider other Causes

**CHEST TRAUMA Guideline**

**Return to Guideline:**
TACTICAL EVACUATION OR Pediatric RESPIRATORY DISTRESS
- Recheck every 5 minutes
- Advanced Airway if de-compensating
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)

RSI MEDICATIONS: IV/IO Doses

Pretreatment:
- Fentanyl 3mcg/kg IV Head Injury Pt.

Induction Agents:
- 80kg adult dose:
  - Etomidate 0.3mg/kg 24mg
  - *Ketamine 1-2mg/kg 80-160mg
  - Midazolam 0.1mg/kg 8mg

Paralytics:
- Vecuronium 0.1 mg/kg, q30-60min
- Rocuronium 1mg/kg, q30-45min
- Succinylcholine 1.5mg/kg-Non Trauma

Continued Sedation:
- Ketamine 0.5-1mg/kg, q10-20min
- OR 1-2mg/kg/hr continuous infusion
- Propofol 0.5-1.5mg/kg-NO Pain Control, q5-10m
- OR 10-50mcg/kg/min continuous infusion
- Midazolam 0.1mg/kg-NO Pain Control, q15-30m
- Fentanyl 0.5-2mcg/kg, q30-60min

* = Preferred medication for Battlefield Trauma Patients

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
3. Induce (Primary Sedation / Anesthesia)
4. Paralyze (Neuromuscular blocking agent)
5. Wait for Fasciculation, Jaw Relaxation, Absence of Movement
6. Pass ET Tube or insert BIAD (throughout attempt, ensure good O₂ saturation. If below 94% stop and provide PPV)
7. Confirm Placement and Secure Tube
8. Continue Sedation and Paralytic as needed per dosing time.

Note: Midazolam and Propofol should only be used for continued sedation when pain management is NOT a concern (i.e., Non Trauma Patient or Patient is already on adequate narcotic pain control).

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

VENTILATOR SETTINGS:

- Mode: AC or SIMV
- Rate: Varies with age (Typical adult start rate is 12, then adjust PRN)
- Tidal Volume: 8mL/kg initially. Reduce by 1mL/kg every 2 hours to meet 6mL/kg.
- I:E Ratio: 1:2-4
- PEEP: 5
- FiO₂: 90%-100% - adjust as necessary. Try to decrease FiO₂ as much as possible while keeping O₂ saturation > 93%.
- Goal FiO₂ = 50-60% to conserve battery life and O₂, while maintaining patient SpO₂ >93%.

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.
**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.
- 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 percent 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

---

**FAIRED AIRWAY**

<table>
<thead>
<tr>
<th>All Attempted as Appropriate:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reposition Airway (jaw-thrust for c-spine injury)</td>
</tr>
<tr>
<td>• Sweep &amp; Suction (as needed)</td>
</tr>
<tr>
<td>• Heimlich Maneuver / Abdominal Thrusts / Back Slaps (as indicated)</td>
</tr>
</tbody>
</table>

**Able to Ventilate with BVM?**
- NO
- YES

**CRICOTHYROIDOTOMY open, percutaneous (>10 y/o) or needle**

**Ventilati Patient (per age respiratory rate)**

**(*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
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?

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

YES

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)

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

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%

Airway Open? (Breathing or Crying)

Post Resuscitation Care

• HR <100?
• Apnea or Gasping?
• Labored Breathing?
• Persistent Cyanosis?

NO

YES

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 - on 100% O₂)

APGAR SCORING

<table>
<thead>
<tr>
<th>APGAR</th>
<th>0 POINTS</th>
<th>1 POINT</th>
<th>2 POINTS</th>
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<tr>
<td>HEART RATE</td>
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<td>&lt;100 BPM</td>
<td>&gt;100 BPM</td>
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<td>NO RESPONSE</td>
<td>GRIMACE</td>
<td>VIGOROUS CRY</td>
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<td>BODY PINK, EXTREMITIES PINK</td>
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<tr>
<td>TOTAL APGAR:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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

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

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

1. D10: 5ml/kg IV (Dilute 25ml D50 into
100ml NS) (Max 25G/Dose)
2. NS or Blood 10mL/kg IV
3. Intubation

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**RESPIRATORY DISTRESS**

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

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

---

**Universal Patient Care Guideline**

**Indications of: Respiratory Insufficiency** (*See Pearls*)

**Position to Patient Comfort**

Monitor O₂ Sat

**AIRWAY Guideline**

Consider:
- Early establishment of Advanced Airway!

**YES**

**Rales / Signs of CHF**

PPV (if patient can tolerate)
Otherwise, 100% O₂ via NRB

NTG SL 0.4mg q5min if SBP > 90

**NO**

**Position to Patient Comfort**

Monitor O₂ Sat

**Indications of:**

**Position to Patient Comfort**

Monitor O₂ Sat

**Rales / Signs of CHF**

PPV (if patient can tolerate)
Otherwise, 100% O₂ via NRB

NTG SL 0.4mg q5min if SBP > 90

**NO**

**Position to Patient Comfort**

Monitor O₂ Sat

**Wheezes**

100% O₂ via NRB

**Consider: Epinephrine 1:1,000**

**0.3mg IM (EPI PEN)**

**IV / IO Guideline**

**Consider:**
- Albuterol 90mcg Inhaler
  2puffs or 2.5mg neb
- Magnesium Sulfate 2gram IV over 20min

**NO**

**Position to Patient Comfort**

Monitor O₂ Sat

**Stridor**

View for Obstruction:
- (jaw-thrust for c-spine injury)
- 100% O₂ via NRB

**O₂ Sat ≤90% or respiratory status continues to deteriorate:**

**PEDs AIRWAY Guideline**

**IV / IO Guideline**

**Consider:**
- Albuterol 90mcg Inhaler
  2puffs or 2.5mg neb
- Epinephrine 1:1,000
  **0.3mg IM (EPI PEN)**

**Methylprednisolone 125mg IV**

---

**Pearls:**

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

**Universal Patient Care Protocol**

**Indications of:**
Respiratory Insufficiency
Fatigue? (*See Pearls)

**AIRWAY Pediatric**
Consider: Early establishment of Advanced Airway!

**YES**

**Indications of:**
Respiratory Insufficiency
Fatigue? (*See Pearls)

**NO**

**Position to Patient Comfort**

**Monitor O₂ Sat**

**Rales / Signs of CHF**

**Wheezes**

**Stridor**

**PPV** (if patient can tolerate)
Otherwise, 100% O₂ via NRB

**NTG SL 0.4mg q5min if SBP > 70 + 2 x age**

**IV / IO Protocol**
If Failing to Improve, Consider: Furosemide 1mg/kg IV (Foley?)

**100% O₂ via NRB**

**Albuterol 90mcg Inhaler**
2 puffs or 2.5mg neb

**Consider Epinephrine**
≥30 kg: 1:1,000 0.3mg IM (EPI PEN)
15-30 kg: 1:1,000 0.15mg IM (EPI PEN JR)
OR (for all PEDS)
1:1,000 0.01mg/kg (max 0.3mg) IM

Consider Methylprednisolone:
1-2mg/kg IV
and Magnesium Sulfate 25-75mg/kg
IV over 30min (Max 2g)

Consider Epinephrine
>30 kg: 1:1,000 0.3mg IM (EPI PEN)
15-30 kg: 1:1,000 0.15mg IM (EPI PEN JR)
OR (for all PEDS)
1:1,000 0.01mg/kg (max 0.3mg) IM

**IV / IO Protocol**
Methylprednisone 1-2mg/kg IV

**Pediatric ALLERGIC REACTION**

**Consider:**
- Sweep & Suction prn
- 100% O₂ via NRB

**Consider:**
- View for Obstruction: (jaw-thrust for c-spine injury)
- Furosemide 1mg/kg IV (Foley?)

**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)

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

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 for pre-medication. If bradycardia is suspected or results from intubation attempts, give atropine as indicated (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 (2015 AHA update))

Paralysis / Sedation: Standard paralysis / sedation should consist of Ketamine or etomidate followed in approx. 1 min by succinylcholine or Rocuronium (*Vercuronium can be used, but is not recommended as first-line due to delayed onset of action and long duration of action.) Sedation should always be performed prior to paralysis. When using succinylcholine, 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.

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

RSI MEDICATIONS

Pretreatment:
*Fentanyl 3 mcg/kg IV

Induction Agents:
Etomidate 0.3-0.5 mg/kg IV
Propofol 0.5-1.5 mg/kg IV
Ketamine 1-2 mg/kg IV

Paralytics:
Succinylcholine 1.5 mg/kg
Rocuronium 1 mg/kg
Vercuronium 0.1-0.15 mg/kg

Sedatives:
Midazolam 0.1 mg/kg
Fentanyl 0.5-2 mcg/kg
Propofol 0.5-1.5 mg/kg
methods: capnometer, esophageal detection device, bilateral equal chest rise, PO$_2$ rise / maintained >95%, equal bilateral breath sounds.

* Vecuronium is the recommended medication for maintenance of paralysis for prolonged field care and longer duration flights.

Document procedure, results, and vital signs. Procedure should be documented on intubation record form and maintained with patient record.
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.
• 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!
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 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.
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.
- Inflated 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 (this should only be able to enter the esophagus as the first should have went into the trachea – 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.

Document procedure, results, and vital signs.

WARNING: BIADs may not prevent or block aspiration of gastric contents.
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 O saturation above 94% or major trauma or obstruction
- NON-DIFFICULT AIRWAY- Airway can receive two (2) attempts so long as O₂ saturation is >94%.
- 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.

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.
TUBE THORACOSTOMY PLACEMENT

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

CONTRAINDICATIONS:
- 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), 36Fr 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 on injured side.
- Anesthetize the area with lidocaine. Take care to anesthetize the rib if possible 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.
- Measure depth of tube by holding over patient’s thorax. Approx. depth of insertion is the length from at the entry site when tip of tube at apex of lung. Clamp the tube with Kelly clamp at this measured length.
- Make incision in skin / SQ tissue overlying 5th rib. Ensure incision large enough for insertion of tube / finger.
- Bluntly dissect tissue going over 5th rib with second clamp until pleura is reached. Then puncture the pleura with the clamps. Holding clamps in hand with index finger on shaft of the instrument will prevent overly deep insertion and subsequent lung injury. Open clamps as wide as possible and remove them, enlarging the pleural opening.
- Place finger into opening and palpate for any adhesions.
- 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. This method ensures tube will drain both hemo /pneumothoraces.
- Holding tube in place – Place modified chest seal around the tube ensuring seal of the wound as well as securing tube in place. If possible, staple chest seal to skin.
- 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 – cut attachments from end of chest tube (e.g., suction adapter, Heimlich valves, suction devices) to convert to open PTX.
NEEDLE THORACOSTOMY

CLINICAL INDICATIONS:

- Suspicion of tension pneumothorax compromising patient's hemodynamic status.
- Symptoms / signs of tension pneumothorax may include: shortness of breath, chest pain, distended neck vessels, hypotension, tracheal deviation away from affected side, lack of breath sounds on affected side, loud percussion on affected side, or 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.

- Once tension pneumothorax suspected, identify 2nd intercostal space, mid-clavicular line on affected side (rib palpable just under clavicle is 2nd rib).
- Clean area if possible with betadine / alcohol, but do not delay treatment for this step.
- Using a 14Ga IV, 3.25” (preferable 3.75” or 10cm), puncture skin at 90° angle just over top of 3rd rib (prevents damage to the neurovascular bundle which runs below each rib) and advance until gush of air is returned.
- Remove needle and secure catheter in place.
- If unsuccessful / unable to penetrate to pleural space and confident that tension pneumothorax present on that side, may attempt same procedure in mid-axillary / anterior-axillary line in 4th ICS (ensure that placement in this area is reported to receiving hospital so that it is not missed).

In cases of cardiac arrest / significant trauma – this may need to be performed bilaterally.

Document procedure, results, and vital signs.
VENTILATOR MANAGEMENT

CLINICAL INDICATIONS:

• Patient received from transferring facility, intubated, and requires ventilator support.
• Patient requiring intubation in the field and subsequent respiratory support.

CONTRAINDICATIONS:

• Equipment malfunction / failure.

PROCEDURE:

• Turn on ventilator and ensure that machine is functional and battery is charged.
• Attach ventilator tubing and O₂ tubing to machine.
• If patient is a transfer and already on vent, maintain ventilator settings from medical treatment facility.
• If patient “newly” on ventilator, initial settings should include:
  o Mode: AC, SIMV, or ASV (if using Hamilton T1)
  o Rate: 10-16bpm (or adequate rate for pediatric patient) (typical adult start rate is 12, then adjust PRN)
  o FiO₂: 100 percent
  o I:E ratio: 1:2 – 1:4
  o Tidal Volume: 6-8mL/kg (of ideal body weight)
  o PEEP: 5
• 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.
• If at any time patient begins to desaturate or develop respiratory problems – check rapidly to ensure that vent did not fail and O₂ tank not empty. Immediately disconnect ventilator and ventilate patient with BVM and 100% O₂. If this resolves problem or vent failed, continue to bag patient. Then titrate FiO₂ down as much as possible while keeping O₂ sat >93% (Goal FiO₂ 50-60%) in order to attempt to conserve oxygen for long flights and conserve battery power.
• If problem does not resolve, ensure tube did not move during transfer. If advanced – pull back to original length and attempt to bag. If this fails, ensure equal chest rise with breaths and that a tension pneumothorax has not developed (if chest tube in place, ensure it is functioning). If tension pneumothorax suspected, perform immediate needle thoracostomy.
• 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 to verify placement, feel for tracheal rings or carina stop. If in doubt, pull tube and attempt BVM. If this fixes problem, continue to bag patient.

Document procedure, results, and vital signs.
VENTILATOR Capabilities, Terms, Transfer Procedure, Troubleshooting

Ventilator Capabilities

**Impact Model 754 Ventilator**
- A/C
- SIMV
- CPAP
- Volume Control

**Impact Uni-Vent 731 Series EMV+**
- A/C
- SIMV
- CPAP
- Volume Control
- Pressure Control
- Pressure Support

**Simplified Automated Ventilator (SAVe)**
- Single tidal volume and respiratory rate (Vt = 600 mL; BPM 10)
- 6 Lpm of supplemental O₂ (MAX FiO₂ = 62%)

**AutoVent 3000**
- CMV
- Adult / Child
- Tidal volume
- Inspiratory time
- BPM

**SAVEe II**
- Varied tidal volume based on patient height
- Accepts supplemental O₂ (FiO₂ 21 – 100%)

**Versamed iVent201**
- A/C
- SIMV
- CPAP
- Pressure support ventilation (PSV)

**Hamilton T1**
- CMV, SIMV, PCV, DuoPAP, APRV, ASV
- Adult / Child

Terms

**Volume-targeted modes (Examples: CMV, A/C, SIMV):** Volume constant, inspiration terminates when preset Vₜ delivered. Peak airway pressure is variable and increases as needed to deliver prescribed Vₜ.

**Pressure-targeted modes (Examples: PSV, PCV):** Volume variable, terminates when preset pressure reached. Volume is variable. Peak airway pressure is fixed, determined by set pressure level.

**Adaptive Support Ventilation (ASV):** Only available on the Hamilton T1. ASV provides intelligent ventilation mode that continuously adjusts respiratory rate, tidal volume, and inspiratory time depending on the patient’s lung mechanics and effort.

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

**IBW calculation:**
- Men: [(height in inches – 60) x 2.2] + 50= Kg IBW
- Women: [(height in inches – 60) x 2.2] + 45= Kg IBW
**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 5 cm/H2O.

**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 H2O).

**Sensitivity or trigger sensitivity**: Effort, or negative pressure, required by the patient to trigger a machine breath, commonly set so that minimal effort (-1 to -2 cm H2O) is required to trigger a breath.

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### Ventilator Transfer Procedure

1. Ensure endotracheal tube is secure, document size and position of ETT at the teeth.

2. Ventilator settings should be coordinated with the transferring physician, anesthesia provider or respiratory therapist. Verify settings, review arterial blood gas (ABG) analysis, and current SPO2 and ETCO2 readings.

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. The initial tidal volume \( (V_t) \) 6 – 10 mL/kg ideal body weight (IBW).

5. **Pressure Support**: If patient has a spontaneous tidal volume, titrate Pressure Support setting to maintain tidal volume minimum of 4-5 ml/kg, typically 10 cmH2O.

6. Respiratory rate (RR) should be set to administer a minute ventilation \( (V_e) \) of 5 – 10 L/min. Maintain ETCO2 between 30-40 mm/Hg. \([\text{Current ETCO2} \times \text{Current RR} \div \text{desired ETCO2} = \text{new respiratory rate}]\)

7. PEEP 2-10 cm H2O

8. I:E Ratio = 1:2 or 1:3

9. FiO2: Initiate at 100% and titrate FiO2 to maintain SpO2 >94%. Wean patient to the lowest level of FiO2 and PEEP while maintaining SpO2 >94%. Goal is FiO2 50-60 and SpO2 >94%.

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**Troubleshooting: Airway compromise or lost airway in-flight**

Remove patient from circuit and perform bag-valve ventilation with 100% O2 while troubleshooting (check to ensure patient can fully exhale first in case there was air trapping).

- **DOPE**: Displaced ETT / Obstructed ETT / Pneumothorax / Equipment failure
• **Airway:** Confirm ETT is in appropriate position: look / feel for symmetric chest wall rise and verify tube position. Check ETCO₂.
• Suction ETT if suspected secretion obstruction.
• **Breathing:** Look and feel for chest excursion, check SPO₂, check patient’s color; Assess for pneumothorax.
• **Circulation:** check pulse, BP, and cardiac rhythm.
• Assess for equipment failure (e.g., battery, depleted oxygen, vent settings).

Note: Remember, PCO₂ is affected by respiratory rate and tidal volume (ventilation), while PO₂ is affected by PEEP and FiO₂ (oxygenation).

10. **High pressure alarms / Peak airway pressure alarms** (Peak pressure >35 cm H₂O): Correct problems causing increased airway resistance and decreased lung compliance, including pneumothorax or pulmonary edema. Check ventilator to make sure prescribed tidal volume is being delivered.

11. **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.

12. **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.

13. **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.
**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

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**Universal Patient Care Guideline**

**O$_2$ (if Hypoxemic)**

**IV / IO Guideline**

Monitor and 12-Lead ECG (ASAP)

Place PACER PADS

Patient Stable?

YES

Observe
Reassess q 5 minutes

NO

Unstable with
2nd degree type 2 or 3rd degree block

Transcutaneous Pacing
(consider sedation: midazolam 2-5mg IV / IO)

Continuous Monitoring

Unstable without Block
(or with 1st degree or 2nd
degree type I AVB)

Atropine IV / IO
0.5mg bolus
Repeat q 3-5 minutes
(MAX 3mg)

Transcutaneous Pacing
(consider sedation: midazolam 2-5mg IV / IO)

**“OVERDOSE” treatable causes:**
- B-blocker (atenolol, metoprolol, labetalol):
  - Glucagon 0.05mg/kg (3-10mg) IV – pretreat with ondansetron 4-8mg for nausea if possible
- Calcium channel blocker (diltiazem, verapamil, nifedipine):
  - Calcium Chloride 10% 1000mg (1amp) slow IV push (1-1.5 mL per minute; not exceeding 200mg/min)

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**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).
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

NO
YES

200J biphasic, 360 monophasic
Shock

CPR 2 min
IV / IO access (IV Guideline)

Rhythm shockable?
NO
YES

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

Rhythm shockable?
NO
YES

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

NO
YES

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

Rhythm shockable?
NO
YES

CPR 2 min
Treat Reversible Causes

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.
- Lidocaine can be used if Amiodorone is unavailable. 1-1.5mg/kg Initial dose. 2nd dose 0.5-0.75mg/kg

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

SIGN AND SYMPTOMS:
- Unresponsive, apneic, pulseless
- Ventricular fibrillation or ventricular tachycardia on EKG

SIGN AND SYMPTOMS:
- Pulseless
- Apneic
- No electrical activity in at least two ECG leads (asystole)
- Electrical activity on monitor without pulses (PEA)
- No heart tones

CARDIAC ARREST

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

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

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

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

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

Universal Patient Care Protocol

O₂ 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 pain free, SBP <100, or taken Viagra, Cialis, Levitra in last 48 hrs)

Normal Sinus Rhythm

BP >100

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

Hypotension / Shock?

500 ml bolus NS/LR

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

Bradycardia with Pulse

Tachycardia with Pulse

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

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).
TACHYCARDIA w/ PULSE

**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 is 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

** 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.
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- All patients should be warned of discomfort / feeling of heart stopping prior to adenosine administration.

---

**TACHYCARDIA w/ PULSE**

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

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

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

---

**Universal Patient Care Guideline**

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

*Synchronized Cardioversion:
- Narrow Irregular, A-Fib
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---

**DILTIAZEM**

- 1st Dose: 150mg IV over 10min
- Repeat prn if VT recurs
- Maintenance infusion: 1mg/min for 1st 6 hrs

---

**AMIODARONE**

Stable Wide-QRS Tachy
- 1st Dose: 150mg IV over 10min
- Repeat pm if VT recurs
- Maintenance infusion: 1mg/min for 1st 6 hrs

---

**ADENOSINE**

- 1st Dose: 6mg rapid IV push: followed by NS Flush
- 2nd Dose: 12mg

---

**METOPROLOL**

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

---

**DILTAZEM**

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

---

**Vagal Maneuvers:**
- Blow through 18ga IV catheter, carotid massage, bear down.
- ADENOSINE: use for Regular Rhythm ONLY!
- DILTIAZEM
- METOPROLOL

---

**QRS Width?**

- Regular
- Irregular

---

**Wide QRS?**

- >.12 Second
- No unstable signs / symptoms, No "Sinus Tach"

---

**Consider Sedation:**
- Midazolam 2-5mg IV / IO

---

**If refractory or becomes unstable at any time!**

---

**All Pathways End with Continuous Monitoring**
**PEDiATRIC ALS Indicators and BLS**

Indicators of Potential Need for Cardiopulmonary Support

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

- **Heart Rate 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**

---

**IOT Prevent Cardiac Arrest You Must Detect and Treat:**

Respiratory Failure

Respiratory Arrest

Shock

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

<table>
<thead>
<tr>
<th>Heart Rate/Min</th>
<th>Awake Rate</th>
<th>Mean</th>
<th>Sleeping Rate</th>
<th>Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn to 3mo</td>
<td>85-205</td>
<td>140</td>
<td>80-160</td>
<td>1-10y</td>
</tr>
<tr>
<td>3mo - 2y</td>
<td>100-190</td>
<td>130</td>
<td>75-160</td>
<td>&gt;10y</td>
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<tr>
<th>Respiratory Rate/Min</th>
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<tr>
<td>Infant</td>
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</tr>
<tr>
<td>Toddler</td>
<td>24-40</td>
</tr>
<tr>
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<td>22-34</td>
</tr>
<tr>
<td>School</td>
<td>18-30</td>
</tr>
<tr>
<td>Adolescent</td>
<td>12-16</td>
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</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)
PEDIATRIC BRADYCARDIA with Pulse and Poor Perfusion

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

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

Identify and Treat Underlying Cause!
Universal Patient Care Guideline
- Maintain Airway / Assisted Breathing
- O₂ (100% FiO₂)
- IV / IO access (IV Guideline)
- Monitor and 12-Lead ECG (ASAP)
- Check Glucose

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

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

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)

Check Pulse every 2 minutes during CPR

If Pulse is lost, GO TO: PEDIATRIC CARDIAC ARREST
Consider:
- Transcutaneous Pacing (Consider sedation: Midazolam 0.05-0.1mg/kg IV / IO)
- Treat Underlying Causes
  - Support ABCs
  - Continue O₂
  - Continuous Monitoring
  - Consider Consultation

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 30-150mcg/kg IV – pretreat with ondansetron (0.1mg/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)

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

- Reversible causes should be addressed as soon as possible.
- Epinephrine Endotracheal Dose: 0.1 mg/kg (0.1mL/kg of 1:1,000 vial)
- 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 (especially in Trauma) before discontinuation of efforts
  - Should take at least 1min to check for pulse in hypothermic patients
  - Lidocaine can be used if Amiodarone is unavailable. 1mg/kg Initial dose. May repeat twice
Identify and Treat Underlying Cause! Continue:

- Maintain Airway / Assisted Breathing
- **O2** (100% FiO2)
- 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 prior to 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:**
  - B-blocker (atenolol, metoprolol, labetalol):
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  - **Calcium Channel Blocker** (diltiazem, verapamil, nifedipine)
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<td>- Search for and Treat Underlying Causes</td>
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**Probable Supraventricular Tachycardia**
- Consider Vagal Maneuvers with NO delay to next step

**Probable Ventricular Tachycardia**
- Expert Consultation ASAP
- Search for and Treat Underlying Causes
- 12-Lead ECG

**Consider Chemical Conversion:** Amiodarone 5mg/kg over 20-60 minutes IV / IO

**If NOT Already Administered:**
- Adenosine IV / IO Rapid Push
  - 1st 0.1mg/kg (max 6mg)
  - 2nd 0.2mg/kg (max12mg)

**Consider:** Synchronized Cardioversion
- 1st 0.5-1J/kg, if fails then 2J/kg (Sedation before Cardioversion: Midazolam 0.05-0.1mg/kg IV / IO)

**Typical Sinus Tachycardia Rates**

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**Narrow QRS?**
- <0.09 Second

**Wide QRS?**
- >0.09 Second

**QRS Width?**
- Uniform QRS?
- Probable Ventricular Tachycardia
- Probable Sinus Tachycardia
- YES
- NO

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- Hypotension
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Continue:
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- Maintain Airway / Assisted Breathing
- O₂ (100% FiO₂)
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  - All patients should be warned of discomfort / feeling of heart stopping prior to adenosine administration.
* If available

Probable Sinus Tachycardia
- Search for and Treat Underlying Causes

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

Possible Ventricular Tachycardia

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

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Treatable causes:
- Check & Treat compromise in ABCs
- Hypoglycemia
  - D25 2mL/kg slow IV (max 25mL)
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  - “OVERDOSE (Mothers Milk)”:
    - β-blocker (atenolol, metoprolol, labetalol):
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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)

Amiodarone 5mg/kg over 20-60 minutes IV / IO

If Regular Rhythm (R-R) and
QRS Monomorphic:
Adenosine IV / IO Rapid Push
1st 0.1mg/kg (max 6mg)
2nd 0.2mg/kg (max12mg)

* Procainamide 15mg/kg over 30-60 minutes

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  - Glucagon 0.025mg/kg IM (max 1mg)
- Tension Pneumothorax
  - “OVERDOSE (Mothers Milk)”:
    - β-blocker (atenolol, metoprolol, labetalol):
      - Glucagon 30-150mcg/kg IV – pretreat with ondansetron (0.1mg/kg – max 2mg) for nausea if possible
    - Calcium channel blocker (diltiazem, verapamil, nifedipine)
      - Calcium chloride 10% 0.2ml/kg slow IV push
    - Naloxone 0.1mg/kg IV/IM (max 2mg)

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)

Amiodarone 5mg/kg over 20-60 minutes IV / IO

If Regular Rhythm (R-R) and
QRS Monomorphic:
Adenosine IV / IO Rapid Push
1st 0.1mg/kg (max 6mg)
2nd 0.2mg/kg (max12mg)

* Procainamide 15mg/kg over 30-60 minutes

Probable Sinus Tachycardia
- Search for and Treat Underlying Causes

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

Possible Ventricular Tachycardia

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

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)”:
    - β-blocker (atenolol, metoprolol, labetalol):
      - Glucagon 30-150mcg/kg IV – pretreat with ondansetron (0.1mg/kg – max 2mg) for nausea if possible
    - Calcium channel blocker (diltiazem, verapamil, nifedipine)
      - Calcium chloride 10% 0.2ml/kg slow IV push
    - Naloxone 0.1mg/kg IV/IM (max 2mg)

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)
**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 NS / LR and consider use of a pressor IV / IO Drip – EPINEPHRINE 2-10mcg/min titrated or NOREPIINEPHRINE 0.1-0.5 mcg/kg/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. Consider Hextend 500ml bolus 1-2 if patient has not received Hextend.
WITHHOLD RESUSCITATION

Signs and Symptoms:
- Unresponsive
- Apneic
- Pulseless

Differential Diagnosis:
- Medical vs. Traumatic Arrest
- Dysrhythmia

Evaluate for Criteria for Death / No Resuscitation

YES

Withhold Resuscitation

NO

Attach Monitor / Defibrillator
Begin BLS / CPR

Assess Rhythm

TRAUMA ARREST

Appropriate ACLS guideline

CARDIAC ARREST
BRADYCARDIA with PULSE
TACHCARDIA with PULSE

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

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.
- Cardiac arrest in MASCAL situations requires frequent re-triage to apply care where it will be most effective.
- Lack of response alone does not equal death – always check for pulse / cardiac activity.
  - If available, cardiac US can be helpful in determining if continued efforts will be helpful. If there are no signs of cardiac movement on US and there is no other known reversible cause, the likelihood of ROSC and recovery with continued resuscitative efforts in the out-of-hospital setting is incredibly unlikely.
CARDIAC DEFIBRILLATION

CLINICAL INDICATIONS:

- Patient who is in pulseless cardiac arrest with either ventricular fibrillation or ventricular tachycardia seen on monitor.

CONTRAINDICATIONS:

- None

PROCEDURE:

- Ensure patient attached to monitor / defibrillator. If paddles used, ensure that they are several centimeters away from monitor leads to prevent arcing. Use pediatric paddles as indicated – if unavailable and pads used, should place in anterior / posterior position for pediatric patients.
- Set energy level to appropriate level. Start 200J adult (biphasic) or 360J adult (monophasic), or 2J/kg pediatric.
- Press “charge” button 30 seconds prior to end of compressions. This maneuver minimizes time between compressions and defibrillation. Compressions should continue until end of cycle.
- Ensure all personnel clear of patient and pilots aware of cardioversion.
- Press and hold “shock” button until energy delivered.
- If rhythm converts – treat as per post resuscitation protocol.
- Following shock delivery, immediately begin / return to CPR for 2 minutes before checking for pulse.
- If pediatric patient fails to convert – repeat steps 2-7 above using escalating energy levels.
- Document procedure, results, and vital signs on run sheet following mission.

AUTOMATED EXTERNAL DEFIBRILLATOR (AED):

- Turn on power to machine and follow prompts to attach pads to patient and machine.
- Ensure no one touching / moving patient and press the “Analyze” or equivalent button. (If not present, the machine will automatically check the rhythm at dedicated time intervals. A vocal warning will tell you when this is occurring).
- If shock advised, press button to deliver shock and return to CPR for 2 minutes.
- After analysis, if subsequent shocks advised, repeat steps 2-3 up to 3 shocks, until further care arrives, or until no further shock advised. If no shock advised at any time, CHECK PULSE. Continue CPR if no pulse. If pulse present, place patient in recovery position and transport.
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.
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.
**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 (if Hypoxemic)**

**IV / IO Guideline**

Cardiac Monitor (ASAP)

---

### ASSESSMENT

1) Skin changes with resp. sx’s or bp reduction.
2) Any 2 of following: skin changes, resp. sx’s, bp reduction, or GI sx’s.
3) shock or reduced bp

---

### Hypotension Guideline

**Epinephrine**

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

**500mL NS / LR if not previously started**

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

**Diphenhydramine 50mg IV / IO**

**Methylprednisolone 125mg IV / IO**

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### Resp. Distress Guideline

**Continuous Monitoring**

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**Pearls:**

- Contact medical control prior to giving epinephrine IV, or 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)

**Assessment**

**Yes**

- Pediatirc Hypoxemia

**No**

- Emergency Airway Intervention Needed?
  - Yes
  - Epinephrine-Pen (Jr for <30kg) OR Epinephrine 1:1,000 0.01mg/kg IM (max 0.3mg)
  - IV Infusion: 0.1-0.3 mcg/kg/min

**Contact Medical Control**

- Arrhythmia?
  - Yes
  - Continuous Monitoring
  - Improved
  - Reassess Patient
  - NO
  - Epinephrine IM: 0.01 mg/kg (0.01mL/kg of 1:1000) or EpiPen Jr.

**Pediatric Bradycardia with Pulse and Poor Perfusion**

**Pediatric Cardiac Arrest**

**Pediatric Tachycardia with Pulse and Poor Perfusion**

**Pediatric Tachycardia with Pulse and Adequate Perfusion**

---

**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.
Continued from: Tactical Evacuation Guideline

**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

---

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

---

**Universal Patient Care Guideline**

O₂ (ASAP)
IV / IO Guideline
Cardiac Monitor (ASAP)

---

**Hypothermia Precautions**
Hypothermia Guideline

---

**Symptoms**

- Headache
- Altered Mental Status
- Ataxia?

  **NO (AMS)**
  - Prevent Further Ascent
  - O₂ (If not previously started)
  - Descend 500-1000m if able
  - Acetazolamide 125-250mg PO
  - Ondansetron 4-8mg IV / IO
  - Acetaminophen 650-1000mg PO
  - Ibuprofen 600-800mg PO

  **YES**

---

**Situations**

- **YES (HACE)**
  - Rapid Descent
  - Consider: Gamow Bag (*See Pearls)
  - O₂ (If not previously started)
  - Dexamethasone: Initial Loading dose 8mg PO/IV/IO
    (4mg if 4mg already provided)
    (then 4mg IV / IO / PO q6hr)
  - Ondansetron 4-8mg IV / IO
  - Consider:
    - Acetaminophen 650-1000mg PO
    - Ibuprofen 600-800mg PO

- **NO**
  - Altered Mental Status

---

**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 often occurs along with high-altitude cerebral edema. These patients may have crackles / fever / hypoxia.
  - *Descent should be done with the least amount of patient exertion possible to prevent worsening of the condition.
- ANY altered mental status / confusion / abnormal gait should be presumed to have cerebral edema and descent should be undertaken immediately.
Bites / Envenomations

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

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

---

### Universal Patient Care Guideline

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

### Position Patient

- Position patient supine
- Immobilize area

### Allergic Reaction Guideline

- Allergic Reaction?
  - NO
    - Consider: Midazolam 2-5mg IV / IO
      - (for black widow spider or scorpion)
    - Pain Management Guideline
      - When appropriate, return to: Tactical Evacuation Guideline
  - YES

### Pressure Immobilization

- Pressure Immobilization
  - Only used for species with little to no local tissue damage
  - Avoid excessive movement of the affected limb
  - Ensure bandage is firm and has similar tightness as for wrapping an ankle
  - DONOT remove bandage until reaching medical treatment facility
  - MES options: IV tourniquets, IV tubing, surgical gloves, BP Cuff deflated to return of distal pulse.

---

**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.
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 (AC) and asystole (DC) are the most common dysrhythmias seen with electrical shock.**
- Damage is often hidden 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.
- Many electrical injury patients will also have significant burn injuries – do not overlook fluid resuscitation.
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

CONTINUED

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 0.1mg/kg

Monitor EKG for Arrhythmia (treat per appropriate guideline)

Be prepared for and consider:
Seizure Guideline

1L NS Bolus / PO fluids

When appropriate, return to:
Tactical Evacuation Guideline

YES

Altered Mental Status?

Universal Patient Care Guideline

O₂ (if Hypoxemic)

IV / IO Guideline

Cardiac Monitor (ASAP)

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

Temperature <40°C

1L NS Bolus or PO fluids

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

Continuous Monitoring / Reassess

Arrhythmia?

Bradycardia with Pulse

Tachycardia with Pulse

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

Altered Mental Status with Temperature <40°C / 104°F

Consider Intubation:
AIRWAY Guideline

1L NS Bolus / PO fluids

Tepid Water or Room Temp Saline to Skin

Altered Mental Status Guideline

Be prepared for and consider:
Seizure Guideline

Monitor EKG for Arrhythmia (treat per appropriate guideline)

Pearls:
- 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.
- If infection is suspected consider use of acetaminophen 1 gram.
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

---

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

Remove Wet Clothing

Assessment:
- Mental Status
- Rectal Temperature
- Glucose (treat per AMS Guideline while re-warming)

Core Temperature <95°F / 35°C
Patient is Alert, w/o Arrhythmia, and is Actively Shivering

- Dry Blankets
- Hypothermia Blanket
- Warm PO fluids (if available)

WARMED IV FLUIDS
(Thermal Angel)
1L NS/LR Bolus

Target re-warming
(D/C warmed IV Fluids)

12-lead EKG

Arrhythmia?
YES
Bradycardia with Pulse Guideline

NO

Tachycardia with Pulse Guideline

Transport to ECMO team or nearest hospital

---

FROSTBITE
- Extremity or body part with suspected frostbite must be protected to prevent further injury (wrapped and covered with a dry blanket).

Core Temp <95° / 35°C with AMS, Arrhythmia, or Absence of Shivering

Handle Very Gently
- HPMK Kit / Hypothermia Blankets
- Dry Clothing
- Hot Packs to Groin, Axilla, Abdomen (avoid contact burn)

---

Submersion Injury Guideline
Airway Guideline

When appropriate, return to:
Tactical Evacuation Guideline

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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.
- 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 further attempts / meds withheld until temp >30°C (86°F).
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)

---

**Universal Patient Care Guideline**

O₂ (100% FiO₂ for all injuries)

**IV / IO Guideline**

Cardiac Monitor (ASAP)

---

**Spinal Immobilization Protocol**

**Hypothermic?**

**YES**

**Hypothermia Guideline**

**NO**

**Reassess Airway, Check for Arrhythmias**

**Address per appropriate protocol**

---

**Multiple Trauma Guideline**

**YES**

**Trauma?**

**NO**

**Consider as appropriate:**

Post-Resuscitation Induced Hypothermia Guideline

**Continuous Monitoring**

When appropriate, Return To:

Tactical Evacuation Guideline

---

**Always Record**

- Dive Depth
- Duration of decent

---

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

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**Pain Management Guideline**

**Airway Guideline**

**Cardiac Arrest Guideline**

**Tachycardia with Pulse**

**Bradycardia with Pulse**

---

**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.
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)

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

Activated Charcoal
- 50grams PO
- (If alert / protecting airway and time of ingestion <1hr)

IV Bolus PRN

Blood Sugar <60?
- YES
- NO

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

Activated Charcoal 50grams PO
- (If alert / protecting airway and time of ingestion <1hr)

Beta Blocker Overdose:
- AV Block (especially, 1st Degree), Bradycardia, and Hypotension:
- Consider giving: Glucagon 3-10mg IV

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

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 2mg IV / IO q3-5min
- (No max dose: double each dose given until ↓ secretions)
- 2-PAM 600mg IV / IM
- (Atropine + 2-PAM = Mark 1 Kit)

Other
- 12-lead EKG

Hyperpotension, Seizures, Ventricular Dysrhythmias, Altered Mental Status, Chest Pain
- Appropriate Guideline

Seizure Guideline
- Midazolam 2.5-5mg IV/IM x 2

Continuous Monitoring, reassess q5 min

Opiates
- (Respiratory Depression)

Naloxone 0.4-2mg IV / IO

Airway Guideline

Pearls:
- **Anticholinergic**: Altered mental status (mad as a hatter), Hyperthermia (hot as a hare), mydriasis (blind as a bat), Flushing (red as a beet), anhidrosis (dry as a bone), Full Bladder (full as a flask).
  - Treat as with Tricyclic overdose pathway (including EKG and Sodium Bicarb for prolonged QRS and/or arrhythmias)
  - LORAZEPAM for agitation and seizures and Hyperthermia Guideline if hyperthermic
- **Beta Blocker**: HypOglycemia.
- **Calcium Channel Blocker**: HypERglycemia.
- **Cyclic Antidepressant**: Hypotension, depressed mental status, respiratory depression, cardiac arrhythmias.
- **Opioid**: Depressed mental status, pinpoint pupils, N/V, respiratory depression, hypotension possible.
- **Organophosphate / Carbamate (Cholinergic)**: Salivation, lacrimation, unination, 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)

### Universal Patient Care Guideline

O₂ (if Hypoxemic)

IV / IO Guideline

Cardiac Monitor (ASAP)

### Blood Glucose:

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

NO

YES

Altered Mental Status Guideline

(25% Dextrose 2mL/kg IV OR Glucagon 20-30 mcg/kg IM if no IV, Max 1mg)

### Altered Mental Status Guideline

12-lead EKG

NS 20mL/kg IV Bolus PRN

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

### Pediatric Seizure Guideline

Beta Blocker Overdose:

AV Block (especially, 1st Degree), Bradycardia, and Hypotension:

Consider: Glucagon 30-150mcg IV/IM

### Pediatric Airway Guideline

Pediatric Seizure Guideline

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).
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ALTERED MENTAL STATUS

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

**Differential Diagnosis:**
- Head Trauma
- Stroke
- CNS Tumor / Mass / Bleed / Infection
- Thyroid Dysfunction
- Hyperglycemia / Hypoglycemia
- Diabetic Ketoacidosis
- Toxic 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:
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- Sepsis

Pearls:
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Evidence of Malnourishment?

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

Evidence of Malnourishment?

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

Consider Alternate Causes: (AEIOU-TIP)
- Alcohol / Acidosis
- Epilepsy
- Insulin
- Overdose
- Uremia / Renal Failure
- Trauma
- Infection
- Psychosis

Consider Alternate Causes: (AEIOU-TIP)
- Alcohol / Acidosis
- Epilepsy
- Insulin
- Overdose
- Uremia / Renal Failure
- Trauma
- Infection
- Psychosis

Glucose >250?
NS 20mL/kg IV
12-lead ECG
Arrhythmia?

Bradycardia with Pulse and Poor Perfusion
Tachycardia with Pulse and Poor Perfusion

Pediatric Cardiac Arrest

Consider Alternate Causes:
- Alcohol / Acidosis
- Epilepsy
- Insulin
- Overdose
- Uremia / Renal Failure
- Trauma
- Infection
- Psychosis

Continuous Monitoring: 12-lead ECG
Recheck Glucose: Give additional Fluid Bolus if Glucose >250. Be alert for signs of fluid overload.

Glucagon
20-30mcg/kg IM (If no IV Access)

Return to Baseline? and Glucose Normalized?
Less than Month Old: 40-99
More than 1 Month Old: 65-99

Improved?

Unimproved After 2nd dose

Oral Glucose (*See Pearls)

25% Dextrose 2mL/kg

Thiamine 25mg IV / IM

Unimproved After 2nd dose

Or

25% Dextrose 2mL/kg

Glucagon 20-30mcg/kg IM (If no IV Access)

Consider Alternate Causes: (AEIOU-TIP)
- Alcohol / Acidosis
- Epilepsy
- Insulin
- Overdose
- Uremia / Renal Failure
- Trauma
- Infection
- Psychosis

Consider Alternate Causes:
- Alcohol / Acidosis
- Epilepsy
- Insulin
- Overdose
- Uremia / Renal Failure
- Trauma
- Infection
- Psychosis

Continuous Monitoring: 12-lead ECG
Recheck Glucose: Give additional Fluid Bolus if Glucose >250. Be alert for signs of fluid overload.

When appropriate, return to:
Tactical Evacuation Guideline

Universal Patient Care Guideline
O₂ (if Hypoxemic)
IV / IO Guideline
Cardiac Monitor
Check Blood Glucose

When appropriate, return to:
Tactical Evacuation Guideline
**SUSPECTED STROKE / TIA**

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

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

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

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

**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 TIs 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 thrombolitics for stroke.
- All strokes/TIs 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.

**Universal Patient Care Guideline**

**O₂ (if Hypoxemic)**

**IV / IO Guideline**

**Cardiac Monitor**

**Blood Glucose <70?**

**YES**

**Glucagon 1mg IV/IM**

**OR**

**50% Dextrose 25g IV**

**NO**

**Quick Neurologic Status:**

**GCS >8?**

**CAN PROTECT AIRWAY?**

**CAN MOVE ALL EXTREMITIES?**

**NO**

**Intubated?**

**YES**

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

**12-lead ECG**

**Arrhythmia?**

**YES**

**Bradyarrhythmia with Pulse**

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

**NO**

**Consider Alternate Guidelines**

**ALTERED MENTAL STATUS**

**HYPERTENSION**

**SEIZURE**
**HYPERTENSION**

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

**One of These:**
- Systolic BP 200 or Higher
- Diastolic BP 120 or Higher

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

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

---

**Universal Patient Care Guideline**

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

**Appropriate Size Cuff**
- Check BP in Both Upper Extremities (manual if able)

**12 Lead EKG**

**STEMI, LBBB, Flipped Ts, ST Depression, or Dysrhythmia?**

**CHEST PAIN Guideline**

**If Symptomatic, consider:**

**LABETALOL 20mg IV**

**Do Not Lower MAP >20% Hold for Pulse <60**

---

**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.
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 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.
- 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).

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

Having Active Seizure?
- NO, Postictal
  - Blood Glucose <70?
    - NO
    - Evidence of Significant Trauma?
      - YES
        - Consider: HEAD INJURY Guideline
      - NO
        - Consider: AIRWAY Guideline
  - YES
    - Monitor and Reassess every 15min
    - When appropriate, return to: Tactical Evacuation Guideline

Evidence of Alcohol Abuse?
- NO
  - Evidence of Alcohol Abuse?
    - YES
      - Thiamine 100mg IV / IM
        - 50% Dextrose 25g IV
          - OR
            - Glucagon 1mg IV / IM
              - Glucose 70-250?
                - YES
                  - Recurrence of Seizure?
                    - YES
                      - Restart Guideline at: Having Active Seizure?
                    - NO
                      - NO
                        - NO
                          - YES
                            - Consider: HEAD INJURY Guideline

LORAZEPAM
- 1-2mg IV / IM
- MIDAZOLAM
- 2.5-5mg IV / IM

Consider:
- Magnesium Sulfate 1-2g IV Over 30min
- Monitor for Hypotension

Seizure Stopped?
- NO
  - OR
    - May Repeat Anticonvulsants Twice (Must Have Definitive Airway Control)
      - AIRWAY Guideline for RSI

Consider:
- Pregnancy (Obstetric Emergency)
  - Mag Sulfate 4g IV Over 15min
    - Elevated ICP
  - HEAD INJURY Guideline
**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?**

- **YES**
- **NO, Postictal**

**Blood Glucose:**

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

**Evidence of Significant Trauma?**

- **YES**
- **NO**

**SPINAL IMMOBILIZATION PROCEDURE**

- **Consider:** Pediatric HEAD INJURY

**Reassess every 5min**

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

**Consider Spinal Immobilization Guideline**

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

**Tachycardia / Hypotension?**

- **Blood Glucose <70?**
- **Glucose 70-250?**

**Continuous Monitoring**

- **Move to Appropriate Protocol as needed**

---

**Evidence of Alcohol Abuse?**

- **NO**
  - **YES**
    - Thiamine 100mg IV / IM
    - 50% Dextrose 25g IV
    - Glucagon 1mg IV / IM
  - **NO**
    - Glucose 70-250?

**GO To:**

- **AMS Guideline**
  - If patient unresponsive or mental status is altered upon arrival of MEDEVAC to patient pick-up site.
  - True Syncope is a brief self-resolving event. If the patient is still altered upon your arrival it’s NOT Syncope!

---

**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.
COMBATIVE PATIENT

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

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

Pearls:
• 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.
• *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)*
  o Do not jeopardize the patient’s airway! – Avoid hog tying, lying prone in restraints, sandwiching between spine boards, etc.
  o Check Vitals, SpO₂, Pulse and Cap Refill every 5 minutes.
• 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.

Continued from: Tactical Evacuation Guideline

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

1. Significant Head Injury?
2. Inability to Protect Airway (GCS <8)?
3. Violent Behavior
4. Altered Mental Status

NO

YES

EPW or Potential Hostile?

NO

Attempt to Calm / Reassure

Physical Restraints as Needed

Ketamine
0.5 mg/kg IM/IN / 0.3 mg/kg IV/IO

• 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)

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

When appropriate, return to:
Tactical Evacuation Guideline

Kerlex gauze can be a useful restraint

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

Glucose 70-250?

1. HEAD INJURY Guideline
(Spinal Immobilization once sedated with Advanced Airway)

2. AIRWAY Guideline
(Establish Advanced Airway)

3. Consider: RSI PROCEDURE
(Must Maintain and Manage Airway)

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

Consider Need / Use Of:
• Security Escort
• Hard Restraints (*See Pearls)
**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. Use with: 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.
**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

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

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

**Tactical Evacuation Guideline**
- 500mL NS / LR Bolus (Repeat as Needed)
- (IV / IO Guideline)

**Consider**
- Chest Pain Guideline

**Pain Management Guideline**
- Promethazine 12.5-25mg IV
  - OR
  - Ondansetron 4-8mg IV

**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.
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

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

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

Tachycardia / Hypotension?

Nausea and/or Vomiting?

Abdominal Pain?

Consider Pediatric Pain Management
When appropriate, return to:
Tactical Evacuation Guideline

Evidence of Malnourishment?

YES

Thiamine 25mg IV / IM

25% Dextrose 2mL/kg IV

Glucagon 20-30mcg/kg IM

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

NO

Abdominal Pain Guideline

Reassess every 5 minutes

Promethazine (if >2 years old)
0.25mg/kg/dose IV
(up to 12.5 mg/dose)

Ondansetron
- ≤40kg: 0.1mg/kg IV
- >40kg: 4mg IV

 Pearls:
- Suspicion of other underlying condition should prompt immediate referral to appropriate guideline.
- Continually monitor for any decompensation.
**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
  - ALTERED MENTAL STATUS Guideline
- NO
  - Monitor, Reassess, Address:
    - BP?
    - Seizure?
    - Glucose
    - Vision Changes / Headache

**Seizure Stopped?**

- YES
  - NO
    - Failed to resolve after 2nd dose

**Seizure?**

- YES
  - Seizure?
  - Failed to resolve after 2nd dose

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

- MIDAZOLAM 2.5-5mg IV / IM
- LORAZEPAM 1-2mg IV / IM

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

**SEIZURE Guideline**

**Blood Product (as available) OR**

- 1000mL NS IV bolus

**Vaginal Bleeding?**

**Tachycardia / Orthostatic?**

- YES
  - NO
    - S/Sx, Complaint of Labor?
    - YES
      - NO
        - 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.
**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)

---

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

**OBSTETRIC EMERGENCY Guideline**
- Left Lateral Position or Place Pad / Lift Under Right Hip
- Hyper / Hypotension? Abnormal Bleeding?

**NEWBORN CARE AND DISTRESS Guideline**
- Assist With Childbirth (*See Pearls*)

---

**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.
**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 true surgical emergency (**Cauda Equina Syndrome**).
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 Hypoxemic)
- IV / IO Guideline (prn)
- Cardiac Monitor (prn)

Control Bleeding

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
**EPISTAXIS**

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

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

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

**CLINICAL INDICATIONS:**
- Suspicion of blood glucose abnormalities – hyperglycemia / hypoglycemia.

**CONTRAINDICATIONS:**
- None

**PROCEDURE:**
- Gather and prepare equipment.
- Obtain blood samples for analysis as per manufacturer’s recommendations.
- Place blood sample onto reagent strip and place into machine for analysis as per manufacturer recommendations.
- Record result and treat any glucose abnormalities per appropriate guideline.
- Perform quality assurance on glucometers weekly, if any suspicious recordings are noted, and/or per manufacturer’s recommendations.

  Document procedure, results, and vital signs.
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 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.
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.
Normal Clinical Parameters

Vital Signs

- Temperature (rectal)- 99.0° to 102.5° F
- Heart Rate/ Pulse- 60 to 80 bpm
- Respiratory Rate- 16 to 30 bpm
- 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.
- IV catheterization access points are:
  - Cephalic vein on the cranial (superior) aspect of the forearm (figures 1 & 2)
  - Lateral saphenous vein on the lateral aspect of the hind limb at the distal tibial area (figure 3)
  - External jugular vein in either jugular furrow of the neck
- 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 or at the dorsal metatarsal artery on the dorsal aspect of the proximal hind paw. (figure 8)
- Heart sounds are best auscultated over the lower 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 acceptable and generally yield reliable results.

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
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.
- Monitor patient for
  - Body Temp
  - Mentation / LOC
  - 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
  - Assortedly cool patient until rectal temp is less than 105°F.
  - Use only room temperature fluids.
- Monitor patient for
  - Vitals, Blood Glucose
  - ECG
  - Mentation / LOC
  - Gait
  - Vision
  - 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 99.0°F to 102.5°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.
**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
- 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 CALCULATION (Quick Reference)**

<table>
<thead>
<tr>
<th>Drug/Action</th>
<th>Concentration</th>
<th>Dose Kg</th>
<th>Route</th>
<th>22.7</th>
<th>27.3</th>
<th>32</th>
<th>36.3</th>
<th>41</th>
<th>45.5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vasopressin</strong></td>
<td>20 units/ml</td>
<td>0.80</td>
<td>U/kg</td>
<td>1.09</td>
<td>1.28</td>
<td>1.45</td>
<td>1.64</td>
<td>1.82</td>
<td></td>
</tr>
<tr>
<td><strong>Epinephrine (1:1000)</strong></td>
<td>1 mg/ml</td>
<td>0.01</td>
<td>mg/kg</td>
<td>0.27</td>
<td>0.32</td>
<td>0.36</td>
<td>0.41</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td><strong>Epinephrine (1:10,000)</strong></td>
<td>0.1 mg/ml</td>
<td>0.01</td>
<td>mg/kg</td>
<td>2.27</td>
<td>2.30</td>
<td>3.63</td>
<td>4.10</td>
<td>4.55</td>
<td></td>
</tr>
<tr>
<td><strong>Atropine</strong></td>
<td>0.4 mg/ml</td>
<td>0.04</td>
<td>mg/kg</td>
<td>2.27</td>
<td>2.30</td>
<td>3.63</td>
<td>4.10</td>
<td>4.55</td>
<td></td>
</tr>
<tr>
<td><strong>Lidocaine (1%)</strong></td>
<td>10 mg/ml</td>
<td>2.00</td>
<td>mg/kg</td>
<td>4.54</td>
<td>5.46</td>
<td>6.40</td>
<td>7.26</td>
<td>8.20</td>
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<tr>
<td><strong>Amiodarone</strong></td>
<td>50 mg/ml</td>
<td>5.00</td>
<td>mg/kg</td>
<td>2.27</td>
<td>2.30</td>
<td>3.63</td>
<td>4.10</td>
<td>4.55</td>
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<tr>
<td><strong>Magnesium Sulfate (0.5 g/ml)</strong></td>
<td>500 mg/ml</td>
<td>30.00</td>
<td>mg/kg</td>
<td>1.36</td>
<td>1.64</td>
<td>1.92</td>
<td>2.18</td>
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<tr>
<td><strong>Sodium Bicarbonate (8.4%)</strong></td>
<td>1 mEq/ml</td>
<td>1.00</td>
<td>mEq/kg</td>
<td>22.7</td>
<td>27.30</td>
<td>32.00</td>
<td>3.63</td>
<td>41.00</td>
<td></td>
</tr>
<tr>
<td><strong>Defibrillate</strong></td>
<td>2.0 J/kg</td>
<td>2.00</td>
<td>J/kg</td>
<td>45.40</td>
<td>54.60</td>
<td>64.00</td>
<td>72.60</td>
<td>82.00</td>
<td></td>
</tr>
</tbody>
</table>

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

**CRI supplementation**
- **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

**Fractious Patient Sedation**
- use for MWDs that are too fraction 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.

- **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!**
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 finger. Loudest “ping” is the site of insertion.
- Clip hair over a 6-inch area over the area.
- Prepare area with surgical scrub.
- Forcefully insert 14-18 gauge IV over-the-needle catheter through skin, abdominal wall, and stomach wall.
- Note gas or air escaping through the trocar/needle from the stomach to signify a successful trocarization. (DO NOT ATTEMPT SECOND INSERTION if first is unsuccessful)
- Apply gentle external pressure to abdominal wall to assist exiting air.
- Remove trocar/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.*
**Emergency Airway Management**

**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.
- **NOTE:** intubation of the MWD is most easily performed with the dog in sternal or prone position and the head and neck extended.
- **Assisted ventilation via an Ambu-bag® at a rate of 8-10 breaths per minute.**

---

**RESPIRATORY DISTRESS PRESENT**
- Tachypnea
- Tachycardia
- Abnormal breathing pattern, as below
  - Head and neck extended
  - Resists restraint and handling
  - Forelimbs abducted
  - Open-mouth breathing
  - (+/-) cyanosis

**OBSTRUCTIVE BREATHING**
- Labored inspiration
- Abnormal upper airway noise (stertor/stridor)

**RESTRICTIVE BREATHING**
- Rapid, shallow breathing
- Muffled/absent lung or Heart sounds

**PARENCHYMAL BREATHING**
- Labored inspiration and Expiration
- Absence of abnormal upper airway noise

**DIFFERENTIAL DIAGNOSIS**
- Upper airway obstruction
- Laryngeal paralysis

**DIFFERENTIAL DIAGNOSIS**
- Pneumothorax
- Hemothorax
- Diaphragmatic hernia
- Pleural effusion
- Pyothorax

**DIFFERENTIAL DIAGNOSIS**
- Pulmonary contusions
- Pulmonary edema
- Pneumonia

---

**100% Oxygen Supplementation Examples**
- Conscious or fractious muzzled dogs (10-15 L/min)
- Orotracheal intubation or Tracheostomy (2 L/min)
Shock Fluid Therapy

Clinical Pearls:

- 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.

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Shock Fluid Therapy Protocol of MWDs

- Place multiple large-bore intravenous catheters, perform venous cut-down, and/or place intra-osseous (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.
III. BLOOD / BLOOD PRODUCTS

***See Blood Component Therapy Guideline***

PURPOSE:
To ensure the safe delivery of blood products to those patients meeting criteria for transfusion by US ARMY Aeromedical Evacuation medical personnel.

Prior to use and/or transport of blood products, maintenance and handling of blood products must be sustained IAW Theater / relevant Command Surgeon SOP. If maintenance and handling cannot be sustained IAW Theater SOP all blood products must be considered non-usable.

INDICATIONS:
- Patients requiring aggressive intravascular blood replacement and resuscitation due to acute, ongoing, major hemorrhage associated with pending or frank shock, and/or acute traumatic coagulopathy
  - Any patient whose clinical course may be improved by increased intravascular oxygen-carrying capacity and/or plasma coagulation factors
  - Usage of blood products requires specific demonstration of proficiency.
    - Certification memorandum maintained in medical aircrew member’s folder and guideline binder or consistent with provider delineated clinical privileges.
    - Complete annual refresher course utilizing concepts of theater blood guideline SOP and approved and validated by unit medical director and trainer.

Adult Inclusion Criteria:
- Injured patients assumed age of 18 years or older
- Patients with two or more positive ABC Scoring System variables (see table)
- ABC Scoring System. 2 or more points = positive prediction for Massive Trauma

| Heart rate > 120 bpm                  | 1 Point |
| Systolic BP less than 90mmHg         | 1 Point |
| Penetrating Trauma                   | 1 Point |
| Positive FAST if available           | 1 Point |

CONTRAINDICATIONS:
- None in pre-hospital combat trauma setting when clinically indicated
  - See PATIENT REFUSAL guideline as needed

EQUIPMENT:
- Blood refrigerator (located at FRST/CSH), which will have a temperature monitoring system (digital, graphic and bottled thermometers) that meets standard guidelines for Blood Bank Refrigerators
- A Temperature Log for the Blood Refrigerator that meets standard guidelines for monitoring blood refrigerators
- Large bore IV or IO access, two sites preferred
- Blood-Y tubing
- Fluid warming equipment
- Safe-T-Vue
- Patient temperature monitoring equipment
- Monitor for possible transfusion reactions
- I-Stat Monitoring Device with CG8 Cartridges (Flight Surgeon Kit)
- Pressure Bags

**TRANSFUSION REACTION:**

*See Blood Component Therapy Transfusion Related Reaction Guideline*

Document procedure, results, and vital signs on run sheet following mission.

**Post-Surgical, Transfer Patients: (adopted from: CENTCOM ECC Nurse Guidelines, 2012)**

a. Patients may require initiation or continuation of blood products during transport. Proper identification and documentation of patient’s blood type is necessary prior to transport and physician’s orders are required.

1) Whole blood does **not** have a universal donor and requires type specific blood. Low-titer O negative whole blood that is FDA cleared is second choice to type specific whole blood.
2) The universal donor for packed or deglycerolized red blood cells is type O Negative. Male recipients may receive O Positive packed red blood cells.
3) Female recipients of child-bearing age (age 10-50) should receive type O Negative. If type O Negative is not available, type O Positive pRBC may be administered provided the accepting MTF is notified so that Rhogam therapy can be provided.
4) The universal donor for plasma is AB positive.

c. Ensure verification of blood products with a second medical person prior to leaving medical facility with blood products.

d. If initiating blood product administration, obtain and record pre-transfusion vital signs. If the operational situation does not allow for a temperature, it should be measured and documented at the first opportunity.

e. Prior to transfusion, the price unit will be assessed for gas, discoloration or sediment. Thawed Plasma units will be assessed to ensure there is no cracking of the plastic bag that has led to a leak, contaminating the unit. Thawed Plasma will be assessed to ensure that there are no clumps or discoloration.

f. All blood products will be administered through a dedicated line of Normal Saline (NS) using blood tubing (inline filter standard in blood tubing). Flush the entire IV line with NS prior to starting the infusion. Minimum caliber IV gauge shall be 18, preferably 14, in adults.

g. **DO NOT** add any other medications or IV fluids, except NS, to the line or unit of blood.

h. If initiating transfusion and patient is not in extremis, start the transfusion slow and infuse approximately 50 mL over 15 minutes.
i. Continually monitor patient during the first 15 minutes. Check and record vital signs. Increase rate to 200 mL/hr after 15 minutes. If patient is in extremis, initiate infusion immediately with high flow rate and pressure bag.

j. Documentation:
1) 1st and 2nd verifiers sign the SF 518
2) Pre-transfusion vital signs to include temperature documented on SF 518 and ECC Record.
3) Date and time transfusion started on SF 518 and ECC Record.
4) Type of blood product transfused and serial number or may place sticker on the ECC Record.
5) Post transfusion, record the amount given and the time the transfusion was completed or interrupted, along with vital signs on the SF 518 and ECC Record. If applicable, also document information regarding transfusion reaction, see “i.” below.

k. Observe patient for signs and symptoms of transfusion reaction to include: chills, back or chest pain, hives, rash, fever, and/or wheezing.
1) If signs or symptoms of transfusion reaction occur, STOP TRANSFUSION IMMEDIATELY.
2) Disconnect and change the IV tubing KVO with NS.
3) Obtain a complete set of vital signs including a temperature. Continue to record VS every 15 minutes.
4) For febrile reaction (temperature increase of ≥ 2°F from baseline), administer acetaminophen 650 mg PO if possible.
5) For allergic or anaphylactic reaction (itching, chills, flushing, nausea/vomiting, coughing, wheezing, or laryngeal edema) administer diphenhydramine 50 mg IVP once. Prepare to administer epinephrine.
6) For acute hemolytic reaction (rapid onset of itching, chills, flushing, nausea/vomiting, coughing, wheezing, laryngeal edema, dyspnea, hypotension hemoglobinuria, rise in venous pressure, distended neck veins, crackles at base of lungs), administer epinephrine (1:1000) 0.5 mL IM in the thigh (preferred) or deltoid every 5 to 15 minutes. Repeat up to 3 times for moderate bronchospasm, facial and laryngeal edema. *If thigh and deltoid are unavailable, may administer subcutaneously. Also, administer diphenhydramine 50 mg IVP once.
7) Document reaction on SF 518 and on ECC Record, type and time of symptom onset, time blood was stopped, vital signs, O2 saturation, blood draw, interventions, and physician to whom you reported and time of report.
8) Save the blood bag and tubing. Blood will be drawn from the patient upon arrival to MTF.
9) Notify receiving physician of transfusion reaction.

EXAMPLE VAMPIRE PROGRAM

*CENTCOM Clinical Operating Protocol CCOP-01: URGENT RESUSCITATION USING BLOOD PRODUCTS DURING TACTICAL EVACUATION FROM POINT OF INJURY

To provide essential instructions on urgent/life-saving resuscitation procedures using blood products during tactical evacuation (refers to both casualty evacuation and medical evacuation) from the point of injury (POI) for casualties suffering major blood loss/massive hemorrhage. Referred to as, Vampire Program. All USCENTCOM clinical operating protocols (CCOPs) are posted to the CCSG SharePoint site at https://intelshare.intelink.gov/sites/ccsg/SitePages/CCSG-CLINOPS.aspx or can be found on the Joint Trauma System page at http://www.usaisr.amedd.army.mil/10_jts.html
2. APPLICABILITY

This CCOP applies to all USCENTCOM Service Components, Combined and other Joint Task Forces (CJTFs), and all U.S. military forces operating under Title 10 within the geographic area of responsibility (AOR) assigned or allocated to Commander, USCENTCOM by approved Global Force Management (GFM) processes (e.g., Command Plan) and Department of Defense (DoD) civilian medical employees deploying with U.S. Forces (hereafter referred to as “DoD personnel”) consistent with DoD and Service specific guidance.

a. Medical and non-medical personnel (e.g., flight medic, crew chief, registered nurse, enlisted medical personnel, physician, nurse practitioner, or physician assistant), assigned/attached or allocated to perform tactical evacuation (CASEVAC and MEDEVAC) duties that involve direct or indirect patient care.

b. All operational units participating in the USCENTCOM Vampire Program will comply with quality assurance and patient safety reporting requirements IAW USCENTCOM Regulation (CCR) 40-1.

***This only applies to the CENTCOM AOR unless adopted by other Geographic Combatant Commands.
IV. 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 can not 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).
   a. The SARC’s shall serve as the single point of contact for coordinating care to ensure that sexual assault victims receive appropriate and responsive care.
4. Sexual assault victims shall be given priority and treated as emergency cases. Emergency care shall consist of emergency medical care and the offer of a SAFE Kit.

PATIENT MANAGEMENT PROCEDURE:

1. In the management of sexual assault patients, the DoD 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), SARC’s, 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.

i. 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.

ii. 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.

2. 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.

3. **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.

4. 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.

5. **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.

V. TREATMENT OF MINORS

**INDICATIONS:** Responding to treat a minor patient without 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 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.

VI. **PATIENT REFUSAL**

**INDICATIONS:** If a patient (or person[s] responsible for a minor) refuses treatment or transport, after pre-hospital providers have arrived on 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:
   - 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**.
   - Ensure that you clearly and repeatedly explain to the patient or responsible parties of the concerns and possible risks involved in refusing medical care.
   - 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 (crew member) and the patient or parties responsible for the patient as to refusal of care.
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.**

**VII. MEDICATION, DRUG CARDS**

a. General Use

i. Use as clinically indicated per guideline.

**Oxygen**

**Class:** Atmospheric gas.

**Mechanism of Action:** 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.
  - If O2 Saturation remains < 95%, apply non-rebreather face mask with oxygen at 15 LPM.
  - If O2 Saturation remains < 90%, refer to **Airway guideline.**
- Patient on Ventilator:
  - Adjust ventilator settings based on ventilatory goals for patient: ETCO2, peak pressures, SpO2, and patient clinical condition.
  - Adjust FiO2 to maintain pulse oxygen saturations > 93% / tissue oxygen saturation (STO2) > 70%, if applicable.
- When planning for available O2 during non-pressurized, aeromedical transfer, ensure adequate resources to provide 1.5 to 2 times the ground transport volume of O2 to compensate for increased consumption associated with altitude related physiological impact.
**0.9% Sodium Chloride (Normal Saline)**

**Class:** Isotonic crystalloid solution.

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

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

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

**Adverse Reactions:** Rare

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

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

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

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**Lactated Ringer’s (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 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 patient’s physiologic response. (See appropriate Guidelines)

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**Normal Saline Hypertonic 3%**

**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 same line as Blood Products – cause crenation and lysis of RBC. Caution or avoid use in patients with known congestive heart failure and kidney disease.

**Adverse Reactions:** Rare

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

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

**Dosage and Administration:**

- **Dosing (Adult):**
  - **Bolus:** 250-500 cc IV Bolus over 15 min
  - **Infusion:** 40 cc/hr

- **Dosing (Pediatrics):**
  - **Bolus:** 5 cc/kg IV Bolus over 15 min.
  - **Infusion:** 0.5 cc/kg/hr
**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).

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b. Medications, all:

i. 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.
### 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:

<table>
<thead>
<tr>
<th>Pain or fever: (Limit total daily dose to &lt;4 g/day)</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO:</strong></td>
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<tr>
<td>Regular release: 325-650 mg every 4-6 hours or 1000 mg 3-4 times daily (maximum: 4 g daily)</td>
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<td><strong>RECTAL:</strong></td>
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<tr>
<td>325-650 mg every 4-6 hours or 1000 mg 3-4 times daily (maximum: 4 g daily)</td>
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<td><strong>IV:</strong></td>
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<tr>
<td>&lt;50 kg: 15 mg/kg every 6 hours</td>
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<td>o Max single dose: 15 mg/kg/dose (750 mg/dose)</td>
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<tr>
<td>o Max daily dose: 75 mg/kg/day (≤3.75 g daily)</td>
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</tr>
<tr>
<td>≥50 kg: 1000 mg every 6 hours;</td>
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<tr>
<td>o Max single dose: 1000 mg/dose</td>
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<tr>
<td><strong>Children ≥12 years &amp; Adolescents:</strong></td>
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<tr>
<td>Refer to adult dosing</td>
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</table>

**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

**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, decreased 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>
<th>Always Reference LB tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO:</td>
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<tr>
<td>• 125-250 mg twice daily.</td>
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</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

<table>
<thead>
<tr>
<th>Altitude Illness (Acute Mountain Sickness):</th>
<th>PEDIATRIC</th>
<th>Always Reference LB tape</th>
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<tbody>
<tr>
<td>PO:</td>
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<tr>
<td>• 2.5 mg/kg/dose every 8-12 hours</td>
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</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.
## ACETYL SALICYLIC ACID

**Class / Mechanism of Action**

**Systemic Corticosteroid**

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.

### Indications

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

### Contraindications

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

### Adverse Reactions / Precautions

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

### Dose and Administration:

<table>
<thead>
<tr>
<th>Acute coronary syndrome (ST-segment elevation myocardial infarction [STEMI], unstable angina (UA)/non-ST-segment elevation myocardial infarction [NSTEMI]): (Not for use in trauma patients):</th>
<th>N/A: No Appropriate need on evacuation platform</th>
</tr>
</thead>
<tbody>
<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></td>
</tr>
</tbody>
</table>
**ACTIVATED CHARCOAL**  ❖ Safe, Lactation Safe  
Trade Name: Actidose

### Class / Mechanism of Action
**Antidote**
Non-absorbable agent that absorbs toxins within the GI tract inhibiting GI absorption.

### Indications
**Labeled Indications:** Management of suspected or known poisonings when gastrointestinal decontamination is an option.
- 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 utilized NG/OG tube.
- Be prepared for possible emesis. Consider use of antiemetic.
- Avoid use in patients at risk of GI hemorrhage or perforation

### Dose and Administration:

<table>
<thead>
<tr>
<th>Adult</th>
<th>Pediatric</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute Poisoning:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO, NG/OG:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Single dose: <strong>50 grams</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Multidose: Initial dose: <strong>50 grams</strong> initially followed by <strong>25 grams</strong> every 2 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

**Note:** Multidose charcoal is indicated if patient ingested life-threatening amount of drug (carbamazepine, dapsone, phenobarbital, guanine, or theophylline)

<table>
<thead>
<tr>
<th>Acute Poisoning:</th>
<th>Children &gt;12 years: Refer to adult dosing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO, NG/OG:</td>
<td></td>
</tr>
<tr>
<td>- Single dose: <strong>1 gram/kg</strong></td>
<td></td>
</tr>
<tr>
<td>- Multidose: Initial dose: <strong>1 Gram/kg</strong> initially, followed by multiple doses of <strong>0.5 Gram/kg</strong> every 2 hours</td>
<td></td>
</tr>
</tbody>
</table>

**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

**Lactation?**

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

Slows conduction time through the AV node, inhibits re-entry pathways through the AV node, restoring normal sinus rhythm. Half-life of less than 10 seconds allows for rapid repeat dosing.

### Indications

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

**Unlabeled:** 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.

### Contraindications

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

### Adverse Reactions / Precautions

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

### Dose and Administration:

<table>
<thead>
<tr>
<th>Paroxysmal supraventricular tachycardia:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I.V.</strong> (rapid push, over 1-2 seconds, via proximal peripheral line (forearm or above, large bore).)</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>
</tr>
</tbody>
</table>

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

**Note:** Initial dose of adenosine should be reduced to 3 mg if patient is currently receiving carbamazepine or dipyridamole, has a transplanted heart or if adenosine is administered via central line (ACLS, 2015).

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

**Trade Name:** Proventil / Ventolin

## Class / Mechanism of Action

**Beta₂ Agonist (Bronchodilator)**

Synthetic sympathomimetic that relaxes bronchial smooth muscle, causing bronchodilation, with little cardiac impact. Onset of action is 2-15 minutes.

## Indications

### Labeled Indications:

- Treatment or prevention of bronchospasm in patients with reversible obstructive airway disease; prevention of exercise-induced bronchospasm

- **Asthma**
- **Reactive Airway / Bronchospasm**
- **COPD**

## Contraindications

- Hypersensitivity to albuterol or any component of the formulation
- Symptomatic tachycardia

## Adverse Reactions / Precautions

- Risk of abortion during 1st or 2nd trimester
- Headache, Dizziness, Flushing, Diaphoresis, Tremor, Weakness
- Angina, A-Fib, Arrhythmia, Chest Pain, Palpitations
- Dyspnea, Bronchospasm in asthmatics

## Dose and Administration:

### 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:**
  - 2.5-5 mg every 20 minutes for 3 doses, then 2.5-10 mg every 1-4 hours as needed.

### 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.

### 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.
AMIODARONE

**Lactation:** Yes, Not Recommended

### Class / Mechanism of Action

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

### Indications

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

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

### Contraindications

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

### Adverse Reactions / Precautions

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

### Dose and Administration:

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

<table>
<thead>
<tr>
<th>Recurrent, Hemodynamically unstable VT (ACLS, 2015):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Dose:</td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>IV/IO slow push</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>150mg IV</strong> over 1st 10 minutes (15mg per minute) dilute in 20-30 mL of NS or D5W.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• May repeat <strong>150 mg</strong> every 10 minutes PRN if VT recurs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Infusion following initial dosing:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>360 mg</strong> over 6 hours (1 mg/ min)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Tachycardia with Pulse and poor perfusion, or symptomatic with adequate perfusion** (PALS, 2015):

<table>
<thead>
<tr>
<th>IV/IO push</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Loading dose: <strong>5mg/kg</strong> over 20 to 60 minutes</td>
<td></td>
</tr>
<tr>
<td>• Can repeat two times (max dose: 15 mg/kg in 24 hrs)</td>
<td></td>
</tr>
<tr>
<td>• Max single dose: <strong>300mg</strong></td>
<td></td>
</tr>
</tbody>
</table>
### 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 has no effect on 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: ADULT PEDIATRIC

#### Symptomatic Bradycardia

**IV/IO**

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

**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 symptoms): **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:**

**Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:**  
IV/IO, SLOW  
- 500-1000 mg over 2-5 minutes; may repeat as necessary

**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

**Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:**  
IV/IO, SLOW  
- 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 (eg, tetany, seizures, arrhythmias); cardiac disturbances secondary to hyperkalemia; magnesium sulfate overdose;

**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 Vien, 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 Vien, 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 NaHCO$_3$ in IV Bag/Tubing

### Dose and Administration:

#### ADULT

Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:
IV/IO, SLOW
- 1500-3000mg over 2-5 minutes

Calcium channel blocker overdose (unlabeled use): Hypotension/conduction disturbances:
IV/IO
- 3 Grams (3000mg) over 5 minutes; may repeat every 10-20 minutes with 3-4 additional doses.

**Note:** Adult and Pediatric Dosages are expressed in terms of 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>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO, SLOW</td>
<td>1500-3000mg over 2-5 minutes</td>
<td>Always Referenc BROSELOW Tape</td>
</tr>
<tr>
<td>Calcium channel blocker overdose (unlabeled use): Hypotension/conduction disturbances: IV/IO</td>
<td>3 Grams (3000mg) over 5 minutes; may repeat every 10-20 minutes with 3-4 additional doses.</td>
<td></td>
</tr>
</tbody>
</table>

Cardiac arrest or cardiotoxicity in the presence of hyperkalemia, hypocalcemia, or hypermagnesemia:
IV/IO, SLOW
- 60-100 mg/kg/dose (maximum: 3000 mg/dose)

Calcium channel blocker overdose (unlabeled use): Hypotension/conduction disturbances:
IV/IO
- 45 mg/kg (maximum 3000mg/dose) over 10-15 minutes; may repeat every 10-15 minutes

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

### Class / Mechanism of Action
- **Systemic Corticosteroid**
- Anti-inflammatory, Immunosuppressant
- Onset of action, IV: Prompt; Duration IV: 72 hours

### Indications
- **Labeled Indications:**
  - Anti-inflammatory or immunosuppressant in treatment of a variety of diseases: allergic, dermatologic, endocrine, hematologic, inflammatory, neoplastic, renal, respiratory, rheumatic, and autoimmune
  - Management if cerebral edema
- **Unlabeled:**
  - Treatment of acute mountain sickness (AMS) and high altitude cerebral edema.

### Contraindications
- Hypersensitivity to dexamethasone or any component of the formulation
- Systemic fungal infection, cerebral malaria

### Adverse Reactions / Precautions
- Not for use in treatment of head injury; increased mortality has occurred in head injury patients treated with high dose IV methylprednisolone. Corticosteroids should not be used in head injuries.

### Dose and Administration:

<table>
<thead>
<tr>
<th><strong>Acute mountain sickness (AMS)/high altitude cerebral edema (HACE)</strong> (unlabeled use):</th>
<th><strong>Acute mountain sickness (AMS)/high altitude cerebral edema (HACE)</strong> (unlabeled use):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO, IM, IV:</strong></td>
<td><strong>PO, IM, IV:</strong></td>
</tr>
<tr>
<td><strong>Adul</strong></td>
<td><strong>Pediatic</strong></td>
</tr>
<tr>
<td><strong>AMS:</strong> 4 mg every 6 hours</td>
<td><strong>0.15 mg/kg/dose</strong> 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>
<td>o consider use in high altitude pulmonary edema because of associated HACE with pulmonary edema</td>
</tr>
</tbody>
</table>

### Notes:
- Always Reference BROSELOW Tape

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160
DEXTROSE 50% ✧ Lactation?

Trade Name: Glutose / B-D Glucose

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

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

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

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

<table>
<thead>
<tr>
<th>Dose and Administration: ADULT PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypoglycemia:</strong></td>
<td></td>
</tr>
<tr>
<td>Oral: 4-20 g as a single dose; may repeat if necessary</td>
<td>Oral: 4-20 g as a single dose; may repeat if necessary</td>
</tr>
<tr>
<td>IV: 10-25 g (40-100 mL of 25% solution or 20-50 mL of 50% solution)</td>
<td>IV: Newborns: 5ml/kg D10 (Max 25 G/dose)</td>
</tr>
<tr>
<td><strong>Note:</strong> 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><strong>Note:</strong></td>
</tr>
<tr>
<td><strong>Hypoglycemia:</strong></td>
<td></td>
</tr>
<tr>
<td>Oral: 4-20 g as a single dose; may repeat if necessary</td>
<td>Oral:</td>
</tr>
<tr>
<td>IV: Newborns: 5ml/kg D10 (Max 25 G/dose)</td>
<td></td>
</tr>
<tr>
<td>Infants and Children: 2ml/kg D25 (Max 25 G/dose)</td>
<td></td>
</tr>
<tr>
<td>Adolescents: Refer to adult dosing</td>
<td><strong>Note:</strong></td>
</tr>
<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

**Class / Mechanism of Action**

Benzodiazepine;
Acts as an anxiolytic/hypnotic, anticonvulsant and sedative – Long Half Life (25-100hrs)
Onset of action: IV, Almost Immediate
Duration: IV, 20-30 minutes

**Indications**

**Labeled Indications:**
- Anxiety Disorders
- Convulsive Disorders and Alcohol Withdrawal Symptoms
- Skeletal Muscle Relaxant
- Induce Sedation and Amnesia (Midazolam is primary medication)

**Contraindications**

- Hypersensitivity to diazepam or any component of the formulation or other benzodiazepines
- Acute narrow angle glaucoma, Acute Alcohol Intoxication
- Respiratory Insufficiency/Depression (Overdose Reversal: FLUMAZENIL can be used, however it carries elevated risk. Respiratory support until the medication is metabolized is traditionally the best care in Benzodiazepine overdose)
- Neurologic Depression (Head Trauma)

**Adverse Reactions / Precautions**

- **No Analgesic properties** (Narcotic pain control is needed for RSI’d / Intubated trauma patients)
- May Cause Respiratory depression: Do not give without stable IV line and BVM (airway control) ready
- Hypotension, vasodilation
- Amnesia, confusion, drowsiness, slurred speech (Paradoxical Reactions possible: aggressiveness, agitation, anxiety, inappropriate behavior)

## Dose and Administration:

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Lactation Yes (Unsafe)</th>
<th>Trade Name: Valium</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anxiety:</strong> Oral, IV, IM:</td>
<td>(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>
<td></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>Loading dose: 5-10 mg; Maintenance dose: 0.03-0.1 mg/kg every 30 minutes to 6 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedation in ICU patient:</td>
<td>IV:</td>
<td>Infants &gt;30 days and Children &lt;5 years: 0.2-0.5 mg given slowly every 2-5 minutes (maximum total dose: 5 mg); repeat in 2-4 hours if needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscle Spasm:</td>
<td>IV:</td>
<td>Infants ≥5 years: 1 mg given slowly every 2-5 minutes (maximum total dose: 10 mg); repeat in 2-4 hours if needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nerve Agent Exposure (CBRNE):</td>
<td>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>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infants &gt;30 days and Children &lt;5 years: 1-2 mg/dose every 3-4 hours as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Children ≥5 years: 5-10 mg/dose every 3-4 hours as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sedation / Muscle relaxation / Anxiety:**

IV, IM (IV doses more reliable)
- Children: **0.04-0.3 mg/kg/dose** every 2-4 hours to a maximum of 0.6 mg/kg within an 8-hour period if needed

**Status Epilepticus:**

- Infants >30 days and Children <5 years: **0.2-0.5 mg** given slowly every 2-5 minutes (maximum total dose: 5 mg); repeat in 2-4 hours if needed
- Children ≥5 years: **1 mg** given slowly every 2-5 minutes (maximum total dose: 10 mg); repeat in 2-4 hours if needed

**Muscle spasm associated with tetanus:**

IV, IM
- Infants >30 days and Children <5 years: **1-2 mg/dose** every 3-4 hours as needed
- Children ≥5 years: **5-10 mg/dose** every 3-4 hours as needed

**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)

### Diazepam

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**Labeled Indications:**
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- 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
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- Hypotension, vasodilation
- Amnesia, confusion, drowsiness, slurred speech (Paradoxical Reactions possible: aggressiveness, agitation, anxiety, inappropriate behavior)
DIPHENHYDRAMINE  ♀B, Lactation Yes (Unsafe)  Trade Name: Benadryl

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histamine H₁ Antagonist;</td>
</tr>
<tr>
<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>Anaphylaxis/Allergic Reactions and Motion Sickness:</th>
<th>ADULT</th>
<th>PEDIATRIC Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oral:</strong></td>
<td>25-50mg every 6-8 hours</td>
<td></td>
</tr>
<tr>
<td><strong>IV Push:</strong></td>
<td>50mg once, prepare to administer epinephrine</td>
<td></td>
</tr>
</tbody>
</table>

**Acute Hemolytic reaction** (rapid onset of itching, chills, flushing, nausea/vomiting, coughing, wheezing, laryngeal edema, dyspnea, hypotension hemoglobinuria, rise in venous pressure, distended neck veins, crackles in lung bases):

- **IV:** 50mg once, after administration of epinephrine 0.5mL in lateral thigh

### Anaphylaxis/Allergic Reactions and Motion Sickness:

- **Oral, IM, IV:**
  - 1 mg/kg every 6 hours

### 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**  
♀B, 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

---

**Infusion Rates for Dobutamine at 1000mcg/mL**

**ADULT**  
**PEDIATRIC** Always Reference BROSELOW Tape
<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Adrenergic Agonist; Vasopressor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

### 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

**Dopamine Dosage Efficacy:**
- 1-5 mcg/kg/min = Dopaminergic effects: increased urine output, increased renal blood flow
- 5-10 mcg/kg/min = Beta1 effects: Increased CO, HR, and contractility
- >10 mcg/kg/min = Alpha1 effects: Increased BP, vasoconstriction

**Note:** Doses >20 mcg/kg/minute likely do not have a beneficial effect on blood pressure and may increase risk of tachyarrhythmias. Add additional vasopressor if Dopamine doses of 20 mcg/kg/min are inadequate. (phenylephrine, norepinephrine, epinephrine)

**PEDiATRIC**
- Always Reference BROSELOW Tape
- "Use adult dosing"

**Note:** Dopamine is a second line medication for hemodynamic support in Pediatric patients behind Epinephrine and Norepinephrine
Mix 400mg dopamine in 250mL D5W or NS (or 800mg dopamine in 500mL D5W or NS); Concentration = 1600mcg/mL

**DOPAMINE Drip Rates, Dosing Chart:**

<table>
<thead>
<tr>
<th>PT WEIGHT</th>
<th>DESIRED DOSE (mL/hr): Drops per minute based on microdrip tube (60gtt/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lbs</td>
<td>Kg</td>
</tr>
<tr>
<td>----------</td>
<td>----</td>
</tr>
<tr>
<td>88</td>
<td>40</td>
</tr>
<tr>
<td>100</td>
<td>45</td>
</tr>
<tr>
<td>110</td>
<td>50</td>
</tr>
<tr>
<td>120</td>
<td>55</td>
</tr>
<tr>
<td>132</td>
<td>60</td>
</tr>
<tr>
<td>143</td>
<td>65</td>
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<tr>
<td>154</td>
<td>70</td>
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<td>165</td>
<td>75</td>
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<td>176</td>
<td>80</td>
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<td>187</td>
<td>85</td>
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<tr>
<td>198</td>
<td>90</td>
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<tr>
<td>209</td>
<td>95</td>
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<tr>
<td>220</td>
<td>100</td>
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<tr>
<td>231</td>
<td>105</td>
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<tr>
<td>242</td>
<td>110</td>
</tr>
<tr>
<td>253</td>
<td>115</td>
</tr>
<tr>
<td>264</td>
<td>120</td>
</tr>
<tr>
<td>275</td>
<td>125</td>
</tr>
</tbody>
</table>

Drip Rate Formula: (1600mcg/mL) / (60gtt/mL) = 26.66mcg/gtt

(mcg x Kg/min) / 26.66 = drops/min

Example: (5mcg x 40Kg/min) divided by 26.66mcg/gtt = 7.5 (or 8gtt/min)
**EPINEPHRINE 1:1000**, Lactation? (Caution)

Trade Name: EpiPen / EpiPen Jr

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alpha &amp; Beta Agonist</strong></td>
</tr>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Allergic Reactions, Anaphylaxis</td>
</tr>
<tr>
<td>• Asthma (Bronchoconstriction)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not for IV use, must first dilute into 10mL NS syringe for Cardiac / IV use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No applicable use in hemorrhagic shock unless fluid replacement therapy maximized! Maximize use of Blood products / Crystalloids before considering use in hemorrhagic shock.</td>
</tr>
<tr>
<td>• Chest Pain, Tachycardia, Arrhythmias, Palpitations, Sudden death</td>
</tr>
<tr>
<td>• Anxiety, Cerebral Hemorrhage, Headache</td>
</tr>
<tr>
<td>• Vesicant: Avoid extravasation, will cause tissue damage/necrosis</td>
</tr>
<tr>
<td>• Use with caution in patients taking tricyclic antidepressants; effects of epinephrine may be increased</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>PEDIATRIC</strong> Always Reference BROSELOW Tape</td>
</tr>
</tbody>
</table>

**Bronchodilator:**

SubQ, IM: **1:1000**
- 0.3-0.5 mg every 20 minutes for 3 doses

Nebulization:
- Add 0.5 mL to nebulizer and dilute with 3 mL of NS; administer over 15 minutes

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

IM: **1:1000**
- 0.3-0.5 mg every 5-15 minutes until clinical improvement

IV: Dilute 1 ml **1:1000** w/9ml NS to make **1:10,000** or use 0.1mg/mL Pre-filled 10cc (Cardiac) Syringe
- **0.1 mg (1ml)** over 5 minutes;
- *Or*
  - IV Infusion:
  - Initiate with an infusion at **5-15 mcg/minute** (with crystalloid)

**Acute Hemolytic reaction**

IM: **1:1000**
- 0.5mg IM in lateral thigh
  - Repeat every 5-15min for moderate bronchospasm or facial/laryngeal edema.
- Follow with Diphenhydramine 50mg IV Push

**Bronchodilator:**

SubQ: Infants and Children **1:1000**
- 0.01 mg/kg (0.01 mL/kg) (maximum single dose: 0.5 mg) every 20 minutes for 3 doses

Nebulization:
- Children <4 years: Croup: **0.05 mL/kg** (maximum dose: 0.5 mL); dilute in 3 mL of NS. Administer over 15 minutes; do not administer more frequently than every 2 hours
- Children ≥4 years: Adult dosing

**Anaphylaxis / Hypersensitivity reaction** *(PALS,2015):* Infants and Children

IM:
- 0.01 mg/kg (0.01 mL/kg of **1:1000** [1 mg/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 1:10,000  
**Trade Name:** Adrenalin

### Class / Mechanism of Action
**Alpha & Beta Agonist**
Sympathomimetic, stimulates both alpha and beta adrenergic receptors, causing relaxation of the bronchial tree, cardiac stimulation, and dilation of skeletal muscle blood vessels.

### Indications
- Cardiac Arrest (VF, pulseless VT, asystole, PEA)
- Symptomatic Bradyardia 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.
- Little, Tachycardia, Arrhythmias, Palpitations, Sudden death
- Anxiety, Cerebral Hemorrhage, Headache
- Vesicant: Avoid extravasation, will cause tissue damage/necrosis
- Use with caution in patients taking tricyclic antidepressants; effects of epinephrine may be increased

### Dose and Administration:

**ADULT**

**Asystole/pulseless arrest, pulseless VT/VF (ACLS, 2015):**
- IV: **1:10,000** (0.1mg/mL) Pre-filled 10cc Syringe
- **1 mg** (10cc of 0.1mg/mL) every 3-5 minutes to ROSC, Follow each with 20mL flush
- Endotracheal:
- **2-2.5 mg** every 3-5 minutes until IV/IO access or ROSC; dilute in 5-10 mL NS or sterile water.

**Bradycardia (symptomatic; unresponsive to atropine or pacing) (ACLS,2015):**
- IV Continuous Infusion:
- **2-10 mcg/minute** titrate to desired effect

**Anaphylaxis / severe Hypersensitivity reaction (ACLS,2015):**
- IV: **1:10,000** (0.1mg/mL) Pre-filled 10cc Syringe
- **0.1 mg** (1ml) over 5 minutes;
- IV Continuous Infusion:
- Initiate with an infusion at **5-15 mcg/minute** (with crystalloid)

**Severe Hypotension/shock, fluid resistant and/or dopamine dose **>20mcg/kg/min**
- **2-10 mcg/minute**; titrate to desired effect

### PEDIATRIC

**Asystole/pulseless arrest, pulseless VT/VF after failed DEFIB (PALS, 2015) and Bradycardia (symptomatic; unresponsive to atropine or pacing)** Infant and children
- IV: **1:10,000** – 0.1mg/mL Pre-filled 10cc Syringe
- **0.01 mg/kg** (0.1 mL/kg of **1:10,000** [0.1 mg/mL]) (maximum single dose: 1 mg) every 3-5 minutes as needed or until ROSC
- **Severe Hypotension/shock and fluid resistant (unlabeled use):**
- IV: Continuous Infusion
- **0.1 - 1 mcg/kg/minute** titrated to desired effect

### Infusion Preparation (standard):
- 1mg epinephrine (1:10,000) in 250mL D5W or NS= 4mcg/ml concentration
- 1mg epinephrine (1:10,000) in 500mL D5W or NS= 2mcg/ml concentration.
**ETOMIDATE**  
-trade name: Amidate

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>General Anesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very short acting non-barbiturate sedative/hypnotic used for induction of anesthesia with little cardiovascular effects. Onset of action: 30-60 seconds, Duration 5-10 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled Indications:</td>
</tr>
<tr>
<td>• Induction and maintenance of general anesthesia</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• NO Analgesic properties!</td>
</tr>
<tr>
<td>• Safety in children less than 10 years has not been established</td>
</tr>
<tr>
<td>• Inhibits adrenal steroid production; may increase mortality if repeat dosing is required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADULT</td>
</tr>
<tr>
<td>PEDIATRIC</td>
</tr>
<tr>
<td><strong>RSI:</strong></td>
</tr>
<tr>
<td>IV:</td>
</tr>
<tr>
<td>• 0.3-0.5 mg/kg over 30-60 seconds for induction of anesthesia;</td>
</tr>
<tr>
<td><strong>Note:</strong> Limit to single dose for anesthesia/induction. Repeat dosing and continuous infusion (maintenance dosing) may increase patient mortality due to adrenal suppression and inability to respond to stress.</td>
</tr>
</tbody>
</table>

| **RSI:**                      |
| IV:                           |
| • 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**

**Lactation: Yes (Not recommended)**

**Trade Name: Sublimaze**

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioid Analgesic; General Anesthetic</td>
</tr>
<tr>
<td>Binds to opioid receptors within the CNS increasing pain threshold and altering pain reception; inhibits ascending pain pathways (blocking painful stimulus); produces CNS depression</td>
</tr>
<tr>
<td>Onset: IV almost immediate, Duration: IV 0.5-1 hour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong></td>
</tr>
<tr>
<td>• Pain relief</td>
</tr>
<tr>
<td>• Adjunct to general or regional anesthesia</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 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).</td>
</tr>
<tr>
<td>• <strong>Head trauma: Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur.</strong></td>
</tr>
<tr>
<td>• May worsen Bradycardia</td>
</tr>
<tr>
<td>• May cause life-threatening hypoventilation and Reparatory depression</td>
</tr>
<tr>
<td>• CNS depression: Impairs physical and mental abilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain Management:</strong> IV: Slow (Unlabeled)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0.5-1mcg/kg PRN for breakout pain q 30-60 min (Max 4mcg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Patients with prior opioid exposure may have increased tolerance and require higher dosing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Sedation during mechanical ventilation:** 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 (Max 200mcg) |

| Pain Management: IV: Slow (Unlabeled) |
| • 0.5-1mcg/kg PRN for breakout pain q 30-60 min (Max 4mcg/kg) |

| **Sedation during mechanical ventilation:** 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) |

**Note:** Titrate doses and intervals to pain relief/prevention. Monitor vital signs. |

• Single IV doses last 0.5-1 hour
FUROSEMIDE

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:

<table>
<thead>
<tr>
<th>Acute pulmonary edema:</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>40 mg over 1-2 minutes. If response not adequate within 1 hour, may increase dose to 80 mg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Edema, heart failure:

<table>
<thead>
<tr>
<th>IV, IM:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial: 20-40 mg/dose; if response is not adequate, may repeat the same dose or increase dose in increments of 20 mg/dose and administer 1-2 hours after previous dose (maximum dose: 200 mg/dose).</td>
<td></td>
</tr>
</tbody>
</table>

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
- 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

**♀B, Lactation? (Caution)**

### Class / Mechanism of Action

Antidote, Hypoglycemia Antidote, Diagnostic agent

Raises blood glucose levels by stimulating increased production of cyclic AMP, promoting hepatic glycogenolysis and gluconeogenesis

### Indications

**Labeled Indications:** Management of hypoglycemia (Glucose <70 in adults or <60 in children)

**Unlabeled:**
- Beta-blocker or calcium channel blocker induced myocardial depression (with or without hypotension) unresponsive to standard measures
- Hypoglycemia secondary to insulin or sulfonylurea overdose (as adjunct to dextrose)

### Contraindications

- Hypersensitivity to glucagon or any component of the formulation
- Insulinoma / Pheochromocytoma

### Adverse Reactions / Precautions

- Should NOT be used as 1st line medication for hypoglycemia or Altered mental status
  - Hypoglycemia patients should receive dextrose. If IV access cannot be established or if dextrose is not available, glucagon may be used as alternate until dextrose can be given.
- Thiamine should precede use in patient with suspected alcoholism or malnutrition

### Dose and Administration: **ADULT** | **PEDIATRIC**

#### Hypoglycemia:

- **IV, IM, SubQ:**
  - 1 mg; may repeat in 20 minutes as needed

**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):

**IV: (ACLS, 2015)**

- 3-10 mg (or 0.05-0.15 mg/kg) bolus followed by an infusion of 3-5 mg/hour (or 0.05-0.1 mg/kg/hour); titrate infusion rate to achieve adequate hemodynamic response

#### Hypoglycemia:

- **IV, IM, SubQ:**
  - **Children <20 kg:** 0.5 mg or 20-30 mcg/kg/dose; repeated in 20 pm.
  - **Children ≥20 kg:** Adult dosing.

**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):

**IV:**

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

<table>
<thead>
<tr>
<th><strong>Class / Mechanism of Action</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anticoagulant</strong></td>
</tr>
<tr>
<td>Inactivates thrombin and activated coagulation factors (IX, X, XI, XII, and plasmin) and prevents conversion of fibrinogen to fibrin.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Indications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Treatment of thromboembolic disorders</td>
</tr>
<tr>
<td><strong>Unlabeled:</strong> ST elevation MI (STEMI) as an adjunct to thrombolysis; unstable angina/non-STEMI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Contraindications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to heparin or any component of the formulation</td>
</tr>
<tr>
<td>• Active Bleeding (Trauma Patient)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Adverse Reactions / Precautions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Continuously monitor for bleeding: Stop immediately if any bleeding occurs</td>
</tr>
<tr>
<td>• Urticarial reactions and anaphylaxis can occur</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Acute coronary syndromes: STEMI/Unstable Angina as an adjunct to fibrinolysis (full-dose alteplase):</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
</tr>
<tr>
<td>• Initial bolus of <strong>60 units/kg</strong> (MAX: 4000 units)</td>
</tr>
<tr>
<td>o Maintenance: 12 units/kg/hour (MAX: 1000 units/hour) as continuous infusion.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment of venous thromboembolism:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: (unlabeled dosing)</td>
</tr>
<tr>
<td>&gt;1 year</td>
</tr>
<tr>
<td>• <strong>DVT/PE: 80 units/kg</strong> (or alternatively 5000 units) IV push followed by continuous infusion of 18 units/kg/hour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment of venous thromboembolism:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: (unlabeled dosing)</td>
</tr>
<tr>
<td>&gt;1 year</td>
</tr>
<tr>
<td>• <strong>DVT/PE: 75 units/kg</strong> IV push followed by continuous infusion of 20 units/kg/hour</td>
</tr>
</tbody>
</table>

**Note:** Heparin is ONLY for use only under written direction of referring provider or direct consultation with medical director.
<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plasma Volume Expander, Colloid</strong></td>
</tr>
<tr>
<td>Colloidal starch producing plasma volume expansion. Onset of Action: approximately 30 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Volume expander used in treatment of hypovolemic / hemorrhagic shock</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Anaphylactoid reactions (allergies to corn)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration: ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plasma volume expansion:</strong></td>
<td></td>
</tr>
<tr>
<td>IV 250-500ml Bolus. May repeat PRN (up to 1500 mL/day). Titrate to individual hemodynamic needs (Sys BP &gt;90).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• May be administered via infusion pump or pressure infusion.</td>
</tr>
<tr>
<td>• Do not administer with blood through the same line / tubing</td>
</tr>
<tr>
<td>• Change tubing or flush extensively with NS before administering blood through the same line.</td>
</tr>
</tbody>
</table>
### HYDROMORPHONE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioid Analgesic</td>
<td>Binds to opioid receptors within the CNS increasing pain threshold and altering pain reception; inhibits ascending pain pathways (blocking painful stimulus); produces CNS depression</td>
</tr>
<tr>
<td>Onset: IV 10-20 minutes. Duration 2-4 hours</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Labeled Indications:</td>
<td>Moderate to severe pain.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hypersensitivity to hydromorphone or any component of the formulation</td>
<td></td>
</tr>
<tr>
<td>- Severe respiratory depression (in absence of resuscitative equipment or ventilator support)</td>
<td></td>
</tr>
<tr>
<td>- Acute or severe asthma</td>
<td></td>
</tr>
<tr>
<td>- Paralytic ileus</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Always be prepared for use of paralytic and intubation (maintain positive control of airway).</td>
<td></td>
</tr>
<tr>
<td>- Head trauma: Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur.</td>
<td></td>
</tr>
<tr>
<td>- May cause Hypotension, Use with caution in hypovolemic patients.</td>
<td></td>
</tr>
<tr>
<td>- May cause life-threatening Respiratory depression</td>
<td></td>
</tr>
<tr>
<td>- CNS depression: Impairs physical and mental abilities</td>
<td></td>
</tr>
</tbody>
</table>

### Dose and Administration

<table>
<thead>
<tr>
<th>Acute pain (moderate-to-severe):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: (Slow)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 0.2-1 mg every 2-3 hours as needed; patients with prior opioid exposure may require higher initial doses.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 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</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Continuous infusion: Usual dosage range: 0.5-3 mg/hour</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute pain (moderate-to-severe):</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: (Slow)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Children: 0.015mg/kg IV q 4-6 PRN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Adolescents &gt;50kg: Refer to adult dosing</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
# HYDROXOCOBALAMIN (Cyanokit®)

**Class / Mechanism of Action**

Antidote; Vitamin

Precursor to Vitamin B₁₂ (cyanocobalamin). Binds cyanide ion to form cyanocobalamin which is excreted within urine.

## Indications

**Labeled Indications:**
- IM: Treatment of pernicious anemia and B₁₂ deficiencies
- IV: (Cyanokit®) Treatment of known or suspected cyanide poisoning

## Contraindications

- No contraindications when treating for suspected or known cyanide poisoning

## Adverse Reactions / Precautions

- May cause transient hypertension (>180mmHG systolic, >110mmHG diastolic)
- Will cause red colored urine and skin

## Dose and Administration:

<table>
<thead>
<tr>
<th>Cyanide Poisonings:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cyanokit®</strong>: Reconstitute each vial with 200 mL of NS (LR and D5W also OK).</td>
<td></td>
<td>Always Reference BROSELOW Tape</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
- Initial: **5 grams** as single infusion given over 15 min
  - Repeat a second 5 gram dose based on severity and clinical response.
  - Maximum cumulative dose: 10 grams

### 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.

## Cyanide Poisonings:

### IV: (Unlabeled Use)
- Initial: **70mg/kg (max 5 grams)** as single infusion given over 15 min
  - 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.
# KETAMINE

## Class / Mechanism of Action

**General Anesthetic**
Dissociative anesthetic; produces a cataleptic like state acting directly on the cortex and limbic system. Onset of action IV: 30-60 seconds; Duration is dose dependent averaging 10-20 minutes.

## Indications

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

**Unlabeled:** Analgesia and sedation

## Contraindications

- Hypersensitivity to ketamine or any component of the formulation
- Conditions that cannot tolerate increases in blood pressure
  - Ex. Hypertensive Head Injury patient with suspected or known elevated ICP and/or spontaneous cerebral hemorrhage
  - 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>Analgesia (unlabeled use):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO Push (over 1 min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 0.1 - 0.2 mg/kg, repeat q 10-30 prn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM/IN Push (over 1 min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 0.5 mg/kg, repeat q 10-30 prn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoTCCC recommendations for analgesia:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 20 mg IV/IO, repeat q 20 min prn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 50 mg IM/IN, repeat q 30 min prn</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Induction of anesthesia (unlabeled dosing):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
<td></td>
</tr>
<tr>
<td>- 1-2 mg/kg</td>
<td></td>
</tr>
</tbody>
</table>

## Maintenance of anesthesia:

<table>
<thead>
<tr>
<th>IV Bolus:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>½ to Full induction</strong> dose every 10-20 minutes</td>
<td></td>
</tr>
<tr>
<td>- 1-2 mg/kg/hr.</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** May be used in combination with anticholinergic agents to decrease hyper salivation.

***Avoid sub-dissociative doses to prevent emergence phenomenon.***

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### KETOROLAC

**Class / Mechanism of Action**

**Nonsteroidal Anti-inflammatory Drug (NSAID)**
Inhibits cyclooxygenase (COX 1 & 2) enzymes, which decreases production of prostaglandin precursors. Provides antipyretic, analgesic, and anti-inflammatory action.

### Indications

**Labeled Indications:** Short term management of moderate to severe acute pain as an opioid alternative.

### Contraindications

- Hypersensitivity to ketorolac, aspirin, other NSAIDs, or any component of the formulation.
- High risk of bleeding, recent history of GI bleeding or perforation, known history of peptic ulcer disease.
  - **Not for use as pain management for battlefield trauma patient!**
- Suspected cerebrovascular bleeding
- Dizziness, Flushing, Diaphoresis, Tremor, Weakness
- Risk of renal failure secondary to volume depletion
- Concurrent use with other NSAIDs

### Adverse Reactions / Precautions

- Inhibits platelet function
- Associated with an increased risk of adverse cardiovascular thrombotic events, including MI and stroke
- May increase risk of GI irritation, inflammation, ulceration, bleeding, and perforation.
- May cause severe bronchospasm in patients with asthma
- May cause new onset hypertension or worsening of existing hypertension.

### Dose and Administration:

<table>
<thead>
<tr>
<th>Pain management (acute; moderately severe):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients ≥50 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM:</td>
<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>• 10-15 mg as a single dose or 15 mg every 6 hours (maximum daily dose: 120 mg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adults ≥65 years and/or adults ≤50 kg</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IM:</td>
<td>• 30 mg as a single dose or 15 mg every 6 hours (maximum daily dose: 60 mg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV:</td>
<td>• 15 mg as a single dose or 15 mg every 6 hours (maximum daily dose: 60 mg)</td>
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<td></td>
</tr>
</tbody>
</table>

| Adolescents >17 years only: | | |
|---------------------------| | |
| • Refer to adult dose | | |
### LABETALOL

**Class / Mechanism of Action**

**Beta Blocker with alpha blocking activity**  
Blocks alpha and beta1/beta2 adrenergic receptor sites. Onset IV: 2-5 minutes

### Indications

**Labeled Indications:** Treatment of hypertension.  
- IV: Treatment of severe hypertension and hypertensive emergencies  
**Unlabeled:**  
- Pre-eclampsia and severe hypertension in pregnancy, hypertension during acute ischemic stroke, and Pediatric hypertension

### Contraindications

- Hypersensitivity to labetalol or any component of the formulation  
- Severe Bradycardia, heart block >1\(^{st}\) 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  
- Patient with bronchospastic diseases (reactive airway) should not use Beta blockers

### Dose and Administration:

<table>
<thead>
<tr>
<th>Acute Hypertension (hypertensive emergency/urgency):</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
</table>
| **Hypertensive Crisis Urgency**  
**Sys: 180-220/Dia: 105-120** | 10 mg IV for 1-2 minutes. May repeat or double q 10 min to max dose of 300mg | Always Reference BROSELOW Tape |
| **Hypertensive Crisis Emergency**  
**Sys: >220/Dia: 121-140** | 10-20 mg IV for 1-2 min; May repeat or double q 10 min to max dose of 300mg. |
| **Continuous Infusion:** | | |
| - If continued medication required, 2mg/min; titrate to desired response up to max 300mg dose. |

**Note:** Goal to lower MAP by no more than 20% within minutes to one hour.

**Hypertension emergencies:**  
- IV Continuous Infusion  
- 0.4-1 mg/kg/hour with a maximum of 3 mg/kg/hour have been used; administration requires the use of an infusion pump.  
- Intermittent bolus doses of 0.3-1 mg/kg/dose have been reported
**LIDOCAINE**

| Lactation Yes (Caution) | Trade Name: Xylocaine(Cardiac) |

### 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 PEDIATRIC

#### 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

**VF/Pulseless VT, Wide Complex Tachycardia (with pulses): (PALS, 2015)**

**IV, IO:**
- Initial dose: 1mg/kg

*2015 AHA ACLS guidelines state: "There is inadequate evidence to support the routine use of lidocaine after cardiac arrest. However, the initiation or continuation of lidocaine may be considered immediately after ROSC from cardiac arrest due to VF/pVT"

### Maintenance Infusion (Adults and Peds):

**IV, IO:** Continuous Infusion
- 1-3 mg/hour (or 20-50 mcg/kg/minute).
LORAZEPAM ♀, Lactation Yes (not recommended)  
Trade Name: Ativan

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)
  o (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:  
ADULT  
PEDIATRIC  
Always Reference BROSELOW Tape

Acute Seizures:
IV:
• 1-2mg over 2-5min. May repeat in 10-15min. Max dose 8mg in 12hr period.

Rapid tranquilization of agitated / combative patient (unlabeled use):
IV, IM:
• 1-2mg every 30-60 minutes; may be used alone or administered with an antipsychotic (i.e. haloperidol)
  o

Acute Seizures / Status epilepticus (unlabeled use):
IV:
• 0.05-0.1 mg/kg; repeat doses every 10-15 minutes for clinical effect. Max 4mg

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 a 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%**

### 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

### 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

**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.

#### 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
# METHYLPREDNISOLONE

**Class / Mechanism of Action**
- Systemic Corticosteroid
- Anti-inflammatory, Immunosuppressant, shock

**Indications**

**Labeled Indications:** Treatment of a variety of diseases: allergic, inflammatory, hematologic, neoplastic, and autoimmune;

**Unlabeled:** None identified unless added by medical direction.

**Contraindications**
- Hypersensitivity to methylprednisolone or any component of the formulation
- No other in emergency setting

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

**Dose and Administration: ADULT**

<table>
<thead>
<tr>
<th>Asthma exacerbations, including status asthmaticus</th>
<th>Allergic Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
<td>IV:</td>
</tr>
<tr>
<td>• 125mg x 1 dose</td>
<td>• 125mg x 1 dose</td>
</tr>
</tbody>
</table>

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

**Dose and Administration: PEDIATRIC**

<table>
<thead>
<tr>
<th>Asthma exacerbations, including status asthmaticus</th>
<th>Allergic Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV:</td>
<td>IV:</td>
</tr>
<tr>
<td>• Children &lt;12 years: 1-2 mg/kg initial dose; followed by 0.5-1 mg/kg q 6 hrs. (maximum: 60 mg/day)</td>
<td>• 2 mg/kg x 1 dose</td>
</tr>
</tbody>
</table>

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

**Trade Name:** Versed

### 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:

**Induction for RSI; Continued sedation; Hyperthermia:**

| IV | 0.1mg/kg IV/IO q 15-30 min PRN |

**Sedation for Transcutaneous Pacing; Cardioversion; Bites/envenomation’s; Seizures (all causes); Combative Pt’s:**

| IV | 2.5-5mg q 15-30 PRN |

**Status epilepticus, prehospital treatment** (unlabeled use):

| IV | 10 mg once for seizures >15min or two or more successive seizures without a period of consciousness / recovery. |

**Procedural sedation; Transcutaneous Pacing; Cardioversion:**

| IV | 0.05-0.1mg/kg q 15-30 PRN |

Intranasal (unlabeled route):

| 0.2-0.5 mg/kg (maximum total dose: 10 mg or 5 mg per nare) |

**Induction/RSI (Not preferred drug)**

| IV | 0.1-0.3 mg/kg |

**Seizure**

| IV, IM | 0.2 mg/kg Q 15-30 PRN |

**Status epilepticus, prehospital treatment** (unlabeled use):

| IV | 13-40 kg: 5 mg once |
| >40 kg: Refer to adult dosing |
### MORPHINE

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th>Opioid Analgesic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Binds to opioid receptors within the CNS increasing pain threshold and altering pain reception; inhibits ascending pain pathways (blocking painful stimulus); produces CNS depression</td>
</tr>
<tr>
<td></td>
<td>Onset: IV variable but rapid, Duration variable, patient dependent.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
<th>Labeled Indications: Moderate to severe acute and chronic pain; pain of myocardial infarction; preanesthetic medication</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
<th>Hypersensitivity to morphine sulphate or any component of the formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Severe respiratory depression</td>
</tr>
<tr>
<td></td>
<td>Acute or severe asthma (in an unmonitored setting or without resuscitative equipment)</td>
</tr>
<tr>
<td></td>
<td>Paralytic ileus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
<th>Always be prepared for use of paralytic and intubation (maintain positive control of airway).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head trauma: Use with extreme caution in head injury, or suspected increased ICP; exaggerated increase in ICP may occur. Some formulations are specifically contraindicated.</td>
</tr>
<tr>
<td></td>
<td>May cause Hypotension, Use with caution in hypovolemic patients.</td>
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<tr>
<td></td>
<td>May worsen Bradycardia</td>
</tr>
<tr>
<td></td>
<td>May cause life-threatening hypoventilation and Reparatory depression</td>
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<tr>
<td></td>
<td>CNS depression: Impairs physical and mental abilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose and Administration:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest Pain/AMI:</td>
<td></td>
<td></td>
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<tr>
<td>IV:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-5 mg q 5-15 min PRN</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Acute pain (moderate-to-severe):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM, SubQ:</td>
<td></td>
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<tr>
<td>5-10 mg 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>
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<tr>
<td>IV: (Slow)</td>
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<tr>
<td>2-3 mg every 5 minutes until pain relief or if associated sedation, oxygen saturation &lt;95%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Acute pain (moderate-to-severe):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM, SubQ:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.1-0.2 mg/kg.</td>
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<tr>
<td>IV: (Slow)</td>
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<td></td>
</tr>
<tr>
<td>0.1-0.2 mg/kg q 120 min PRN, not to exceed 10 mg per dose</td>
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<tr>
<td>Continuous infusion:</td>
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<td></td>
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<tr>
<td>10-30 mcg/kg/hour; titrate PRN for pain</td>
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</tbody>
</table>
# NALOXONE

**Trade Name:** Narcan

**Class / Mechanism of Action**

**Antidote, Opioid Antagonist**
Competes and displaces opioids at opioid receptor sites, reversing narcotic effects.

**Indications**

**Labeled Indications:** Reversal of opioid drug effects, including respiratory depression

**Contraindications**

- Hypersensitivity to naloxone or any component of the formulation

**Adverse Reactions / Precautions**

- When correcting for respiratory depression in a postoperative (intubated patient), carefully titrate the dose to reverse hypoventilation; do not fully awaken patient or reverse analgesic effect.
- Recurrence of respiratory depression is possible continue to watch for respiratory depression until patient hand-off.
- May cause narcotic withdrawal effects

**Dose and Administration:**

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

<table>
<thead>
<tr>
<th><strong>Opioid overdose (with standard PALS protocols):</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM, SubQ:</td>
<td></td>
</tr>
<tr>
<td><strong>&lt;5 years or ≤20 kg (unlabeled dose): 0.1 mg/kg/dose</strong> (maximum dose: 2 mg); repeat every 2-3 minutes PRN</td>
<td></td>
</tr>
<tr>
<td><strong>≥5 years or &gt;20 kg:</strong> Adult Dosing</td>
<td></td>
</tr>
</tbody>
</table>

**Reversal of respiratory depression with therapeutic opioid doses:**

<table>
<thead>
<tr>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV, IM, SubQ:</td>
<td></td>
</tr>
<tr>
<td><strong>0.1-0.4 mg</strong> titrated to adequate respiratory rate. If not improved after 0.8 mg total, look for other cause of respiratory depression.</td>
<td></td>
</tr>
</tbody>
</table>

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

- 0.001-0.015 mg/kg/dose; repeat as needed.
<table>
<thead>
<tr>
<th><strong>NIFEDIPINE</strong></th>
<th><strong>Lactation</strong> Yes (Not Recommended)</th>
<th><strong>Trade Name:</strong> Procardia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class / Mechanism of Action</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Antianginal Agent, Calcium Channel Blocker</strong></td>
<td>Inhibits movement of calcium ion across cell membranes of smooth muscle and myocardium resulting in relaxation of coronary vascular smooth muscle and vasodilation as well as reduced peripheral vascular resistance (reducing blood pressure).</td>
<td></td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Labeled Indications:</strong> Chronic stable or vasospastic angina</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unlabeled:</strong> Prevention and treatment of high altitude pulmonary edema</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hypersensitivity to nifedipine or any component of the formulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cardiogenic Shock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Acute MI</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adverse Reactions / Precautions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Symptomatic hypotension:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bradycardia, nausea</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dose and Administration:</strong></td>
<td><strong>ADULT</strong></td>
<td><strong>PEDIATRIC</strong></td>
</tr>
<tr>
<td><strong>High altitude pulmonary edema</strong> (unlabeled use):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 10 mg every 4-6 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pulmonary hypertension</strong> (unlabeled use)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 30 mg (Extended Release) twice daily; may increase cautiously to 120-240 mg/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Do not use for acute anginal episodes; may precipitate myocardial infarction</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High altitude pulmonary edema</strong> (Not FDA approved for use in children) (unlabeled use):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Immediate release: 0.5 mg/kg/dose (maximum: 20 mg/dose) every 8 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Treatment is needed only necessary if response to oxygen and/or descent is poor.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Nitroglycerin

**Trade Name:** NitroMist/Nitrostat

## Class / Mechanism of Action

**Antianginal agent, Vasodialator**

Induces smooth muscle relaxation and vasodilation of peripheral veins and arteries and coronary arteries thus improving collateral blood flow to ischemic regions of the myocardium. Reduces cardiac oxygen demand by decreasing preload. Onset of action: Sublingual tablet and spray, 1-3 minutes. Duration: 25 minutes.

## Indications

**Labeled Indications:** Treatment or prevention of angina pectoris

## Contraindications

- Hypersensitivity to nitrates or any component of the formulation
- Use with phosphodiesterase-5 inhibitors (Sildenafil, Levitra, Cialis) in previous 48hrs
- Increased intracranial pressure
- Hypotension (SBP <90mmHg or >30mmHg below baseline), Bradycardia <50bpm, Tachycardia without heart failure (>100bpm), and Right ventricular infarction.

## Adverse Reactions / Precautions

- IV/IO access should be placed and SBP should be >110.
  - Use cautiously in cases of chest pain unless inferior wall / right-ventricular MI can be ruled-out by ECG prior to administration
- Can cause severe hypotension with associated paradoxical bradycardia and increased angina
- Use with caution in volume depleted patients
- Do not use for inferior wall MI and suspected right ventricular involvement

## Dose and Administration:

<table>
<thead>
<tr>
<th>Angle/Coronary Artery Disease:</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sublingual:</td>
<td>0.4 mg every 5 minutes for maximum of 3 doses in 15 minutes</td>
<td></td>
</tr>
<tr>
<td>Translingual:</td>
<td>1 spray (0.4mg per spray) onto or under tongue every 3-5 minutes for maximum of 3 doses in 15 minutes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHF Related Respiratory Distress:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sublingual:</td>
<td>0.4 mg every 5 minutes for maximum of 3 doses in 15 minutes as long as SBP:&gt;90</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHF or Cardiogenic Shock:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV Drip:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children:</td>
<td>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)</td>
<td></td>
</tr>
<tr>
<td>Adolescents:</td>
<td>5-10 mcg/min (not per kg) (max 200 mcg/min)</td>
<td></td>
</tr>
</tbody>
</table>

**CHF Related Respiratory Distress: PO:**
- 0.4 mg q 5min if SBP > 70 + 2 x Age

**CHF or Cardiogenic Shock:**

- 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 Related Respiratory Distress:**

- 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:**

- 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**  
-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 Vesicant; ensure proper catheter placement and avoid extravasation, use a large vein (preferably a central line) and avoid leg veins.
- Assure adequate circulatory volume to minimize need for vasoconstrictors. Monitor BP closely, avoid hypertension and adjust infusion rate as needed.

### Dose and Administration:

<table>
<thead>
<tr>
<th><strong>Hypotension/shock:</strong></th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IV: Administer as continuous infusion with infusion pump. Do not use in same line as sodium bicarbonate. It will inactivate norepinephrine.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initial: <strong>8-12 mcg/minute</strong>; titrate to effect.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Maintenance: <strong>2-4 mcg/minute</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Post ROSC Hypotension:** | | |
|---------------------------| | |
| • Initial: **0.1-0.5 mcg/kg/minute** titrate to effect. | | |

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.

### Mixing Norepinephrine Solution:

- Mix 4 mg norepinephrine in 500mL D5W for a concentration of 8mcg/mL
- OR
  - 4mg norepinephrine in 250mL D5W to make 16mcg/mL.
  
To titrate, ↑ rate by 0.5mcg/min every >2 minutes.
**ONDANSETRON** *(B, Lactation? (Caution) Trade Name: 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:

<table>
<thead>
<tr>
<th>Nausea and Vomiting</th>
<th>ADULT</th>
<th>PEDIATRIC</th>
<th>Always Reference BROSELOW Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/IO/IM/PO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4-8 mg</strong></td>
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</tr>
</tbody>
</table>

**Treatment of severe or refractory hyperemesis gravidum** (unlabeled use):

**IV:**
- **8 mg** administered over 15 minutes every 12 hours

**Nausea and Vomiting** (Children 1 month to 12 years):

**IV:**
- ≤40 kg: **0.1 mg/kg** as a single dose over 2-5 minutes
- >40 kg: **4 mg** as a single dose over 2-5 Minutes
# PHENYLEPHRINE

**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:

#### ADULT

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

<table>
<thead>
<tr>
<th>Hypotension / Shock:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV Infusion:</strong></td>
<td></td>
</tr>
<tr>
<td>100 mcg/min; titrate to MAP &gt; 60 mm Hg.</td>
<td></td>
</tr>
<tr>
<td>o To titrate, increase rate by 10 mcg/min every 2 minutes.</td>
<td></td>
</tr>
<tr>
<td>o Maximum dose is 200 mcg/min.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypotension / Shock:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maintenance infusion:</strong></td>
<td></td>
</tr>
<tr>
<td>Rate of 40-60 mcg/min after BP stabilizes.</td>
<td></td>
</tr>
</tbody>
</table>

### PEDIATRIC

**Always Reference BROSELOW Tape**

<table>
<thead>
<tr>
<th>Hypotension / Shock:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV Push:</strong></td>
<td></td>
</tr>
<tr>
<td>5-20 mcg/kg/dose</td>
<td>every 10-15 minutes as needed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypotension / Shock:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV Infusion:</strong></td>
<td></td>
</tr>
<tr>
<td>0.1-0.5 mcg/kg/minute</td>
<td></td>
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</tbody>
</table>

### Mixing Norepinephrine 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.

---

192
<table>
<thead>
<tr>
<th>PRALIDOXIME CHLORIDE</th>
<th>C, Lactation? (Caution)</th>
<th>Trade: 2-Pam Chloride</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class / Mechanism of Action</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antidote for organophosphate anticholinesterase poisoning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak plasma concentration following IM dose is reached in approximately 30 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labeled Indications:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Organophosphate Pesticide Poisoning: Used with Atropine to reverse muscle paralysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Chemical Warfare Agent Poisoning: Used with Atropine for treatment of nerve agent (e.g., sarin, soman, tabun, VX [methylphosphonothioic acid])</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None in emergency setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adverse Reactions / Precautions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Not effective in exposure to phosphorus, inorganic phosphates, or organophosphates that do not possess anticholinesterase activity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Consider cautions and adverse reactions of Atropine when using together</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Monitor BP and cardiac rhythm</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dose and Administration:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pesticide Poisoning:</strong></td>
<td><strong>ADULT</strong></td>
<td><strong>PEDIATRIC</strong></td>
</tr>
<tr>
<td>Mild symptoms: miosis or blurred vision, tearing, runny nose, hypersalivation or drooling, wheezing, muscle fasciculations, nausea/vomiting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe symptoms: behavioral changes, severe breathing difficulty, severe respiratory secretions, severe muscle twitching, involuntary defecation or urination, seizures, unconsciousness.</td>
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<td></td>
</tr>
<tr>
<td><strong>Chemical Warfare Agent Poisoning:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild to moderate symptoms: localized sweating, muscle fasciculations, nausea, vomiting, weakness, and/or dyspnea</td>
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<td></td>
</tr>
<tr>
<td>Severe symptoms: apnea, flaccid paralysis, seizures, and/or unconsciousness</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DOSING:</strong></td>
<td></td>
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</tr>
<tr>
<td>Auto-injector: IM into anterolateral aspect of thigh and hold in place for 10 seconds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- DuoDote®, ATNAA: For ≥2 mild symptoms, inject single dose. If severe symptoms develop, inject 2 additional doses in rapid succession.</td>
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<td></td>
</tr>
<tr>
<td>- DuoDote®, ATNAA: For severe symptoms, utilize 3 auto-injectors (total dose: atropine 6.3 mg and pralidoxime chloride 1800 mg) in rapid succession.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> DuoDote® and ATNAA auto-syringe provides a sequential single IM dose of atropine 2.1 mg and pralidoxime chloride 600 mg through one needle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chemical Warfare Agent Poisoning:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organophosphate Anticholinesterase Nerve Agents:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Children 0–10 years of age and adolescents &gt;10 years of age who present with mild/moderate symptoms: 15 mg/kg.</td>
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<td></td>
</tr>
<tr>
<td>- Children 0–10 years of age and adolescents &gt;10 years of age who present with severe symptoms: 25 mg/kg.</td>
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</tr>
</tbody>
</table>
# 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</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>
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</tr>
<tr>
<td>• May repeat 12.5mg once after 10 minutes if first dose ineffective</td>
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<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

### Lactation
Yes (Not Recommended)

### Trade Name:
Diprivan

### Class / Mechanism of Action

**General Anesthetic**
Lipophilic intravenous general anesthetic.
Onset of action IV bolus: 9-51 seconds (average 30 seconds), Duration is dose and rate dependent: 3-10 minutes, prolonged with continued doses

### Indications

**Labeled Indications:** Induction of anesthesia in patients ≥3 years of age; maintenance of anesthesia in patients >2 months of age; sedation in intubated, mechanically-ventilated ICU patients

### Contraindications

- Hypersensitivity to propofol or any component of the formulation
- Allergy to eggs, egg products, soybeans, soy products, and peanuts.

### Adverse Reactions / Precautions

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

### Dose and Administration:

<table>
<thead>
<tr>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sedation/ RSI:</strong> (For use in intubated patients only)</td>
<td><strong>Sedation/ RSI:</strong> (For use in intubated patients only)</td>
</tr>
<tr>
<td>IV Push:</td>
<td>IV Push:</td>
</tr>
<tr>
<td>• 0.5-1.5 mg/kg every 5-10min PRN.</td>
<td>• 3 mg/kg every 5-10min PRN.</td>
</tr>
<tr>
<td><strong>Maintenance of general anesthesia:</strong></td>
<td><strong>Maintenance of general anesthesia,</strong></td>
</tr>
<tr>
<td>IV Infusion:</td>
<td>IV Infusion:</td>
</tr>
<tr>
<td>• 10-50 mcg/kg/min via infusion pump or Dial-a-Drip. Titrate to minimum effective dose.</td>
<td>Healthy children 2 months to 16 years:</td>
</tr>
<tr>
<td>o MAX DOSE: 100 mcg/kg/min.</td>
<td>• 125-300 mcg/kg/minute (or 7.5-18 mg/kg/hour)</td>
</tr>
</tbody>
</table>

**CAUTION:** Administration of a Propofol drip during rotary wing operations can be problematic; Alaris III is unreliable in the UH-60 (especially with Propofol) and dosages often need to be increased secondary to increased patient stimulation with resultant negative hemodynamic effects (hypotension).
- Use of Dial-a-Drip tubing in the absence of an infusion pump will increase accuracy of infusion dosage.

Note: Wait 3-5 minutes between dosage changes to clinically assess drug effects. Smaller doses are required when used with opioids.
### 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><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></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>Army Rotary wing RSI and maintenance bolus dosing:</strong></td>
<td><strong>Army Rotary wing RSI and maintenance bolus dosing:</strong></td>
</tr>
<tr>
<td>(unlabeled and unreferenced dose)</td>
<td>(unlabeled and unreferenced dose)</td>
</tr>
<tr>
<td>IV Push:</td>
<td>IV Push:</td>
</tr>
<tr>
<td>• 1mg/kg every 30-45 minutes</td>
<td>• 1mg/kg every 30-45 minutes</td>
</tr>
<tr>
<td><strong>ICU paralysis (eg, facilitate mechanical ventilation):</strong></td>
<td><strong>Maintenance for continued surgical relaxation:</strong></td>
</tr>
<tr>
<td>IV:</td>
<td>IV:</td>
</tr>
<tr>
<td>• Initial bolus dose: 0.6-1 mg/kg,</td>
<td>• Bolus: 0.075-0.15 mg/kg</td>
</tr>
<tr>
<td>• Maintenance: continuous infusion of 8-12 mcg/kg/minute</td>
<td>o Redosing interval is guided by monitoring with a peripheral nerve stimulator or</td>
</tr>
<tr>
<td><strong>Note:</strong> Loading dose of 50 mg followed by 25 mg given when peripheral nerve stimulation returns has been described.</td>
<td>• Continuous infusion: 7-12 mcg/kg/minute</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>(0.42-0.72 mg/kg/hour)</td>
</tr>
<tr>
<td>o 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>
<td></td>
</tr>
</tbody>
</table>
### 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>TriCyclic Antidepressant OD</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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 mEq/kg; May repeat to maintain QRS &lt;100</td>
<td></td>
<td></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>
</tr>
</thead>
<tbody>
<tr>
<td>1 mEq/kg/dose; repeat doses should be guided by arterial blood gases</td>
<td>Follow Adult Dosing</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 (eg, metabolic acidosis, hyperkalemia, or tricyclic antidepressant overdose), sodium bicarbonate may be beneficial.

**Hyperkalemia (ACLS Guidelines, 2015)**  

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

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

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depolarizing Neuromuscular Blocking Agent (Paralytic)</strong></td>
</tr>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> Rapid sequence and routine endotracheal intubation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypersensitivity to succinylcholine or any component of the formulation</td>
</tr>
<tr>
<td>• Acute phase of injury following major burns, multiple trauma (greater than 5 days after injury)</td>
</tr>
<tr>
<td>• Myopathies associated with elevated serum creatine phosphokinase and myasthenia gravis</td>
</tr>
<tr>
<td>• <strong>DO NOT USE IN PATIENTS WITH BURNS, CRUSH INJURIES, OR HYPERKALEMIA</strong></td>
</tr>
<tr>
<td>• Re-Dosing is not advised due to increased risk of Hyperkalemia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reactions / Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• May cause Bradycardia, Malignant hyperthermia, and increased intraocular pressure</td>
</tr>
<tr>
<td>• 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.</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>Dose and Administration:</th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RSI / Neuromuscular blockade:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1-1.5 mg/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Pretreatment with 10% dosage of non-depolarizing agents prior to neuromuscular-blockade with Succinylcholine is <strong>NO LONGER ADVISED</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| RSI / Neuromuscular blockade: | | |
| IV: | | |
| • <10kg: | | |
| o Initial: **1.5-2 mg/kg/dose** | | |
| • >10kg: | | |
| o Initial: **1-1.5 mg/kg/dose** | | |

**Note:** Pretreatment with 10% dosage of non-depolarizing agents prior to neuromuscular-blockade with Succinylcholine is **NO LONGER ADVISED**
<table>
<thead>
<tr>
<th><strong>Class / Mechanism of Action</strong></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><strong>Indications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labeled Indications:</strong> 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><strong>Contraindications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypersensitivity to thiamine 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>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><strong>Dose and Administration:</strong></th>
<th><strong>ADULT</strong></th>
<th><strong>PEDIATRIC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMS; Seizure; Syncope; Malnutrition; Vomiting and Diarrhea; w/ Hx of ETOH abuse:</strong></td>
<td></td>
<td>Always Reference BROSELOW Tape</td>
</tr>
<tr>
<td>IM/IV:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100mg/day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>AMS or Seizure w/ signs of Malnutrition:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IM/IV:</td>
</tr>
<tr>
<td>25mg/day</td>
</tr>
</tbody>
</table>
## TRANEXAMIC ACID

<table>
<thead>
<tr>
<th>Class / Mechanism of Action</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antifibrinolytic Agent, Hemostatic Agent</strong></td>
<td></td>
</tr>
<tr>
<td>Displaces plasminogen from fibrin resulting in inhibition of fibrinolysis and inhibits the proteolytic activity of plasmin</td>
<td></td>
</tr>
</tbody>
</table>

### Indications

- **Labeled Indications:**
  - Trauma-associated hemorrhage

- **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:

#### Trauma-associated hemorrhage (unlabeled use):

- **IV:**
  - **Initial Dose:** 1 gram of TXA in 100 cc NS or LR **ASAP**, but **NOT** later than 3 hours after injury
  - **Follow-up dose:** 1 gram of TXA over the next 8 hours following blood, Hextend, or other fluid treatment to attain hemodynamic stability.

- **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.
**VECURONIUM**

**Class / Mechanism of Action**

*Nondepolarizing Neuromuscular Blocking Agent (Paralytic)*

Blocks acetylcholine from binding to motor neuron receptors inhibiting depolarization. Onset of action IV: 1.5-3 minutes, Duration: approximately 25-40 minutes

**Indications**

*Labeled Indications:* Endotracheal intubation, facilitates mechanical ventilation in ICU patients

**Contraindications**

- Hypersensitivity to vecuronium 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></th>
<th>ADULT</th>
<th>PEDIATRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rapid sequence intubation (RSI) and maintenance of paralysis:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Push:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Induction:</td>
<td>0.1 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Maintenance:</td>
<td>0.1 mg/kg every 30-60 minutes PRN</td>
<td></td>
</tr>
<tr>
<td>IV Continuous infusion:</td>
<td>1 mcg/kg/min and titrate to 2:4 train of four (TOF) if stimulation devise is available.</td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>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>Note:</td>
<td>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>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rapid sequence intubation (RSI) and maintenance of paralysis:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Push:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Induction:</td>
<td>0.1-0.15 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intermittent bolus dosing:</td>
<td>0.1 mg/kg every 30-60 minutes PRN</td>
<td></td>
</tr>
<tr>
<td>IV Continuous infusion:</td>
<td>1-2.5 mcg/kg/minute</td>
<td></td>
</tr>
</tbody>
</table>
## Fluid volume for Dilution

<table>
<thead>
<tr>
<th>Drug Dose</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>1mcg</td>
<td>0.02mcg/ml</td>
<td>0.01mcg/ml</td>
<td>0.005mcg/ml</td>
<td>0.002mcg/ml</td>
<td>0.001mcg/ml</td>
<td>0.005mcg/ml</td>
<td>0.002mcg/ml</td>
<td>0.001mcg/ml</td>
</tr>
<tr>
<td>5mcg</td>
<td>0.2mcg/ml</td>
<td>0.1mcg/ml</td>
<td>0.05mcg/ml</td>
<td>0.02mcg/ml</td>
<td>0.01mcg/ml</td>
<td>0.05mcg/ml</td>
<td>0.02mcg/ml</td>
<td>0.01mcg/ml</td>
</tr>
<tr>
<td>10mcg</td>
<td>1mcg/ml</td>
<td>0.5mcg/ml</td>
<td>0.25mcg/ml</td>
<td>0.1mcg/ml</td>
<td>0.05mcg/ml</td>
<td>0.02mcg/ml</td>
<td>0.01mcg/ml</td>
<td>0.005mcg/ml</td>
</tr>
<tr>
<td>25mcg</td>
<td>5mcg/ml</td>
<td>2.5mcg/ml</td>
<td>1.25mcg/ml</td>
<td>0.5mcg/ml</td>
<td>0.25mcg/ml</td>
<td>0.1mcg/ml</td>
<td>0.05mcg/ml</td>
<td>0.025mcg/ml</td>
</tr>
<tr>
<td>50mcg</td>
<td>10mcg/ml</td>
<td>5mcg/ml</td>
<td>2.5mcg/ml</td>
<td>1mcg/ml</td>
<td>0.5mcg/ml</td>
<td>0.2mcg/ml</td>
<td>0.1mcg/ml</td>
<td>0.05mcg/ml</td>
</tr>
<tr>
<td>100mcg</td>
<td>20mcg/ml</td>
<td>10mcg/ml</td>
<td>5mcg/ml</td>
<td>2mcg/ml</td>
<td>1mcg/ml</td>
<td>0.4mcg/ml</td>
<td>0.2mcg/ml</td>
<td>0.1mcg/ml</td>
</tr>
<tr>
<td>250mcg</td>
<td>50mcg/ml</td>
<td>25mcg/ml</td>
<td>12.5mcg/ml</td>
<td>5mcg/ml</td>
<td>2.5mcg/ml</td>
<td>1mcg/ml</td>
<td>0.5mcg/ml</td>
<td>0.25mcg/ml</td>
</tr>
<tr>
<td>500mcg</td>
<td>1mg/ml</td>
<td>0.5mg/ml</td>
<td>0.25mg/ml</td>
<td>0.1mg/ml</td>
<td>0.05mg/ml</td>
<td>0.025mg/ml</td>
<td>0.01mg/ml</td>
<td>0.005mg/ml</td>
</tr>
<tr>
<td>1mg</td>
<td>0.2mg/ml</td>
<td>0.1mg/ml</td>
<td>0.05mg/ml</td>
<td>0.02mg/ml</td>
<td>0.01mg/ml</td>
<td>0.005mg/ml</td>
<td>0.002mg/ml</td>
<td>0.001mg/ml</td>
</tr>
<tr>
<td>2mg</td>
<td>0.4mg/ml</td>
<td>0.2mg/ml</td>
<td>0.1mg/ml</td>
<td>0.05mg/ml</td>
<td>0.02mg/ml</td>
<td>0.01mg/ml</td>
<td>0.005mg/ml</td>
<td>0.002mg/ml</td>
</tr>
<tr>
<td>3mg</td>
<td>0.6mg/ml</td>
<td>0.3mg/ml</td>
<td>0.15mg/ml</td>
<td>0.075mg/ml</td>
<td>0.0375mg/ml</td>
<td>0.01875mg/ml</td>
<td>0.009375mg/ml</td>
<td>0.0046875mg/ml</td>
</tr>
<tr>
<td>4mg</td>
<td>0.8mg/ml</td>
<td>0.4mg/ml</td>
<td>0.2mg/ml</td>
<td>0.1mg/ml</td>
<td>0.05mg/ml</td>
<td>0.025mg/ml</td>
<td>0.01mg/ml</td>
<td>0.005mg/ml</td>
</tr>
<tr>
<td>5mg</td>
<td>1mcg/ml</td>
<td>0.5mg/ml</td>
<td>0.25mg/ml</td>
<td>0.1mg/ml</td>
<td>0.05mg/ml</td>
<td>0.025mg/ml</td>
<td>0.01mg/ml</td>
<td>0.005mg/ml</td>
</tr>
<tr>
<td>6mg</td>
<td>1.2mg/ml</td>
<td>0.6mg/ml</td>
<td>0.3mg/ml</td>
<td>0.15mg/ml</td>
<td>0.075mg/ml</td>
<td>0.0375mg/ml</td>
<td>0.01875mg/ml</td>
<td>0.009375mg/ml</td>
</tr>
<tr>
<td>7mg</td>
<td>1.4mg/ml</td>
<td>0.7mg/ml</td>
<td>0.35mg/ml</td>
<td>0.175mg/ml</td>
<td>0.0875mg/ml</td>
<td>0.04375mg/ml</td>
<td>0.021875mg/ml</td>
<td>0.0109375mg/ml</td>
</tr>
<tr>
<td>8mg</td>
<td>1.6mg/ml</td>
<td>0.8mg/ml</td>
<td>0.4mg/ml</td>
<td>0.2mg/ml</td>
<td>0.1mg/ml</td>
<td>0.05mg/ml</td>
<td>0.025mg/ml</td>
<td>0.01mg/ml</td>
</tr>
<tr>
<td>9mg</td>
<td>1.8mg/ml</td>
<td>0.9mg/ml</td>
<td>0.45mg/ml</td>
<td>0.225mg/ml</td>
<td>0.1125mg/ml</td>
<td>0.05625mg/ml</td>
<td>0.028125mg/ml</td>
<td>0.0140625mg/ml</td>
</tr>
<tr>
<td>10mg</td>
<td>2mg/ml</td>
<td>1mg/ml</td>
<td>0.5mg/ml</td>
<td>0.25mg/ml</td>
<td>0.125mg/ml</td>
<td>0.0625mg/ml</td>
<td>0.03125mg/ml</td>
<td>0.015625mg/ml</td>
</tr>
<tr>
<td>15mg</td>
<td>3mg/ml</td>
<td>1.5mg/ml</td>
<td>0.75mg/ml</td>
<td>0.375mg/ml</td>
<td>0.1875mg/ml</td>
<td>0.09375mg/ml</td>
<td>0.046875mg/ml</td>
<td>0.0234375mg/ml</td>
</tr>
<tr>
<td>25mg</td>
<td>5mg/ml</td>
<td>2.5mg/ml</td>
<td>1.25mg/ml</td>
<td>0.625mg/ml</td>
<td>0.3125mg/ml</td>
<td>0.15625mg/ml</td>
<td>0.078125mg/ml</td>
<td>0.0390625mg/ml</td>
</tr>
<tr>
<td>50mg</td>
<td>10mg/ml</td>
<td>5mg/ml</td>
<td>2.5mg/ml</td>
<td>1mg/ml</td>
<td>0.5mg/ml</td>
<td>0.25mg/ml</td>
<td>0.125mg/ml</td>
<td>0.0625mg/ml</td>
</tr>
<tr>
<td>75mg</td>
<td>15mg/ml</td>
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<td>3.75mg/ml</td>
<td>1.875mg/ml</td>
<td>0.9375mg/ml</td>
<td>0.46875mg/ml</td>
<td>0.234375mg/ml</td>
<td>0.1171875mg/ml</td>
</tr>
<tr>
<td>100mg</td>
<td>20mg/ml</td>
<td>10mg/ml</td>
<td>5mg/ml</td>
<td>2.5mg/ml</td>
<td>1mg/ml</td>
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<td>0.25mg/ml</td>
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<td>250mg</td>
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<td>12.5mg/ml</td>
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<td>3.125mg/ml</td>
<td>1.5625mg/ml</td>
</tr>
</tbody>
</table>

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

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

1mg=1000mcg  
0.1mg=100mcg  
0.01mg=10mcg
<table>
<thead>
<tr>
<th>Drug</th>
<th>Amiodarone</th>
<th>Epinephrine</th>
<th>Etomidate</th>
<th>Fentanyl</th>
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<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>
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</tbody>
</table>
VIII. USEFUL CALCULATIONS

**PEDIATRIC FORMULAS:**

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

**MEDICATION FORMULAS:**

- **\(\text{mcg/kg/min (micrograms/kilogram/minute)}\)** = \([16.7 \times \text{Drug Concentration (mg/ml)} \times \text{infusion rate (ml/h)}]\) Weight (kg).
- **INFUSION RATE (ml/h)** = \([\text{Desired mcg/kg/min} \times \text{Weight (kg)} \times 60]/\text{Drug concentration (mcg/mL)}\)

**HEMODYNAMIC FORMULAS:**

- **MAP**: Mean Arterial Pressure = \([(2 \times \text{DBP}) + \text{SBP}]/3\).
- **SBP** = (Systolic Blood Pressure)
- **DBP** = (Diastolic Blood pressure)
- / = (Divided by)
- **PULSE PRESSURE**: 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 \times 2.2 or kg = lbs. \times 0.45
- Fahrenheit = (Celsius \times 1.8) + 32 or Celsius = (Fahrenheit -32) \times 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
Length of Use for Compressed O2 Cylinders: Approx. Guide

<table>
<thead>
<tr>
<th>Cylinder</th>
<th>D</th>
<th>E</th>
<th>G</th>
<th>H</th>
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<tr>
<td>Liters</td>
<td>356</td>
<td>622</td>
<td>5260</td>
<td>6900</td>
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<tr>
<td>Flow (LPM)</td>
<td>Length of use (min)</td>
<td>Length of use (min)</td>
<td>Length of use (min)</td>
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<td>41</td>
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NOTE: Current MEDEVAC Oxygen Cylinder is “D” type.

To estimate duration of use for Oxygen Cylinders:

- Duration of Flow = Contents of cylinder / Flow rate.

Cylinder Factors for Calculation of Duration of Oxygen Flow:

- **Cylinder Size**  D  E  G  H and K
  - **Factor**  0.16  0.28  2.41  3.14

Once you have the cylinder factor and the amount of pressure remaining in the cylinder, the duration of flow can be calculated with the following equation.

**Duration of flow (min) = Pressure (psig) x Cylinder Factor/Flow (L/min)**
IX. COMMON LABORATORY VALUES

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<th>Laboratory</th>
<th>Conventional</th>
<th>SI Units</th>
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<td>Anion Gap</td>
<td>8-16 mEq/L</td>
<td>8-16 mmol/L</td>
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<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>
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<tr>
<td>Carbon Dioxide</td>
<td>24-30 mEq/L</td>
<td>24-30 mmol/L</td>
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<tr>
<td>Creatine</td>
<td>Male: 0.2-0.5 mg/dL</td>
<td>Female: 0.3-0.9 mg/dL</td>
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<tr>
<td>Creatine Kinase</td>
<td>Male: 17-40 U/L</td>
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<tr>
<td></td>
<td>Female: 10-79 U/L</td>
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<td>Creatinine</td>
<td>0.6-1.5 mg/100L</td>
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<td>Potassium</td>
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<tr>
<td>INR</td>
<td>0.8-1.2</td>
<td>Treatment/prophylaxis, DVT, 2.0-3.0</td>
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</tbody>
</table>

HEMATOLOGY

| Hemoglobin          | Male: 13-18 g/100 mL |
|                     | Female: 12-16 g/100mL |
| Hematocrit          | Male: 45-52%        |
|                     | Female: 37-48%      |

CARDIAC MARKERS

| *Troponin I         | Onset: 4-6 hrs. |
|                     | Peak: 12-24 hrs. |
| *Troponin T         | Onset: 3-4 hrs. |
|                     | Peak: 10-24 hrs. |
| Myoglobin           | M: 10-95 ng/ml   |
|                     | F: 10-65 ng/ml   |
|                     | Onset: 1-3 hrs.  |
|                     | Peak: 6-10 hrs.  |

NORMAL BLOOD GASES

|                     | pH 7.35-7.45 |
|                     | Pco2 35-45 mm Hg |
|                     | HCO3 22-26 mmol/L |
|                     | Base excess (-2)-(+2) mEq/L |
|                     | CO2 19-24 mEq/L |
|                     | SaO2 96-100%   |

*Troponin assays are becoming more analytically sensitive. Each device has different reference ranges associated. Correlate cTn with reference lab. Point of care readers are less sensitive.
X. DOCUMENTATION AND FORMS

DD 1380 (Tactical Combat Casualty Care (TCCC) Card)
***All medical providers should indicate their level of training after their name (e.g., CCFP, RN, APA/ANP, MD/DO)
EXAMPLE: DA FORM 4700, FEB 2003 JTS TACEVAC AAR & PCR OP 05 (MCMR-SRJ) NOV 2014

MEDICAL RECORD-SUPPLEMENTAL MEDICAL DATA

REPORT TITLE
Tactical Evacuation After Action Report & Patient Care Record, Page 1

Event: Date 09/11/2011 Time 11:35

A-Line 1135 Platform MEDVAC

Dispatch Cat: Urgent: 1

Assumed Cat: Priority: 2

TraumaNIST: Wounds: GSW Right upper thigh

Signs & Symptoms: Pressure dressing

Remarks: No Tourniquet to right upper thigh due to low blood loss and superficial nature of the entrance and exit wound

Pickup: Time 12:16 Reason: 1-pair Other: Region Other: Location Other:

Dropoff: Time 1231 Rate: 2 Other: Region Other: Location Other:

Capability: EMT-B EMT-I EMT-P EMT-PCC RN CRNA PA MD DO Other:

Circulation-Reperfusion Control

Direct Pressure

Hemostatic Dressing

Kerlex Dressing

Pressure Dressing

Other

Airway

Self NPA OPA ORAL TRACH ETTO SCAG Type

Tube Size Pos O Yes Continued JS Vis ETCO2

O2 Source: HC NIBR IVAM Vent: FPR

Intubated: Prior to transport By transport crew Suction ETTO Yaw:

Breathing

Needle Decompression

Chest X-Ray and Ribs

Time: R L Mid-axillary Mid-clavicular

Respiratory Eff: Y N N/A

Time: R L Mid-axillary Mid-clavicular Respiratory Eff

Chest Tube: Time: R L

Vent Settings

Initial Mode: Rate: TV: PEEP: FIO2: ETCO2:

Change: Time: Mode: Rate: TV: PEEP: FIO2: ETCO2:

Circulation-Assessment

Rhythm: Normal SVT

Pulse: A D+1+4+4+4

Transfusion Indication:

Blood Transfusion Time: Component: ABO/Rh Unit Number:

DOB Date Blood Age

Arterial Line

Central Line Location:

Peripheral

IO Type/Route:

Transfusion Site: Infusion Line: Other

Central Venous Line: Location:

DOCUMENTATION:

Prepared by: Lare Johnson, EMT, Flight Paramedic

Department/Service/Clinic: Flight Unit: C Co 6-101 GSAB

Date: 09/11/2011

Patients Identification (Name: Last First Middle): Roth Maxwell

Last Name: Roth First Name: Maxwell

RR: 2070 Rank: SPC Unit: A Co 7-145th Inf

SSN: 123-45-6789 DOB: 07/07/1985 Gender: Female

AL: 00 Other: None

MOS: 1200 Other: None

OTHER: None

DA FORM 4700, FEB 2003 EDITION OF MAY 70 ID OBSOLETE JTS TACEVAC AAR & PCR OP 05 (MCMR-SRJ) NOV 2014
Patient picked up in stable condition already on litter. Patient L/E established Right AC prior to arrival by ground medics. Once patient in AC placed in HPMK blanket and hooked up monitoring device. Conducted focused exam and gave initial dose of ketamine 25mg and ondansetron 4mg. Reinforced pressure dressing on right upper thigh. Blood controlled with pressure dressing. Patient experienced pain relief after 5 minutes. Vital signs stable throughout flight and trended downward. Patient successfully handed off to ER trauma section.
### Tactical Evacuation - After Action Report & Patient Care Record

**Causalities Protective Equipment (Check all worn)**

- Helmet, Ballistic
- Plate Front
- Plate Back
- Neck Protector (Back)
- Groin Shield
- Elast Gauge
- Tactical Vest (IOTV)
- Plate Right Side
- Throat Protector (Front)
- Pelvic Undergarment Tier 1
- Elast Sensor Helmet
- Eye Protection
- Plate Left Side
- Deltoid Right
- Pelvic Undergarment Tier 2
- Elast Sensor Other
- Ear Protection
- Deltoid Left

**AAR Discussion**

Event Date: 06/01/2011

- Tactical situation complicated care (Explain in discussion)

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### Sustains

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>M/F</th>
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<td>Robert</td>
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<td>0020</td>
<td>SPC</td>
<td>A Co 2-345 Inf Bn</td>
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**Allergy**

- NKA
- Other

---

**Improves**

The National Defense Authorization Act for Fiscal Year 1997 (Public Law [P.L.] No. 105-85, section 1102, Title VI, 10 USC 1102) specifies that the information in this report is exempt from release to the public under the Freedom of Information Act.
EXAMPLE Standing Order Sheet for Critical Care Patient Transfers 2016

PAGE 1

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____ml/hr
[ ] 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 (1 of 3)**

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

**Date & Time of Injury**

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<tr>
<th>BAMC/ISR Burn Team DSN 312-429-2876: Yes No</th>
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<tr>
<th>Tx Site/Team</th>
<th>HR from burn</th>
<th>Local Time</th>
<th>Crystalloid* (LR)</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 (6-8 mmHg)</th>
<th>Pressors (Vasopressin 0.04 u/min)</th>
<th>Bladder Pressure (Q4)</th>
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**Total Fluids:**

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*Guideline Only/Not a Substitute for Clinical Judgment*
## MEDEVAC REQUEST FORM

### LINE ITEM

<table>
<thead>
<tr>
<th>LINE</th>
<th>ITEM</th>
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<tbody>
<tr>
<td>1</td>
<td>Location of Pickup Site.</td>
</tr>
<tr>
<td>2</td>
<td>Radio Freq., 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 (Peace time).</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 (Peace time).</td>
</tr>
</tbody>
</table>

### EXPLANATION

- **1. Location of Pickup Site.** 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).

- **2. Radio Frequency, Call Sign, Suffix.** 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.

- **3. No. of Patients by Precedence.** Report only applicable info & 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 “break” between each category.)


- **5. No. of Patients by Type.** Report only applicable information and encrypt brevity code. If requesting MEDEVAC for both types, insert the word “break” between the litter entry and ambulatory entry. L + # of Pnt-Litter, A + # of Pnt - Ambul (flooring).

- **6. Security Pickup Site (Wartime).** N = No enemy troops in area, P = Possibly enemy troops in area (approach with caution), E = Enemy troops in area (approach with caution), X = Enemy troops in area (armed escort required).

- **6. Number and Type of Wound, Injury, Illness (Peace time).** Specific information regarding patient wounds by type (gunshot or shrapnel). Report serious bleeding, along with patient blood type, if known.

- **7. Method of Marking Pickup Site.** Encrypt the brevity codes. A = Panels, B = Pyrotechnic signal, C = Smoke Signal, D = None, E = Other.

- **8. Patient Nationality and Status.** Number of patients in each category need not be transmitted. Encrypt only applicable brevity codes. A = US military, B = US civil, C = Non-US mil, D = Non-US civilian, E = EPW.

- **9. NBC Contamination (Wartime).** Include this line only when applicable. Encrypt the applicable brevity codes. N = nuclear, B = biological, C = chemical.

- **9. Terrain Description (Peace time).** 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).

Reference: FM 8-10-6, Medical Evacuation in a Theater of Operations, pages 7-7 through 7-9.
Addendum Page for Unit Level Flight Surgeon/ Aeromedical Physician Assistant
XI. 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.